Review of capital and operating expenditure plans for the Water Corporation

Report

3606-23

Prepared for
Economic Regulation Authority of Western Australia

17 August 2017

Cardno
Shaping the Future

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Executive Summary

Background and purpose

The Economic Regulation Authority of Western Australia was requested by the Treasurer of Western Australia in October 2016 to undertake an inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and Busselton Water. The Authority is to inquire into the efficient costs for the services of the Water Corporation, Aqwest and Busselton Water for the five year period commencing 2018/19.

The purpose of this Review is to provide advice to ERAWA on the prudence and efficiency of Water Corporation's proposed capital and operating expenditure as well as the prudence and efficiency of historical capital expenditure.

Scope

There are four complementary elements of scope in the brief set by the Authority:

> Review of governance arrangements

> Detailed review of capital and operating expenditure forecasts

> Review of actual and forecast capital expenditure

> Review treatment of disposed assets.

Review of governance arrangements

The Authority requires that as an initial task, the systems and processes used by the water corporations to manage capital and operating expenditure are evaluated. The purpose of this review is to determine whether these systems and processes can be relied upon to generate expenditure that is prudent (or will be prudent for future expenditure).

Detailed review of capital expenditure and operating expenditure forecasts

The Authority requires a detailed assessment of the capital and operating expenditure forecasts of each of the water corporations to determine if the expenditure is consistent with that which a prudent service provider acting efficiently would incur – in line with good industry practice and to realise the lowest sustainable costs.

Review of actual/forecast capital expenditure

The Authority requires capital expenditure in the current regulatory period to determine whether it is appropriate to include this expenditure in the Regulated Asset Base, a key input into the building blocks for pricing. The review is to cover actual expenditure in 2011/12 to 2015/15 and forecast for 2016/17 and 2017/18.

Review treatment of disposed assets

The Consultant is required to review a recent major asset disposal from between 2011/12 and 2015/16 to assess the efficacy of the water corporations' method for disposing of assets.

Methodology

To complete this review, the following activities were undertaken:

1. An initial request for information was provided to Water Corporation, along with a plan for on-site interviews with key staff
2. Face to face meetings were held with Water Corporation staff from 3 April 2017 to 6 April 2017
3. Following these meetings, further requests for information were made of Water Corporation and Water Corporation provided the information and analysis requested. Analysis and investigation was undertaken based on the information provided.
4. A draft report was prepared and provided to the Economic Regulation Authority of Western Australia and Water Corporation for fact checking and to identify any confidential items within the report
5. The report was finalised based on the feedback received from the the Economic Regulation Authority of Western Australia and Water Corporation

Water Corporation

Water Corporation is a State government-owned entity that is the principal provider of water, wastewater, recycled water, drainage and bulk irrigation services in Western Australia. Its operating area covers Western Australia and it provides services where there is no other licenced supplier. Water Corporation is accountable to the Minister for Water. Water Corporation has offices located across Western Australia.

Water Corporation has a significant asset base of $19.0 billion (historical cost of property, plant and equipment). This asset base includes two major desalination plants (the Perth Seawater Desalination and Southern Seawater Desalination plants) and six regional desalination plants, 128 drinking water dams and weirs and 94 licenced borefields for water supply. Water Corporation delivered 366GL of water in 2014/15. The largest water supply scheme is the Integrated Water Supply Scheme which supplies Perth, the Goldfields and Agricultural Region and some parts of the South West. This scheme delivered 291GL of water in 2014/15.

Water Corporation's wastewater collection and treatment network includes 16,416km of sewer mains, 1,129 pump stations and 113 treatment plants. 164 GL of wastewater was collected and treated in 2014/15. Water Corporation operates over 80 water recycling schemes across the state and is proactively increasing the proportion of wastewater that is reused.

Findings from benchmarking operating expenditure

We undertook benchmarking of Water Corporation's operating expenditure for its water and sewerage services and for both services combined, and on both a per property and volumetric basis. The benchmarking also includes Water Corporation's Perth and regional businesses separately and for the business combined. We make the following observations based on this benchmarking:

> Understandably, Water Corporation's operating costs per property as a total business (i.e. including regional areas) is higher than for the Perth metropolitan area alone

> Combined operating costs per property for water and sewerage for the Perth region are amongst the lowest in the comparator group but Water Corporation rates second highest when considering all of its operating area

> There is difficulty in ascertaining whether the combined and water-only operating costs per property are generally increasing, decreasing or remaining constant. However, sewerage operating costs per property generally appear to be remaining constant or decreasing. No significant peaks are observable in the annual combined/water-only operating costs.

> Water Corporation (Total)'s water operating costs are mid-range after using water volume as the calculation basis rather than property numbers. Water Corporation (Perth only) remains amongst the lowest in its comparator group. This likely reflects higher per capita consumption by Water Corporation's customers than the comparator companies.

> Conversely, Water Corporation's sewerage operating costs, when considered on a per-ML basis, are low to mid-range.

Considering the benchmark analysis, we make the following conclusions:

> Water Corporation displays relatively low operating costs for both water and sewerage operating expenditure per property compared with its peers. It is reasonable to conclude that Water Corporation is relatively efficient compared to its peers. However, it is not possible to separate out drivers and constraints on efficiency such as economies and diseconomies of scale, varying cost of inputs and varying product quality.

> Water Corporation faces notably higher costs in delivering operations in its regional areas compared to the Perth region. This is not surprising.

Benchmarks on a volumetric basis are difficult to interpret due to the relatively high fixed costs in providing water and sewerage services and the different levels of consumption between businesses, i.e. high consumption will make a utility appear more efficient with all else being equal.

Strategic management overview

The *Water Corporation Act 1995* is the primary piece of legislation that governs how Water Corporation conducts business. The Act establishes minimum governance requirements for the business including roles for a Board and Chief Executive Officer. The Act also sets the functions to be carried out by Water Corporation but also establishes that as a corporation, Water Corporation is not an agent of the government and has discretion to act as it considers best. Water Corporation prepares annually a five year Strategic Development Plan in accordance with this act.

Many of Water Corporation's business processes including those for developing operating and capital expenditure forecasts have been subject to review by us as part of the 2015 Asset Management System Effectiveness Review. This review found that Water Corporation had in place robust business processes. However, in this review we have noted a disconnect between Water Corporation's documented tools and processes and how it actually develops its expenditure forecasts. We make further comment in specific areas following.

Our review of Water Corporation's approach to allocating support costs to scheme level concluded that the approach was not reflective of the true cost to serve small schemes. This is due to the use of the "Ops and Maintenance" cost category for allocation. This category is highly variable from year to year. To the extent that allocation of costs to a scheme level is important, we recommend that Water Corporation revisit its allocation methodology and adopt a proxy for allocation of support costs that is more representative of the costs to serve schemes.

We found that Water Corporation's cost estimation system is impressive in its comprehensiveness, links to other processes and level of granularity. However, despite this, there is significant uncertainty in the contingency allowances and regional adjustments, and probably also the cost escalation factor applied, given that many recent tender prices have been lower than expected. This is demonstrated by our review of the build-up of cost estimates and benchmarking of these estimates detailed in Section 3.6. Best practice suggests a consistent, empirically-robust, approach to deriving contingency allowances, comparing full outturn costs to prior assumptions. We also consider that it would be prudent to carry out further validation of the regional adjustments to improve confidence in estimates outside of the Metro area.

Based on our review of projects and programs, Water Corporation appears to put a reasonably significant amount of effort into optimal procurement at a project level. However, we found little evidence of rigorous quantitative evaluation of procurement options at aggregate level. It therefore seems likely that Water Corporation could make further efficiency gains by undertaking such a review

Recommended efficient operating expenditre

Our overall conclusions with respect to operating expenditure are:

> 2015/16 is an appropriate base year but there should be a reduction of $9.5M to base operating expenditure due to unjustified expenditure items occurring between the base year and the start of the regulatory period as detailed in Section 4.3.

> Operating expenditure in the forward regulatory period is substantially increased over current levels due to step changes in 2016/17 and 2017/18 which Water Corporation explain are primarily due to its drying climate response and increased operation of its desalination plants

> However, for the regulatory period, the operating expenditure forecast is relatively flat in real terms

> We believe that Water Corporation should manage labour expenditure so that there is no real increase in total expenditure over the forward regulatory period

> It is hard to draw conclusions regarding the appropriateness of Water Corporation's adjustments to operating expenditure forecasts out to 2022/23 when these have not been developed with bottom-up scrutiny for a regulatory review in mind and the Macro Model does not cover the last two years of the regulatory period. It appears that Water Corporation has underestimated opex arising from capex in the regulatory period.

> Despite the evidence that Water Corporation's efficiency target mechanism is successful at realising efficiency gains, we have concerns that the drawbacks of the mechanism are becoming more pronounced and may limit its effectiveness in the next regulatory period.

Our recommended level of efficient operating expenditure has been derived as follows consistent with our review methodology:

- **Adjustment to reflect our assessment of the prudence, timing and efficient level of expenditure of specific projects**

  We propose the following specific adjustments to operating expenditure items:

  - Removal of -$9.5 from base operating expenditure for two initiatives with unclear justification (See Section 4.3)
  - An increase to operating expenditure arising from capital expenditure to make all years consistent with the 2017/18 budget (See Section 4.2)

- **Adjustment of any top down factors applied to expenditure categories where we believe that the factors applied by Water Corporation are unreasonable.**

  - A reduction in labour costs for alliances to reflect the recently renegotiated Enterprise Agreement which has a lower annual increase than that included by Water Corporation in its forward forecasts (See Section 4.4.2)
  - A reduction in the forecast labour expenditure so that there is no real increase over the regulatory period (See Section 4.4.2).

- **Efficiency**

  - We have applied an annual compounding efficiency factor of 0.5% per annum. As Water Corporation's forecasts include an efficiency factor, these are added back in.

Our recommended level of efficient operating expenditure is summarised in Table 1.

Table 1 Recommended efficient operating expenditure (Real $16/17)

	18/19	19/20	20/21	21/22	22/23
Water Corporation forecast	942.2	948.6	944.9	943.9	939.8
Remove contestable business and reimbursable projects	-39.3	-39.3	-39.1	-39.0	-38.3
Water Corporation forecast (adjusted)	902.9	909.3	905.7	905.0	901.5
Adjustments					
Adjustments to base operating expenditure	-9.5	-9.5	-9.5	-9.5	-9.5
Increase FIS to reflect trends	7.7	7.7	9.9	12.1	12.1
Lower labour cost escalator for alliance	-0.9	-1.9	-2.9	-3.9	-5.0
Maintain no real increase in labour costs	-2.1	-3.8	-7.8	-11.9	-11.9
Sub-total	*898.0*	*901.9*	*895.4*	*891.8*	*887.2*
Efficiency	0.50%	0.50%	0.50%	0.50%	0.50%
Efficiency factor	0.995	0.990	0.985	0.980	0.975
Efficiency adjustment	-4.49	-9.00	-13.36	-17.70	-21.96
Add back Water Corporation efficiency	10.77	14.15	9.67	9.32	9.32
Recommended operating expenditure	904.2	907.0	891.7	883.4	874.6
Adjustments made compared with forecast	1.4	-2.3	-14.0	-21.6	-26.9

	18/19	19/20	20/21	21/22	22/23
Adjustments made compared with forecast (%)	*0.1%*	*-0.2%*	*-1.5%*	*-2.3%*	*-2.9%*

Recommended prudent and efficient capital expenditure

The process we have followed in deriving our recommended prudent and efficient capital expenditure is summarised below:

1. Allocation of expenditure to drivers/service. This is done to allow understanding of the trends in expenditure and the adjustments below to make at a program level.
2. Removal of capitalised interest. Interest has been removed as this is treated separately in the regulatory approach.
3. Removal of Standard Infrastructure Charge (SIC) expenditure. This has been removed as it is paid for by third parties.
4. Conversion to consistent price base. A price escalation factor has been applied to convert all costs to an end 2015/16 price base.
5. 'Pre-efficiency adjustments'. We have applied pre-efficiency adjustments setting out our recommended project or program-specific adjustments. These are summarised below.
6. Efficiencies. We then make full capital program level adjustments based on our view of the potential for Water Corporation to realise savings which are not specific to particular projects or individual programs.

The result of this process is our recommended prudent and efficient forecast capex excluding SIC and capitalised interest.

Pre-efficiency adjustments

Our recommended pre-efficiency adjustments are summarised in Table 2. These are explained in further detail in section 5.5.1 of this report.

Table 2 Summary of pre-efficiency adjustments (excluding SIC and capitalised interest)

All in end $15/16M		FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan
Defer Grange Enhancement	BC- Common				-5.0	-34.5	-34.0	
Defer major IT capex until roadmap (defer ODDS)	BC- Common		-9.7	-7	0.0	5.6	5.6	5.6
Double counting of ARC Flash parent and child	BC- Common		-4	-4	-4.0	-3.9	-3.9	-4.0
Defer "SWR Long Term Sludge Treatment Facility"	BC- Wastewater				-0.2	-2.1	-17.7	-8.4
Wastewater base capex adjustment	BC- Wastewater		-13.4	-16.4	-21.6	-1.2	-7.9	-24.0
Reprofile spend on 'Broome South WWTP & TWWM Upgrade'	QS- Wastewater		0	-0.9	-4.0	0.0	4.9	0.0
Reduce NK Extension Stage 3	QS- Water			-0.2	-4.9	-1.4	-0.3	0.0
Reduce and reprofile "Broome South WWTP Holding Pond Lining" costs	ES- Wastewater		1.1	-1.8	0.0	0.0		
Water base capex adjustment	BC- Water		-27.0	-73.8	-75.0	-9.1	10.0	3.6
Prudent capex for Walpole New Source	SD- Water		0.0	-13.0	-1.0	0.0	0.0	0.0

All in end $15/16M	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan
TOTAL	0	-53.0	-117.1	-115.6	-46.7	-43.1	-27.3

Source: Adjustments made on basis of 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects'

Efficiency adjustments

We consider that there are a number of areas in which it should be possible for Water Corporation to achieve efficiencies beyond the adjustments outlined above. These are cost estimating, benefits case challenge and program optimisation, the competitive supplier environment and through continuing efficiencies.

Table 3 summarises our proposed efficiencies to apply to capital expenditure.

Table 3: Recommended efficiencies

	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan
Cost-estimation contingency (one-off)		5%					
Benefits case challenge and program optimisation (phased in)			1%	1%	1%	1%	1%
Competitive supplier environment not reflected in Construction Index used in cost estimation tool (one-off)			2%				
Continuing efficiency			0.25%	0.25%	0.25%	0.25%	0.25%
Efficiency factor to apply	**1.00**	**0.95**	**0.92**	**0.91**	**0.90**	**0.89**	**0.87**

Recommended prudent and efficient capex

Our recommended prudent and efficient capex is summarised by driver and service in Table 4.

Table 4 - Recommended prudent and efficient capex (end $15/16 M)

Line of Business	Cost Driver	FY11/12 Actual	FY12/13 Actual	FY13/14 Actual	FY14/15 Actual	FY15/16 Actual	FY216/17 Plan	FY17/18 Plan	FY18/19 Plan	FY19/20 Plan	FY20/21 Plan	FY21/22 Plan	FY22/23 Plan
Common	Base Capital	$114.2	$99.3	$90.5	$87.1	$83.6	$104.4	$68.6	$82.0	$82.0	$64.9	$62.2	$97.4
Common	Enhanced Services	$5.5	$19.9	$14.0	$7.3	$8.8	$14.4	$16.6	$9.6	$20.2	$21.1	$18.7	$20.5
Common	Quality & Standards	$1.2	$1.3	$1.8	$0.6	$0.7	$1.6	$1.0	$-	$-	$-	$0.1	$0.1
Common	Supply Demand	$5.7	$4.1	$8.6	$10.0	$1.9	$2.5	-$0.2	$1.0	$2.5	$2.6	-$2.8	$-
Drainage	Base Capital	$1.2	$1.1	$1.4	$1.5	$3.4	$19.5	$1.1	$2.9	$25.8	$27.7	$26.5	$28.9
Drainage	Enhanced Services	$0.3	$4.3	$0.9	$-	$0.0	$-	$-	$-	$-	$-	$-	$-
Drainage	Quality & Standards	$0.1	$0.5	$0.2	$0.8	$0.4	$3.8	$8.5	$1.5	$-	$0.5	$1.2	$1.3
Drainage	Supply Demand	$0.0	$3.3	$3.5	$0.5	$0.0	$1.0	$0.8	$1.6	$4.6	$1.1	$3.9	$5.4
Irrigation	Base Capital	$3.7	$3.2	$3.8	$2.4	$0.5	$2.2	$7.3	$6.2	$7.5	$5.1	$-	$-
Irrigation	Enhanced Services	$-	$-	$0.0	$-	$-	$-	$-	$-	$-	$-	$-	$-
Irrigation	Quality & Standards	$0.0	$0.1	$0.0	$-	$-	$-	$-	$-	$-	$1.5	$16.7	$18.3
Irrigation	Supply Demand	$-	$-	$-	$94.3	$-	$-	$-	$-	$-	$-	$-	$-
Wastewater	Base Capital	$27.7	$37.6	$35.6	$44.6	$50.2	$71.4	$49.9	$36.0	$35.5	$35.1	$34.6	$34.2
Wastewater	Enhanced Services	$4.9	$2.5	$1.8	$2.8	$5.7	$19.2	$34.5	$30.5	$12.0	$0.8	$2.2	$2.4
Wastewater	Quality & Standards	$20.6	$33.7	$15.1	$15.6	$13.7	$34.4	$24.1	$15.4	$3.7	$14.7	$15.6	$12.3
Wastewater	Supply Demand	$73.2	$112.5	$172.5	$128.2	$53.5	$57.9	$107.1	$97.1	$91.5	$79.9	$42.2	$46.4
Water	Base Capital	$49.8	$63.8	$86.1	$74.1	$83.9	$210.7	$93.7	$65.8	$64.9	$64.1	$63.3	$62.5
Water	Enhanced Services	$9.5	$7.4	$5.3	$16.5	$12.7	$19.6	$13.8	$23.3	$35.5	$19.1	$14.4	$15.7
Water	Quality & Standards	$17.3	$26.2	$273.1	$19.5	$41.4	$39.8	$31.3	$24.4	$24.3	$4.3	$24.7	$27.2
Water	Supply Demand	$429.8	$398.2	$120.2	$142.8	$90.5	$84.8	$150.5	$107.1	$142.3	$152.0	$177.5	$147.2
Total		**$764.7**	**$819.0**	**$834.7**	**$648.7**	**$451.0**	**$687.3**	**$608.5**	**$504.6**	**$552.5**	**$494.7**	**$501.2**	**$519.9**

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1 Introduction

1.1 Background

1.1.1 Overview

The Economic Regulation Authority of Western Australia was requested by the Treasurer of Western Australia in October 2016 to undertake an inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and Busselton Water. The Authority is to inquire into the efficient costs for the services of the Water Corporation, Aqwest and Busselton Water for the five year period commencing 2018-19.

The Authority published an Issues paper on 6 December 2016.

The Authority will publish its draft recommendation report in mid-2017.

1.1.2 Economic Regulation Authority of Western Australia

The Economic Regulation Authority of Western Australia (ERAWA) is responsible for regulating the economic framework for gas, electricity and water in Western Australia. Its primary objective is to ensure the provision of a competitive and fair environment, particularly where businesses operate as natural monopolies.

The ERAWA has a range of regulatory functions related to water including:

> Issuing licences and monitoring performance against the water licences held by the three businesses under the Water Services Act 2012 (the Act)

> Administering the regulatory instrument for customer protection, the Water Services Code of Conduct (Customer Service Standards) 2013 (the Water Code) and undertaking five-yearly reviews of the Water Code

> Providing economic advice to the Government in relation to water issues including competition, water resources management and planning, recycled water pricing, and retail water pricing.

1.2 Purpose

The purpose of this Review is to provide advice to ERAWA on the prudence and efficiency of Water Corporation's proposed capital and operating expenditure and as well as the prudence and efficiency of historical capital expenditure.

1.3 Scope

There are four complementary elements of scope in the brief set by the Authority:

> Review of governance arrangements

> Detailed review of capital and operating expenditure forecasts

> Review of actual and forecast capital expenditure

> Review treatment of disposed assets.

1.3.1 Review of governance arrangements

The Authority requires that as an initial task, the systems and processes used by the water corporations to manage capital and operating expenditure are evaluated. The purpose of this review is to determine whether these systems and processes can be relied upon to generate expenditure that is prudent (or will be prudent for future expenditure).

This review is to consider expenditure management processes broadly and in particular:

1. Integration and consistency of procedures and policies across projects;

2. Adequacy of internal control structure or specific internal controls, to ensure due regard for effectiveness and efficiency;
3. Extent to which activities have been effective in achieving the water corporations' objectives;
4. Timeliness of projects and their implementation at least cost;
5. Effectiveness of internal audit processes in relation to the capex and opex processes including planning and procurement.

1.3.2 Detailed review of capital expenditure and operating expenditure forecasts

The Authority requires a detailed assessment of the capital and operating expenditure forecasts of each of the water corporations to determine if the expenditure is consistent with that which a prudent service provider acting efficiently would incur – in line with good industry practice and to realise the lowest sustainable costs. The brief identifies the following specific areas to be considered and commented on as appropriate:

6. Factors driving capital and operating expenditure efficiency, including:
    a. Key performance indicators that support the forecasts and comparisons with industry standards
    b. Comparison of service levels and operating performance with industry standards
    c. Forecast changes (if relevant) to operating performance and service levels
7. Methodology used to determine capacity and utilisation forecasts, and independent assessment, including:
    a. Key drivers
    b. How capacity and utilisation forecasts inform expenditure forecasts
8. Methods (and models) used to estimate expenditure including how needs are prioritised, including
    a. Cost estimating
    b. Cost estimating risk and benchmark comparison to determine if the level is acceptable
9. Overhead costs, including
    a. Appropriateness of included costs
    b. Allocation of overhead across other opex categories
    c. Criteria for allocating overheads between services and regions
    d. Benchmarking with other service providers.
10. Interaction between capital and operating expenditure and trade-offs
11. Extent to which future efficiencies have been factored into capital and operating expenditure forecasts
12. Proposed escalation factors and how they have been applied
13. Reasonableness of procurement practices and processes
14. Any additional matters.

The brief also requires that the review of opex should include:

15. Assessment of forecasts, accounting for historical and industry benchmark data, including:
    a. Assessment of the efficient level of base operating expenditure including the most recent actual operating expenditure. Undertake benchmarking with other service providers
    b. Justification and supporting evidence for any forecast increased costs
    c. Forecast operational and service level performance resulting from its forecast operating expenditure

d. Operating expenditure arising from capital expenditure.

16. Evaluation of appropriate efficiency targets for overall operating expenditure given the growth scenarios expected over the forecast period, and accounting for benchmark comparisons with other Australian service providers.

17. Assessment of whether maintenance procedures meet best practice; including:

    a. Level and balance of maintenance costs (preventative versus corrective) as a result of any changes in maintenance or replacement programs

    b. Assessment of whether the water corporations have adopted optimal solutions in terms of that balance.

1.3.3 Review of actual/forecast capital expenditure

The Authority requires capital expenditure in the current regulatory period to determine whether it is appropriate to include this expenditure in the Regulated Asset Base, a key input into the building blocks for pricing. The review is to cover actual expenditure in 2011/12 to 2015/15 and forecast for 2016/17 and 2017/18. The review is to include:

18. Assessment of the overall prudence and efficiency of total capital expenditure in the period from 2011/12 to 2015/16, through reference to a representative sample of projects

19. Adequacy and reliability of information used as a basis for forecast capital expenditure for 2016/17 and 2017/18, through reference to a representative sample of projects

20. Review of the related depreciation schedules and depreciation criteria.

1.3.4 Review treatment of disposed assets

The Consultant is required to review a recent major asset disposal from between 2011/12 and 2015/16 to assess the efficacy of the water corporations' method for disposing of assets.

1.4 Regulatory environment

The regulatory environment under which Water Corporation operates is set out in Table 1-1. In the case of water pricing and regulation ERAWA's role is price recommendation with pricing set by the Western Australian Government. This is unlike the ACT, New South Wales and Victoria where the economic regulator sets water prices.

Table 1-1 Summary of Water Corporation's regulatory environment

Water pricing and economic regulation			
Economic regulator	**Key responsibilities**	**Regulated services**	**Who sets water prices?**
Economic Regulation Authority of Western Australia (ERAWA).	Price recommendation. Oversight for urban and rural water pricing practices. Monitor performance agreement as per Operating Licence.	Not applicable.	Western Australia Cabinet – Urban bulk and retail. Irrigation Cooperatives (3) – Rural retail.
Metropolitan water planning and management			
Organisation responsible	**Key responsibilities**	**Key legislation and policy documents**	**Summary of planning strategy**
Department of Water (DoW).	The department's responsibilities include protecting water quality, preparing policies and plans critical to the state's future development, analysis of water resources information, issuing	*Water for Growth, Water for Growth – Urban*	Integrates a range of water policy reforms at state and national levels. The plan sets out broad state-wide strategic directions and policies for water.

	licenses and regulating water use. The department is also responsible for the quantity, quality, use and availability of the state's water resources and ensures that all Western Australians have access to water services. It develops policies and processes to ensure sustainable water services are delivered to both the private and public sectors. The department administers a state-wide water planning framework.		

Recycled water management			
Category	**Size/type**	**Legislation**	**Approval authority or requirement**
Water services providers of water supply (potable and non-potable), sewerage, and irrigation and drainage services.	Provision of water supply (potable or non-potable), sewerage, irrigation or drainage services within a 'controlled area'.	*Water Services Act 2012*	Required to be licensed by the Economic Regulation Authority of Western Australia or exempted by the Governor. Economic Regulation Authority of Western Australia administers the licensing requirement. Department of Water administers the exemption process.
Recycled water	Category 54: Sewage facility: premises - (a) on which sewage is treated: or (b) from which sewage is discharged onto land or into water over 100 ML per day. Category 85: Sewage facility: premises - (a) on which sewage is treated: or (b) from which sewage is discharged onto land or into water over 20 but under 100 m3 per day.	*Environment Protection Act Part V - Environmental regulation 1986* *Environmental Protection Regulations 1987 Schedule 1 (Part 1) - Prescribed premises* *Environment Protection Act Part V - Environmental regulation 1986* *Environmental Protection Regulations 1987 Schedule 1 (Part 2) - Prescribed premises*	Department of the Environment and Conservation with advice sought from Department of Health. Requires a works approval for the construction of the wastewater treatment plant or the construction of the recycled waste storage plant. A license is required to regulate the discharge of the wastewater to the environment (i.e. irrigation scheme) from DECC.

Rural and regional water planning and management			
Organisation responsible	**Key responsibilities**	**Key legislation and policy documents**	**Environmental water manager**
Department of Water (DoW).	Administer the Rights in Water and Irrigation Act 1914. Water allocation planning and administration of water entitlements and water	*Rights in Water and Irrigation Act 1914* State Water Plan 2007. Regional water plans Water management plans.	DoW.

rights.

Drinking water management			
Organisation responsible	**Key responsibilities**	**Key instruments**	**Drinking Water Quality Standards**
Department of Health.	Advise on the appropriate health standards for drinking water. Regulate the Water Corporation's drinking water quality.	*Country Areas Water Supply Act 1947* *Metropolitan Water Supply, Sewerage and Drainage Act 1909* State Planning Policy 2.7 - Public Drinking Water Source	The Department of Health has adopted the Australian Drinking Water Guidelines (2004).
Economic Regulation Authority of Western Australia (ERAWA).	Issue operational licences that specify drinking water quality standards to water supply providers.	*Water Services Act 2012* Operational licences	
Department of Water (DoW).	Identify and protect public drinking water source areas and prepare drinking water source protection assessments and drinking water source protection plans.	Operational licences	

1.5 Methodology

To complete this review, the following activities were undertaken:

1. An initial request for information was provided to Water Corporation, along with a plan for on-site interviews with key staff
2. Face to face meetings were held with Water Corporation staff from 3 April 2017 to 6 April 2017
3. Following these meetings, further requests for information were made of Water Corporation and Water Corporation provided the information and analysis requested. Analysis and investigation was undertaken based on the information provided.
4. A draft report was prepared and provided to the Economic Regulation Authority of Western Australia and Water Corporation for fact checking and to identify any confidential items within the report
5. The report was finalised based on the feedback received from the the Economic Regulation Authority of Western Australia and Water Corporation

1.6 Price base

The Asset Investment Program (AIP), which is the basis of Water Corporation's capex submission, contains line items in a mixture of price bases. According to its memo on escalation[1], the approach taken differs between active and planned projects:

> Active projects. Capex is presented in outturn dollars, i.e. nominal expenditure. These figures are not subsequently modified to reflect inflation or other form of escalation.

> Planned projects not yet activated. Capex is presented in real dollars, which are rolled over to the new financial year's dollars within SAP using the CCI (Capital Cost Index).

These capex items are summed together in the AIP in a mix of price bases. However, we understand from Water Corporation that, up to 2021/22, the Strategic Investment Business Cases (SIBC) balancing adjustments applied are in nominal prices, meaning that because of the adjustments the *total* capex up to 2021/22 sums to a nominal forecast, even if the individual lines in the AIP have different price bases.

The balancing adjustments underlying the 2022/23 projection are taken from Year 6 SIBC capex expressed in real dollars[2]. This means that the total capex for 2022/23 sums up to a real dollar forecast.

[1] "capital program escalation 080517"
[2] Email from Water Corporation, 17 May 2017

For opex, Water Corporation's budget on budget using price inflators for various cost categories to arrive at the next year's budgets means that opex forecasts are determined in nominal terms. We understand that all opex figures presented to us by Water Corporation in its supporting material are in nominal terms.

Water Corporation back-calculates the level of efficiency achieved by it in real terms by comparing expenditure to a real 2010/11 price basis.

In this report, we have sought to make clear whether figures presented by us are in nominal or real terms. For the purposes of our efficiency assessment, it is often preferable to deal with real expenditure forecasts so that movements over time are better observed.

2 Water Corporation

2.1 Overview and asset base

Water Corporation is a State government-owned entity that is the principal provider of water, wastewater, recycled water, drainage and bulk irrigation services in Western Australia. Its operating area covers Western Australia and it provides services where there is no other licenced supplier. Water Corporation is accountable to the Minister for Water. Water Corporation has offices located across Western Australia.

Water Corporation has a significant asset base of $19.0 billion (historical cost of property, plant and equipment). This asset base includes two major desalination plants (the Perth Seawater Desalination and Southern Seawater Desalination plants) and six regional desalination plants, 128 drinking water dams and weirs and 94 licenced borefields for water supply. Water Corporation delivered 366GL of water in 2014/15. The largest water supply scheme is the Integrated Water Supply Scheme which supplies Perth, the Goldfields and Agricultural Region and some parts of the South West. This scheme delivered 291GL of water in 2014/15.

Water Corporation's wastewater collection and treatment network includes 16,416km of sewer mains, 1,129 pump stations and 113 treatment plants. 164 GL of wastewater was collected and treated in 2014/15. Water Corporation operates over 80 water recycling schemes across the state and is proactively increasing the proportion of wastewater that is reused.

The historical cost and fair values for Water Corporation's assets as reported in its 2015 Annual Report are summarised in Table 2-1.

Table 2-1 Summary of Water Corporation assets by historical cost and fair value ($M 2015)

	Historical cost ($M 2015)	Fair value ($M 2015)	% historical cost of sub-total
Pipelines and fittings	11,822	9,222	62%
Dams, reservoirs, bores and tanks	1,609	1,257	8%
Ocean outfalls	205	147	1%
Pump stations and treatment plants	2,190	1,737	11%
Drains and channels	177	151	1%
Other structures	111	73	1%
Plant and equipment	2,938	1,847	15%
Sub-total system assets	**19,052**	**14,434**	**100%**
Land	356	356	49%
Buildings and associated works	394	275	51%
Sub-total land and buildings	**750**	**631**	**100%**
Plant and equipment	147	57	50%
Computer equipment	77	12	26%
Vehicles and mobile plant	69	36	24%
Subtotal - plant and equipment	**293**	**105**	**100%**

Water Corporation's drainage assets are located in Perth where it receives stormwater from networks owned by local governments and in the Perth, Great Southern and South West Regions. It controls 2,546 km of urban and rural drains. Water Corporation is also a bulk supplier to irrigation schemes and delivered 150,147ML (excluding the South-West irrigation area) of water to the Mid-West and North West regions in 2014/15.

2.2 Cost benchmarking

Benchmarking can provide a useful insight into the relative performance of regulated businesses. The most notable data set available is the National Performance Report. However, there are difficulties in benchmarking performance and cost data relating to Australia's water utilities. These include differing business structures and scope of services, inconsistent interpretation of the National Performance Report definitions and a lack of rigour in the data submitted for the National Performance Report. Despite these limitations, some useful insights can be gained from comparisons using this data set.

Following are benchmarks of Water Corporation's costs compared with other water utilities in Australia that have a similar scope of services provided. SA Water and Icon Water also provide water and sewerage services to a whole state or territory. SA Water also has a desalination plant. The comparisons include data for Water Corporation as a whole and for the Perth region and regional areas separately.

The benchmarks chosen are for operating costs for water and sewerage services and for both services combined. It is important to look at services separately and in totality as there may be inconsistent allocation of costs to services from business to business. The benchmarks are included with both properties and volume delivered/received as the denominator. Considering both is important because of the high fixed costs of water utilities. It is possible for a water utility to appear more efficient by delivering more water to its customers than its peers and conversely, to appear inefficient where it delivers less water to its customers (e.g. if it has restrictions in place).

2.2.1 Operating expenditure benchmarking

Figure 2-1 to Figure 2-5 benchmark Water Corporation's operating cost per property and volumetrically for water, sewerage and both services combined against the peer group.

We make the following observations on the benchmarks included for operating expenditure:

> Understandably, Water Corporation's operating costs per property as a total business (i.e. including regional areas) is higher than for the Perth metropolitan area alone

> Combined operating costs per property for water and sewerage for the Perth region are amongst the lowest in the comparator group but Water Corporation rates second highest when considering all of its operating area

> There is difficulty in ascertaining whether the combined and water-only operating costs per property are generally increasing, decreasing or remaining constant. However, sewerage operating costs per property generally appear to be remaining constant or decreasing. No significant peaks are able to be observed in the annual combined/water-only operating costs.

> Water Corporation (Total)'s water operating costs are mid-range after using water volume as the calculation basis rather than property numbers. Water Corporation (Perth only) remains amongst the lowest in its comparator group. This is likely reflects higher per capita consumption by Water Corporation's customers than the comparator companies.

> Conversely, Water Corporation's sewerage operating costs, when considered on a per-ML basis, are low to mid-range.

Considering the benchmark analysis, we make the following conclusions:

> Water Corporation displays relatively low operating costs for both water and sewerage operating expenditure per property compared with its peers. It is reasonable to conclude that Water Corporation is relatively efficient compared to its peers. However it is not possible to separate out drivers and constraints on efficiency such as economies and diseconomies of scale, varying cost of inputs and varying product quality.

> Water Corporation faces notably higher costs in delivering operations in its regional areas compared to the Perth region. This is not surprising.

> Benchmarks on a volumetric basis are difficult to interpret due to the relatively high fixed costs in providing water and sewerage services and the different levels of consumption between businesses, i.e. high consumption will make a utility appear more efficient with all else being equal.

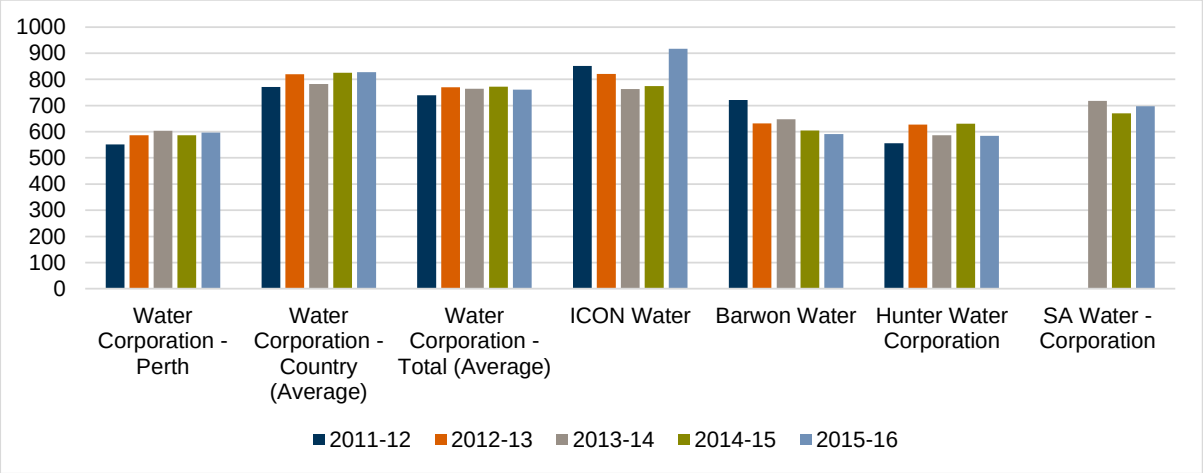

Figure 2-1 Combined operating cost - water and sewerage ($/property)[3]

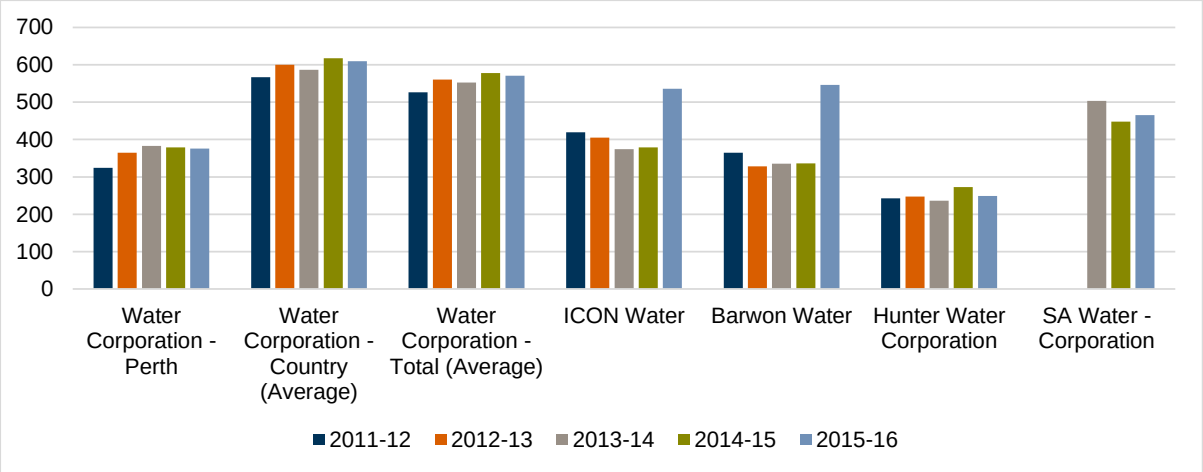

Figure 2-2 Operating cost - water ($/property)

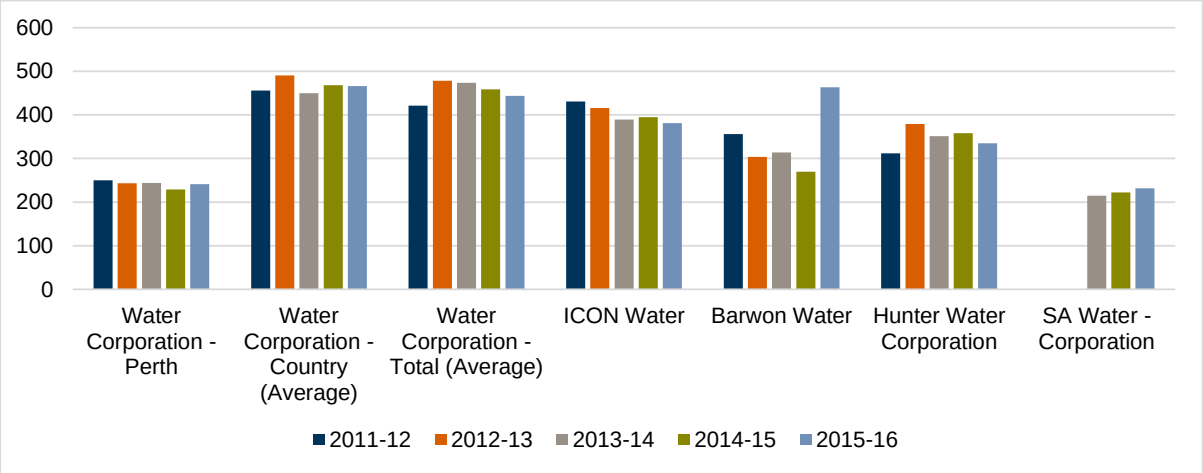

Figure 2-3 Operating cost - sewerage ($/property)

[3] Per-property operating cost data is not available for SA Water for the 2011-12 and 2012-13 financial years.

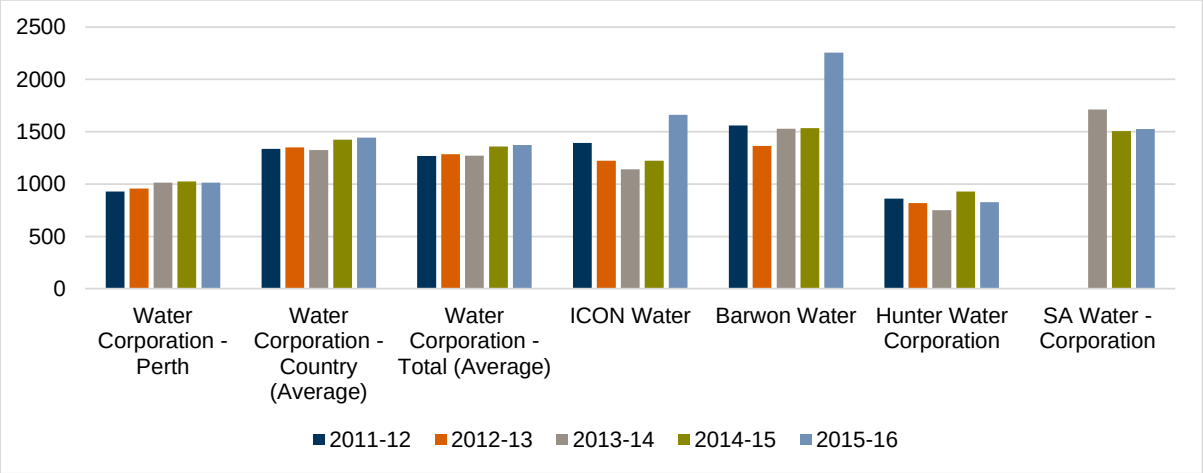

Figure 2-4 Operating cost - water ($/ML water sourced[4])

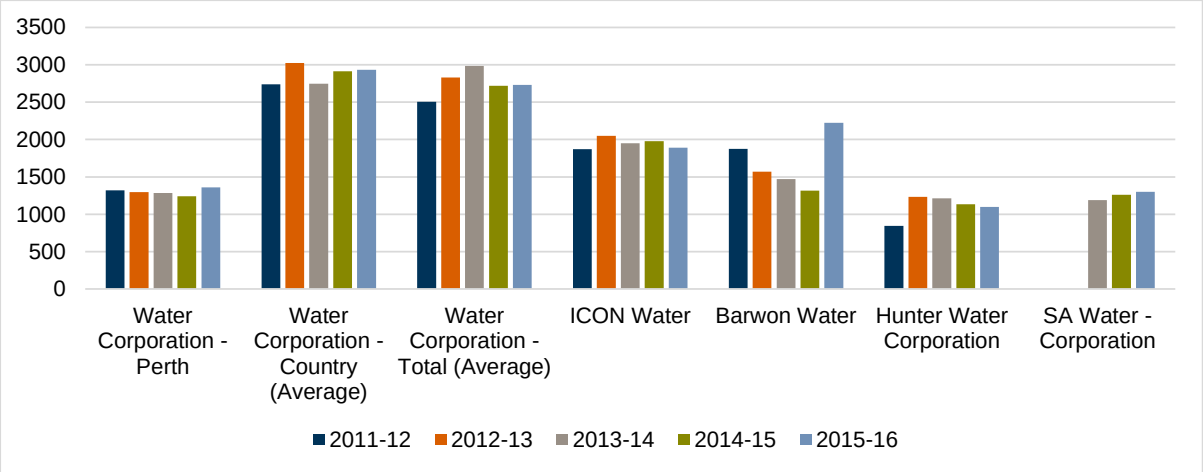

Figure 2-5 Operating cost - sewerage ($/ML received at treatment plants)

2.2.2 Overhead cost benchmarking

To inform our assessment of Water Corporation's efficient costs, we have benchmarked the proportion of operating expenditure spent by Water Corporation against the proportion spent by other major water utilities in Australia. The results are shown in Figure 2-6. This analysis is based on publically available information[5] and that provided by Water Corporation for this review. There are likely to be differences in the interpretation of direct and indirect costs between businesses. Also, the businesses included have different functions, different operating environments and different business models. A further factor which complicates the analysis is the varying extent to which the businesses outsource activities. Where a business outsources

[4] This metric is provided as $/ML sourced as data on water produced by Water Corporation is not available in all years.
[5] Melbourne Water data from http://www.esc.vic.gov.au/wp-content/uploads/esc/57/578d0c77-f5a7-4c63-98fd-308625848aa0.pdf Figure 4.3,
Sydney Water data from https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/investigation-legislative-requirements-water-metropolitan-water-sydney-water-corporation-pricing-investigation-commencing-from-1-july-2016/consultants_report_-_atkins_cardno_-_sydney_water_corporation_expenditure_review_-_december_2015.pdf, Table 6-2
Hunter Water data from: https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-water-services-metro-water-legislative-requirements-hunter-water-corporation-pricing-investigation-commencing-from-1-july-2016/draft_report_-_review_of_prices_for_hunter_water_corporation_-_from_1_july_2016_to_30_june_2020.pdf Table 4.1
Seqwater data from http://www.qca.org.au/getattachment/5a96203c-1e63-4f9c-b92b-9273e4c5a5ad/CH2M-HILL-s-Final-Report.aspx Table 5-54

functions (or purchases bulk water) the cost of the outsourced contract would typically be recorded as a direct cost even though this cost has embedded within it the indirect costs of the external service provider. We are therefore cautious in interpreting the results but it appears that Water Corporation has a higher proportion of indirect costs than other major water utilities in Australia.

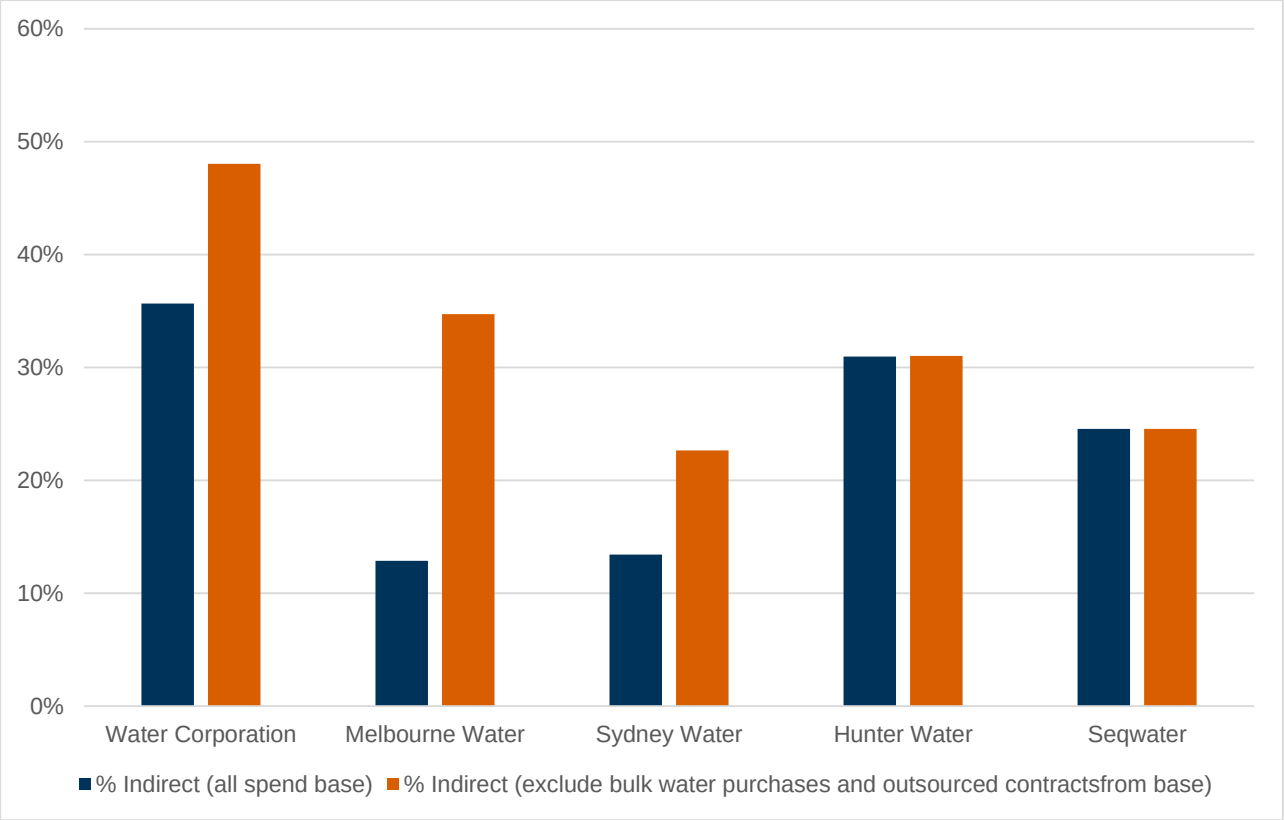

Figure 2-6 Benchmarking of indirect costs

Excluding the two bulk water utilities, support costs per connection are: Sydney Water - $103/connection, Hunter Water - $182/connection and Water Corporation $394/connection. Neither Sydney Water nor Hunter Water have to service the large geographical expanse and resulting low population density that Water Corporation does through a network of regional offices. This is very likely a major driver for the observed higher operating costs per connection recorded by Water Corporation.

3 Strategic management overview

3.1 Business planning

The *Water Corporation Act 1995* is the primary piece of legislation that governs how Water Corporation conducts business. The Act establishes minimum governance requirements for the business including roles for a Board and Chief Executive Officer. The Act also sets the functions to be carried out by Water Corporation but also establishes that as a corporation, Water Corporation is not an agent of the government and has discretion to act as it considers best.

The Act requires Water Corporation to prepare the following business planning documents:

> **Strategic development plan** – this plan is prepared annually and covers a five year forecast period. It is required to set out economic and financial objectives and operational targets and how those objectives and targets will be achieved. In preparing the strategic development plan, the business is to consider competitive strategies, pricing of products, productivity levels, financial requirements, capital expenditure, customer service arrangements, relevant government policy and personnel requirements.

> **Statement of corporate intent** – this document is also prepared annually and provides detail on how the corporation will conduct business in the coming financial year. The Act specifically requires the following to be addressed within the statement of corporate intent:

a) an outline of objectives including —

   i. the continuity of the provision of water services

   ii. the maintenance of assets to ensure the proper provision of water services

   iii. the delivery of an optimum service to customers in meeting their requirements for water services

b) the performance targets and other measures by which performances may be judged and related to objectives

c) measures to be taken to protect the environment

d) an outline of the nature and scope of the functions proposed to be performed during the relevant financial year

e) an outline of the borrowings to be undertaken or proposed to be undertaken

f) an outline of main undertakings during the relevant financial year

g) the dividend policy for the relevant financial year

h) accounting policies that apply to the preparation of accounts

i) the type of information to be given to the Minister, including information to be given in quarterly and annual reports

j) the nature and extent of community service obligations that are to be performed

k) the costings of, funding for, or other arrangements to make adjustments relating to, community service obligations

l) the ways in which, and the extent to which, compensation will be made for performing community service obligations

m) such other matters as may be agreed on by the Minister and the board.

Under the Act, Water Corporation must perform its functions in accordance with its strategic development plan and its statement of corporate intent as existing from time to time.

The 2016/17 statement of corporate intent identified that Water Corporation's vision is to achieve balance between:

1. Water forever: provide water services for the long term
2. Great place: contribution to a positive quality of life/lifestyle for all Western Australians
3. Zero footprint: borrow water from the environment and return it to the environment with minimal impact.

In conducting our review, we have found that Water Corporation's primary focus for business planning has been preparing the strategic development plan and statement of corporate intent for the 2017/18 financial year. Water Corporation's requirement to prepare the strategic development plan (for the five year period) and statement of corporate intent (each year) is not aligned with the requirements of the economic regulator as the regulatory review period is for five years but commencing for more than a year from when Water Corporation made its submission. This also create challenges for Water Corporation in allocating its time to each process.

The Act requires that Water Corporation's Board and the Minister should agree on these documents as soon as possible before a financial year commences. The strategic development plan also requires concurrent approval from the Treasurer. With the recent change in government in Western Australia, Water Corporation faces an additional constraint at this time in engaging with the new Minister and Treasurer.

3.2 Governance arrangements

3.2.1 Overview

As detailed in Section 3.1, the *Water Corporations Act 1995* sets out minimum governance requirements for Water Corporation including establishment of a Board and the role of the Chief Executive Officer. The *Act* also requires that Water Corporation must act in accordance with prudent commercial principles and endeavour to make a profit, consistently with maximising its long term value. A limitation to the independence of Water Corporation is that it has to act on direction by the relevant Minister and is required under the *Act* to consult with the Minister on major initiatives and matters of significant public interest.

3.2.2 Capex

Water Corporation produces Strategic Investment Business Cases (SIBCs) to present and provide justification for capital investment projects. SIBCs are prepared for each capital portfolio of projects to allow the economics of the different engineering options to be assessed. SIBC documents set out the business outcomes that would follow from different levels of investment over a 20-year horizon. They are developed at a higher strategic level in order to inform the full business plan program.

The asset investment program 2017/18 to 2021/22 was approved by the Board in October 2016 for inclusion in Water Corporation's Strategic Development Plan (SDP) for submission to the Minister and the Government's 2017 State Budget at the board meeting in October 2016. Whilst there appears to be some governance over the program there does not appear to be any detailed rationale or evidence of optimisation presented in the board papers. Projects appear to be developed in isolation, at a system level, using the System Risk Assessment (SRA) tool and the asset investment plan does not indicate evidence of program optimisation or rigorous justification of review. We would expect to see evidence of scenario testing that would be carried out to test the robustness of the overall program. We saw no evidence of a rational testing of scenarios including the impact of service to customers, level of risk or asset performance/serviceability.

Asset planning for capital projects is governed by three levels of planning: strategic planning, scheme planning and Asset Investment Plans (integration and optimisation). Water Corporation's asset planning is aligned to its five year Strategic Development Plan (a draft Plan has been prepared for the 2016-2017 to 2020-2021 period), and annual Statement of Corporate Intent and Corporate Risk Report. The organisation's Water Forever document (October 2009) forms the over-arching long-term 50 year plan for management of its water sources and delivery of water services to Perth, Mandurah and surrounding communities. This also drives the long-term wastewater planning for these areas. The Water Forever plan assesses growth predictions in the areas and looks at the impact of climate change on the supply demand water balance and

the different water sources used for supply, using information provided by Commonwealth Scientific and Industrial Research Organisation (CSIRO).

3.2.3 Opex

Water Corporation adopts the following approach to forecast and budget its operating expenditure:

1. A 'Macro Budget' is determined bottom up from groups across the business and from business cases for specific initiatives
2. The Macro Budget is fed into the 'Economic Forecasting Model' to determine whether Water Corporation is meeting its target of 2.0% real efficiency per property per annum on non-'level of service' operating expenditure and other efficiency dividends as agreed with Treasury
3. Where the Macro Budget exceeds the efficiency target, these bottom up budgets are iterated to find the efficiency to meet the top down target.

The Macro budgeting process starts with the previous financial year's budget as the starting point. Nominal inflation indices for labour and other inputs are then applied. Different indices are applied for different inputs based on the understanding of future changes in costs. An efficiency adjustment of 0.5% is then applied by the business to all budget areas as one means to drive cost savings throughout the business and reach the whole of business target. Adjustments are then made for known changes, for example capital projects and business initiatives.

In determining its performance relative to the efficiency target, Water Corporation compares its cumulative performance in the year in question back to 2010/11 as a reference year. This means that year on year fluctuations are smoothed out. We discuss Water Corporation's operating expenditure efficiency performance further in Section 4.5.

Water Corporation advised that its budgeting process is informed by the statement of corporate intent and the strategic development plan. When these documents are drafted, opex budgeting commences around the middle of the financial year with operating expenditure budgets finalised in May for approval through the State Government budget process. Therefore, this review has coincided with the period where Water Corporation's budgets for the 2017/18 financial year are being finalised. This has been exacerbated by the recent change in government in Western Australia. There is therefore some uncertainty that the operating budgets put forward by Water Corporation will be accepted as appropriate by the State Government; they may change.

There are two main pathways for the business to make step changes to its operating expenditure budgets in response to changes in its operating environment:

1. Financial Impact Statements (FIS) - capture the operating expenditure impacts from capital investment
2. Operating Implementation Business Cases (OIBC) – are required to demonstrate expenditure requirements due to a specific project or activity or due to changes in circumstances, e.g. regulatory change or growth.

FIS are prepared alongside the capital expenditure business cases and will be updated as the capital initiative is progressed from planning to delivery. FIS are the most significant driver of operating expenditure change from year to year. For the 2016/17 year, FIS accounted for $20.9M in operating expenditure additional to the prior year, around 2.3% of all operating expenditure. We describe and assess the operating expenditure arising from capital expenditure over the forward regulatory period in Section 4.3.3.

OIBCs have a threshold of $300k per annum impact. Impacts or initiatives less than this are expected to be delivered through existing operating budgets. Each OIBC includes an importance rating based on strategic fit, risk mitigation, whether the need is externally imposed and financial payoff. The Financial Management Branch compiles the OIBC for review by the executive in light of their relative importance and overall affordability. For 2016/17, accepted OIBC led to an increase in operating expenditure of $3.2M, a 0.3% increase on the year before.

Water Corporation has developed a process accountability framework for developing its operating expenditure budgets. While the Financial Management Branch is responsible for driving the process, groups

are responsible for developing their budgets. The Financial Management Branch uses the Macro Budget model to consolidate Group level budgets along with FISs and OIBCs. Where the bottom-up Macro Budget exceeds the required level of efficient expenditure, the Executive is responsible for determining with General Managers and process owners how the efficient level of expenditure will be achieved by reducing proposed expenditure or deferring initiatives.

We consider that Water Corporation's operating expenditure processes are appropriate for developing robust annual operating budgets from year to year. There is considerable governance around the budget process and there is constructive tension created between the business groups and Financial Management Branch. There are also appropriate mechanisms for the business to account for changes to its business in these forecasts as they are recognised. However, as we discuss further in Section 4, Water Corporation's approach does not lead to great certainty beyond the annual budget being prepared. In our experience, this is not typical for a water utility's being subject to a regulatory review. The lack of certainty beyond the annual budget creates a challenge for this regulatory review which is considering a five year period commencing more than one year from now.

There is a risk in using a nominal inflator approach for setting budgets that costs are factored into the budget that are not actually incurred and then remain in the 'base' expenditure in future years. Water Corporation responded to the draft report by noting that inflation parameters in the base budgets and Operating Efficiency Model are retrospectively adjusted each year to reflect actual inflation. We also note that in practice, the relatively high inflation environment Water Corporation has faced in preceding years will have also mitigated this risk. However, it is a concern for the future period where relatively low inflation is forecast and the regulatory approach does not have a mechanism for making adjustments each year.

3.3 Organisation, structure and functions

Water Corporation underwent a 'redesign' of its business in 2015. A new structure was put in place with the Groups detailed in Table 3-1, each with a General Manager (or Chief Financial Officer in the case of the Finance and corporate services Group) reporting to the Chief Executive Officer. Table 3-1 also details the functions that each group is responsible for, or geographical regions for the Operations Group.

Table 3-1 Organisational structure

Strategy and stakeholders	Finance and Corporate Cervices	Asset planning	Asset delivery	Operations services	Operations	Customer and community
▪ Strategy, Policy & Analytics ▪ Legal Services ▪ Infrastructure Markets ▪ Media and Government Relations ▪ Business Improvement	▪ Risk & Assurance ▪ Financial Management ▪ Pricing & Evaluation ▪ Procurement & Property ▪ Business & Technology Solutions ▪ Human Resources	▪ Asset Investment Planning Metro ▪ Asset Investment Planning Regional ▪ Asset Investment ▪ Asset Strategy ▪ Development Services	▪ Project Management ▪ Infrastructure Design ▪ Contracts ▪ Mechanical & Electrical Services	▪ Water Quality ▪ Operations Centre ▪ Safety, Environment & Aboriginal Affairs ▪ Operations Integration	▪ Great Southern Region ▪ Goldfields & Agricultural Region ▪ South West Region ▪ North West Region ▪ Mid West Region ▪ Field Services	▪ Contact Centre ▪ Customer Strategy & Engagement ▪ Customer & Industry Partnerships ▪ Customer Billing & Assurance ▪ Internal Communications

We note that it is not clear why there should be an "Operations services" Group separate to the "Operations" group. While the Operations services Group generally provides specialist services to the geographical based teams within the Operations Group, both Groups together are ultimately responsible for operating assets to deliver service to customers and there may be synergies and more streamlined decision making and activities through combining the two Groups. Water Corporation noted that this possibility has been considered and not ruled out.

Through the redesign, Water Corporation sold its Engineering and Construction branch with around 150 employees. This team was responsible for delivering around $80-100M of capital works each year. Other

reductions in staff numbers were made at this time. Water Corporation currently has a workforce of approximately 2,600 full time equivalents (FTE).

Water Corporation also delivers operations and maintenance activities through two alliances:

1. Perth Region Alliance (PRA) –an alliance between Programmed and Water Corporation that commenced in 2012 [redacted] and which includes water, wastewater and drainage networks..
2. Aroona Alliance – an alliance between Water Corporation, Suez and Broadspectrum which commenced in 2012 [redacted] and which includes collection and treatment of water and treatment and disposal of wastewater

Figure 3-1 provides an overview of these two alliances.

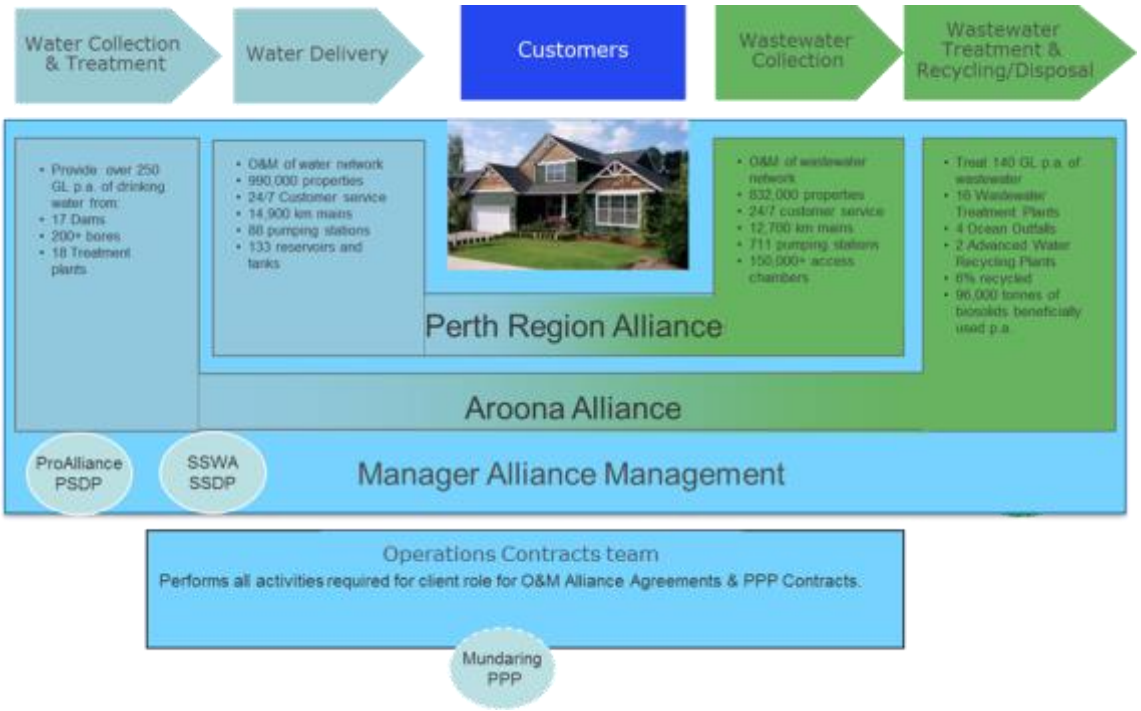

Figure 3-1 Overview of Perth Regional Alliance and Aroona Alliance
Source: Water Corporation

Water Corporation's two major desalination plants – the Perth Seawater Desalination Plant and the Southern Seawater Desalination Plant – are also alliance contracts with the private sector which include long term operation and maintenance components.

We noted at the time of the Asset Management System Effectiveness Review in 2015 that some process documentation was out of date and that processes were yet to be updated to reflect the revised structure and business model. This is understandable given the changes that had taken place. However, we have also noted at this review a disconnect between Water Corporation's documented tools and processes and how it actually develops its expenditure forecasts.

3.4 Overheads and cost allocation

We are required to comment on Water Corporation's treatment of overhead costs including the appropriateness of the included costs and the allocation of overhead costs. For the 2015/16 financial year, 62% of Water Corporation's operating expenditure (excluding depreciation) was for direct activities and the balance (32%, $330.7M) were support costs that were allocated.

Water Corporation has a structure of cost centres against which costs are booked. The cost centres include cost centres that are for support activities as well as cost centres that capture all costs for a region and finally, scheme level cost centres. Direct costs are booked to the regional level cost centre. Supporting costs are allocated to scheme cost centres in a two step process for the purpose of the pricing model. First, to

regional cost centres and secondly, to schemes or capital projects. Water Corporation provided to us a schedule for all cost centres which details:

> Whether the cost centres are direct opex or support opex

> For support opex, the basis on which the costs are allocated

> The cost centre that receives the allocated costs.

There are 354 different cost centres in the schedule. Of these, 71 are for 'direct opex' and the balance (283) are support costs. Note though that many cost centres are likely to be no longer in use with new cost centres introduced following the redesign project.

Direct opex cost centres in each region outside of Perth generally include:

> Occupation Health and Safety

> Stakeholder engagement

> Operations support

> Operations services

> Operations engineering

> Service delivery management.

There are additional cost centres with direct opex for Perth and Operational Assurance.

Of the 283 allocated cost centres, all but four are allocated to the regions. The exceptions are all allocated to a general corporate expenses category and relate to land clearing. From this general corporate expense category the costs are re-allocated to regions as for all other cost centres. There are six regions to which Water Corporation allocates support costs:

> Agricultural and Goldfields

> Great Southern

> Midwest

> North West

> Perth

> South West

Table 3-2 provides a summary of the approaches used to allocate support costs to the regions.

Table 3-2 Mapping of cost centres allocated to regions

Allocation approach	No. of cost centres allocated	Proportion of costs	Example cost centres allocated using this approach
Number of Water & Wastewater Services	165	41%	Executive Services, Comm Branch Mgt, Infill Sewerage Prog, Contracts Establishm, Project Mgmnt Ops, Project Mgt Proj Sup, Const Branch Proj Su, Geotech Instrumentn, Drilling Consulting, CWS Administration, Mechanical, Mechanical Services, Meter Test Serv Int, Plumbing Testing, Electrical Services, Electrical, Eng & Tech Services, Treatment, S-Industrial Waste, Operations Support, Framework & System, Strategy & Risk, Operations Integratn, Const Brch Projects, Const Admn Supp, I D Management, Design Office, Dams & Dams Safety, Program Mgt ID, Construction Specs, Elect Mech & SCADA, Water Conveyance, Water &W/Water Treat, RCS Group Exec, Mgr Customer B&A, Customer Billing Ser, 41, Operation Services, Balcatta Support, Customer Systems, CR Estate Admin, Property Management, Acquisitions,

Allocation approach	No. of cost centres allocated	Proportion of costs	Example cost centres allocated using this approach
			Accommodation Mgt, Customer Assurance, Metro Metering Serv, Regional Meter Reading
Fixed % based on Asset Value (TF5)	49	4%	Infrast Plng Mgt, Infrastr Plan Proj, General Manager, PC Group Initiatives, Administration, Human Resources, Executive Payroll, Renewals, Info Systems & Data, AM Mngmt Exec Pay, ASB Support, Asset Management Sys, Asset Information, Asset Reg & Research, Asset Risk, Asset Performance, Principle Strat Prgm, AIP Metro Branch Sup, In-Service Assts Met, IWCP - Metro, Customer Network Met, Drain & Waterway Met, Asset Perform Metro, Asset Manage Service, In-Service Asset Reg, IWCP - North, Customer Network Reg, IWCP - South, Resource Investigat, Asset Perform Region, Strategy & Integrt'n, Capability, Maintenance, Branch Support, Energy Management, OAM Asset Delivery, 41, AQ Management, Business Change PMO, Asset Handover, Country Water Pl IPB, IWSS Planning IPB, Strategic Init. IPB, WWT & Discharge IPB, Wastewater & Drainag, Maintenance Planning, AIP Regional Support
Fixed % based on ave lots cleared (TF9)	4	3%	Business Management, Land Planning, Land Servicing, Building Services
Fixed % based on FBT to regions (TF6)	1	0%	C- Gen Corp Expenses
Fixed % based on FTEs (TF1)	12	35%	HR Leadership Supp, HR Service Centre, People Development, Career Entry Program, HR Operations, Employee Relations, Payroll, OD & Performance, Superannuation, Recruitment, Apprentice & Trainee, W/force Plan & Syst
Fixed % based on FTEs (TF5)	1		Legal Services
Fixed % based on FTEs + Alliance (TF2)	48		Environmental Approv, Managing Director, Board, Mgt Review & Audit, Finance Group Mgt, Corp Financial Mgt, Corporate Charges, Risk Management, Branch Management, Information Planning, Information Projects, Information Services, Library & Records, IT Program Mgt, Environment Proj, Environment Mgt, Business Syst Group, Data Room Project, BS Group Initiatives, MD Exec Payroll, Fin Div Exec Payroll, Corporate IT Costs, Str & Corp Analytics, Chief Operating Off, Business Serv Mgt, BS Exec Payroll, OSH Administration, Aboriginal Affairs, Spatial Info Mng Grp, Executive Support, Utilities Services, Enhancement Services, Commercial Support, ISB Scada Support, Governance & Health, Consult & Field Serv, 41, Acquisition Strategy, Info Mgt Competency, Enhan't Services IBM, Utilit Serv Kinetic, Environment Contamin, Strat, Plan & Govern, Busines Relationship, IT Operations, Infrastructure Mngmt, Information Managmnt, Library and Records

We have reviewed the allocation approaches and the cost centres included and consider the approach is reasonable, although we have not audited the allocation of costs. The most used allocation approaches are:

> Number of water services – used for many whole of business support activities (e.g. billing) as well as whole of business support functions (e.g. SCADA)

> Asset value – used for many asset management related tasks

> FTEs – used for functions that support employees to undertake their work, e.g. IT and HR

We consider that cost allocation to the region level is appropriate.

The second step in allocation is undertaken by assigning the pool of support costs at region level to specific schemes proportional to the direct opex recorded for that scheme. We are concerned that this approach may not provide an accurate picture of the cost to service small and medium sized schemes. This is because direct opex for a small scheme can be significantly impacted by a single high cost activity, e.g. major maintenance. We discuss cost allocation at the scheme level in more detail following.

Figure 3-2 shows for each of Water Corporation's schemes the allocated support costs per connection plotted against the number of connections in each scheme.

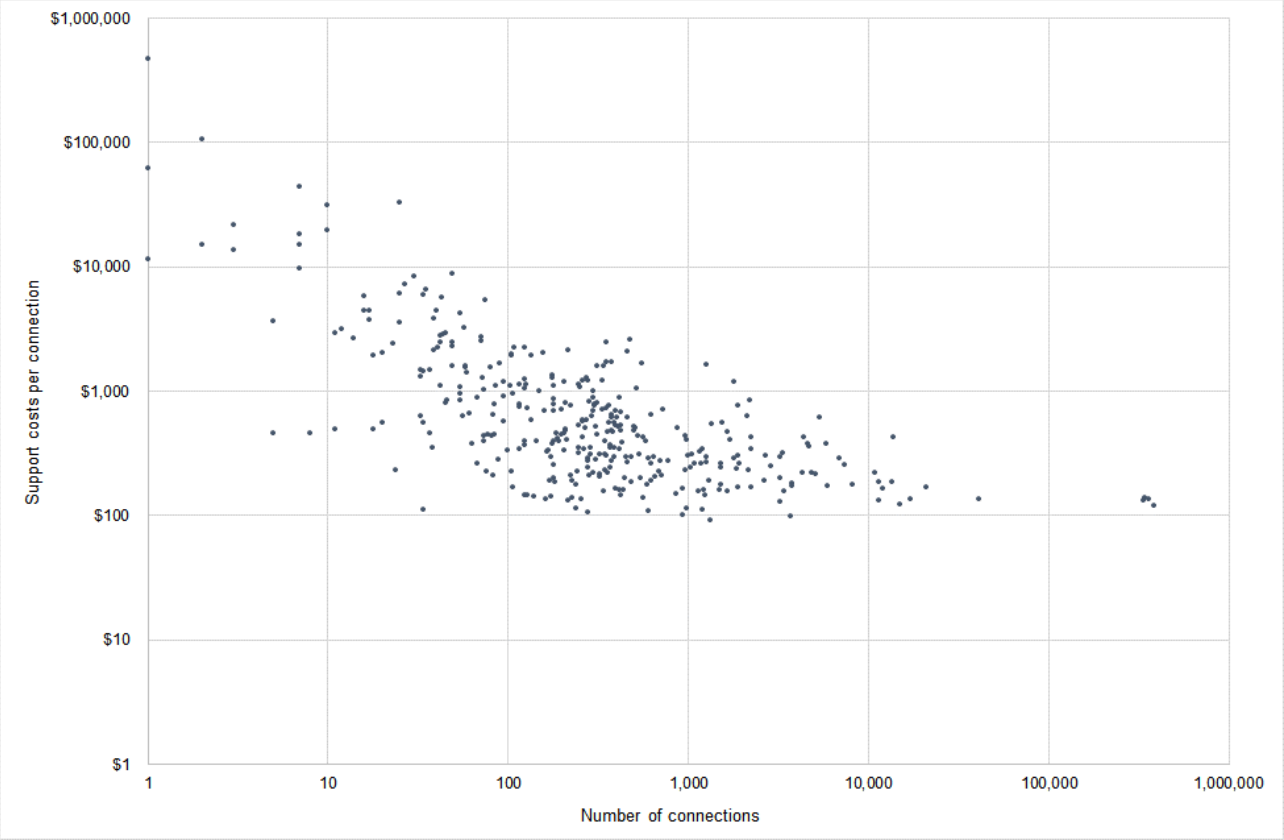

Figure 3-2 Support costs per connection v number of connections

This figure shows:

> A generally declining level of support costs per connection as schemes get larger, consistent with economies of scale being realised.

> A lower bound of around $100 per connection of support costs. The large Perth metropolitan schemes have support costs of between $119/connection to $138/connection. As identified in Section 2.2.2, Water Corporation's support costs per connection across its whole business ($394/connection) are higher than its peers. However, these figures for Perth are of a similar magnitude to the support costs for Hunter Water ($182/connection) and Sydney Water ($103/connection) which serve a greater proportion of metropolitan areas.

> Somewhat surprisingly large variance in support costs for schemes of the same relative size. For example, the support costs for schemes from 100 – 10,000 connections lie within in a band of broadly $100 - $2,000 per connection. There is no obvious reason on why the cost to support schemes of relatively similar size would vary so widely.

> There are a number of significant outliers, most notably:

  - W-F/L - Won Hill Eas with support costs of $473,000 per connection

- W-F/L - Waddourin Nt with support costs of $107,000 per connection
- W-Millstream to Yann with support costs of $61,500 per connection

> Unsurprisingly, all of the above schemes have very few connections: one, two and one respectively. All of the above schemes also have relatively high costs in the "Ops and Maintenance" category (which then drive allocation of support costs) in the year.

It is an outcome of Water Corporation's allocation methodology that support costs are highly correlated to "Ops and Maintenance" costs for the scheme in the year. This then leaves the allocation open to being skewed by irregular maintenance costs (e.g. corrective maintenance or high value scheduled maintenance carried out at long intervals) and the problem is exacerbated for schemes with small numbers of connections.

We do not accept that it would cost $473,000 to support delivery of a scheme with one connection. While a higher cost to serve smaller and more remote schemes is expected, we suggest that the highly variable nature of Ops and Maintenance costs and the resulting variability on direct costs for small schemes, makes the current allocation approach not reflective of the true cost to serve small schemes. To the extent that allocation of costs to a scheme level is important, we recommend that Water Corporation revisit its allocation methodology and adopt a proxy for allocation of support costs that is more representative of the costs to serve schemes. Alternative approaches may include:

1. Adding an overhead burden to "Ops and maintenance" activities at a flat rate reflective of the support costs of providing "Ops and maintenance". These overhead costs would be subtracted from the total indirect costs pool before these are distributed to schemes based on a measure such as number of connections.
2. Using average direct costs over a five year period as the basis of allocation to reduce the volatility from year to year

The final decision should be made by Water Corporation based on its understanding of the costs and benefits of implementing an alternative methodology. Water Corporation advised in response to the draft report that it has now moved to a three year weighted average of "ops and maintenance" costs for allocating overhead costs. While this will be an improvement on the existing approach, we recommend that Water Corporation demonstrate that this averaging period is an appropriate proxy for the cost to serve each scheme. A longer period will provide a better approximation of the cost to serve but there are trade-offs in other areas such as complexity, data retention and consistency.

The above discussion concerns Water Corporation's methodology for allocating support costs. We discuss Water Corporation's level of support costs relative to other Australian water utilities in Section 2.2.2.

3.5 Asset management framework

Water Corporation has developed a series of tools, processes, systems, practices that aim to ensure its assets are delivering effective services to customers. The key components of the Asset Management System and Framework is outlined in Water Corporation's Asset Management System Manual (*PM#14247282 last updated 09/09/16*[6]).

Water Corporation's asset management functions have been broadly structured under the asset owner, asset manager and service delivery partner model as depicted in Figure 3-1. Water Corporation is in the process of aligning its asset management framework to ISO550001, it has identified that just over half of its asset management system is aligned to ISO55001.

[6] Water Corporation advised in response to the draft report that this manual was updated on 9 June 2017 which was after this review commenced. This later version of the manual now notes that 82% of all key documentation is broadly aligned with ISO55001.

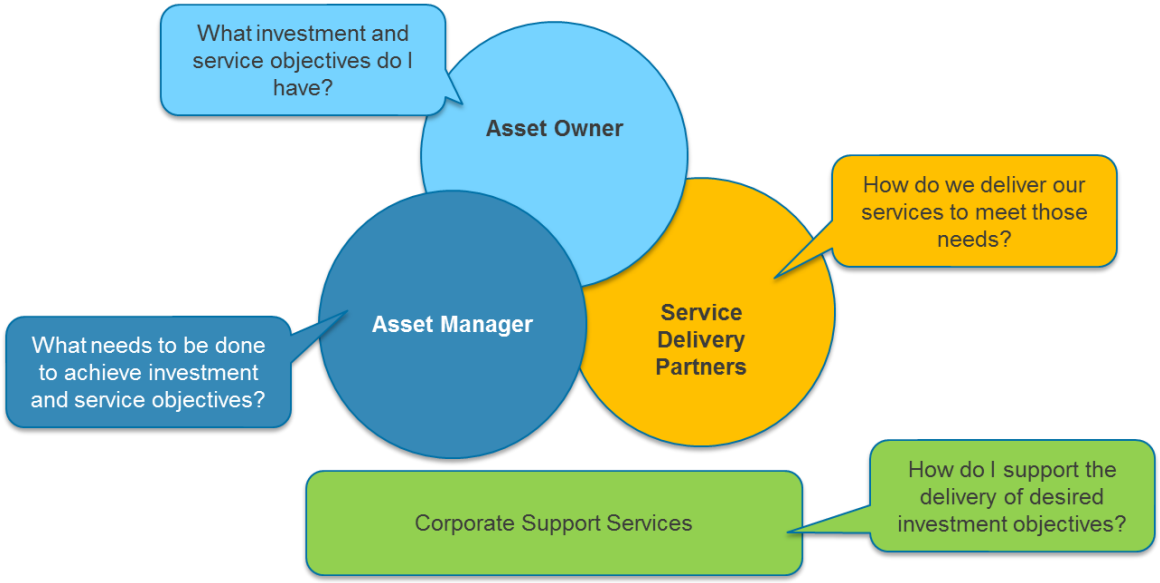

Figure 3-1 Water Corporation's Asset owner, asset manager and service delivery partner model

The asset management framework is based around the new concept of a 'Line of sight' between Customers, strategic and corporate objectives, business services and relating corporate risk drivers to the various investment categories.

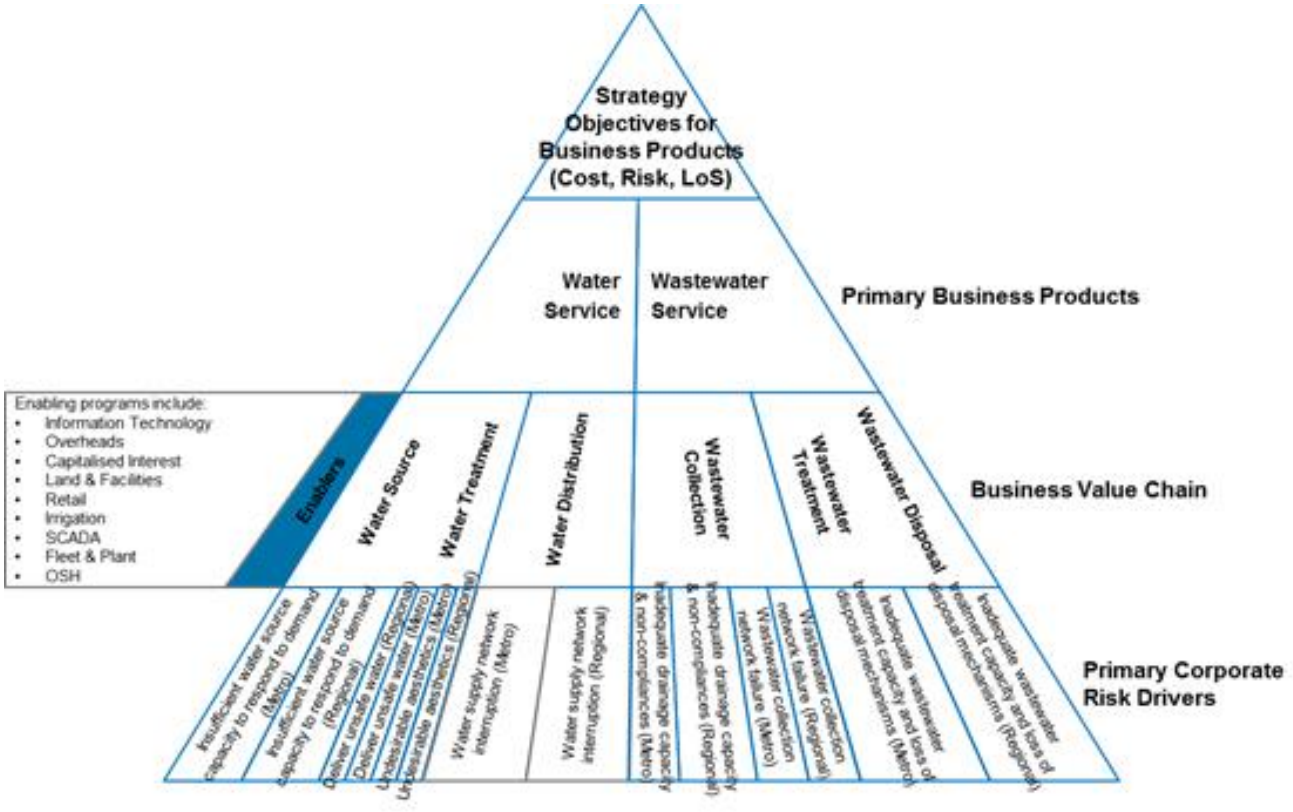

Figure 3-3 Line of sight through Water Corporation's business

Table 3-3 outlines Water Corporation's asset management document hierarchy, this outlines how the line of sight from the corporate objectives cascades through the documentation. Water Corporation's Asset Management Strategy translates corporate objectives into asset management objectives. It defines what WC intend to achieve from asset management activities and timescales.

We are informed that Water Corporation's strategies inform the asset management planning through defining level of services and associated decision making criteria, however we have not been provided evidence of how the asset management plan informs scheme planning and investment decisions based on defining service levels. We consider that thereis no clear link between the asset management framework and the asset investment plan especially with respect to how that plan is integrated and optimised.

Table 3-3 Document hierarchy and line of sight from Water Corporation's corporate objectives

Line of Sight	Asset Management System Layer	Key Elements		
	Stakeholder Needs & Governance	**Corporate Strategies**		
	Strategic Asset Management	**Asset Management Strategy**		
		Asset Class Strategies	**Geographical Strategies**	**Investment Strategies**
	Planning to Meet Objectives	**Asset Class Plans** (Maintenance & Renewals)	**Scheme Plans** *Network Service Plan, Integrated Water Cycle Plan or Drainage Plan*	
		Asset Investment Plans *(integration & optimisation)*		

Since our last review there has been an organisation transformation which was aimed to better reflect the different service delivery approaches taken in urban and rural areas through separating operations into regional areas and alliances.

3.6 Cost estimating process

Water Corporation's cost estimation team has built a comprehensive cost estimation system which draws on unit rates received in tender processes to produce scheme estimates. The system also provides a framework for generating schedules of prices for tender processes and for settlement to the Fixed Asset Register and Fixed Location Register at PPC stage in a consistent manner.

Users can draw on a MS Excel cost estimation spreadsheet, which builds up estimates from assumed and measured quantities as well as generic estimates produced using typical quantities and average rates from the Quest database.

The model functions in current dollars for the Metro area and is updated for tender prices on a weekly basis. Regional adjustments are made to the unit rates for schemes outside of this area. The regional adjustments are challenging and largely theoretical rather than empirical because there are few data points to calibrate them. They are based loosely on the Rawlinsons method which uses concentric rings from the Metro area and are adjusted when they appear to be incorrect.

Scheme and project cost estimates are produced by the seven person strong cost estimation team, working alongside project managers and planners. A check list is used to ensure that factors, such as power availability, which may significantly affect cost are reflected in the estimate where possible. The team manually analyse tender data to exclude unusual tenders and generally add the average of the three lowest bids received in the database.

The model uses the Construction Cost Index to bring historical tendered rates to current prices for analysis. This index is also used to generate future nominal cost estimates at the expected mid-point of the construction process. The index is updated quarterly. Although the model is updated regularly, it does not give greater weight to more recent tender prices or take account of the effect of delivery mechanism. It is possible that some adjustments are made outside of the model to take account of these factors. From discussions with Water Corporation staff we understand that it has been difficult to keep up to date with the market recently with bids coming in lower than expected.

The Construction Cost Index used is different to the Capital Cost Index used by Water Corporation in its submission, as demonstrated in the example below using a cost estimate produced in June 2016[7].

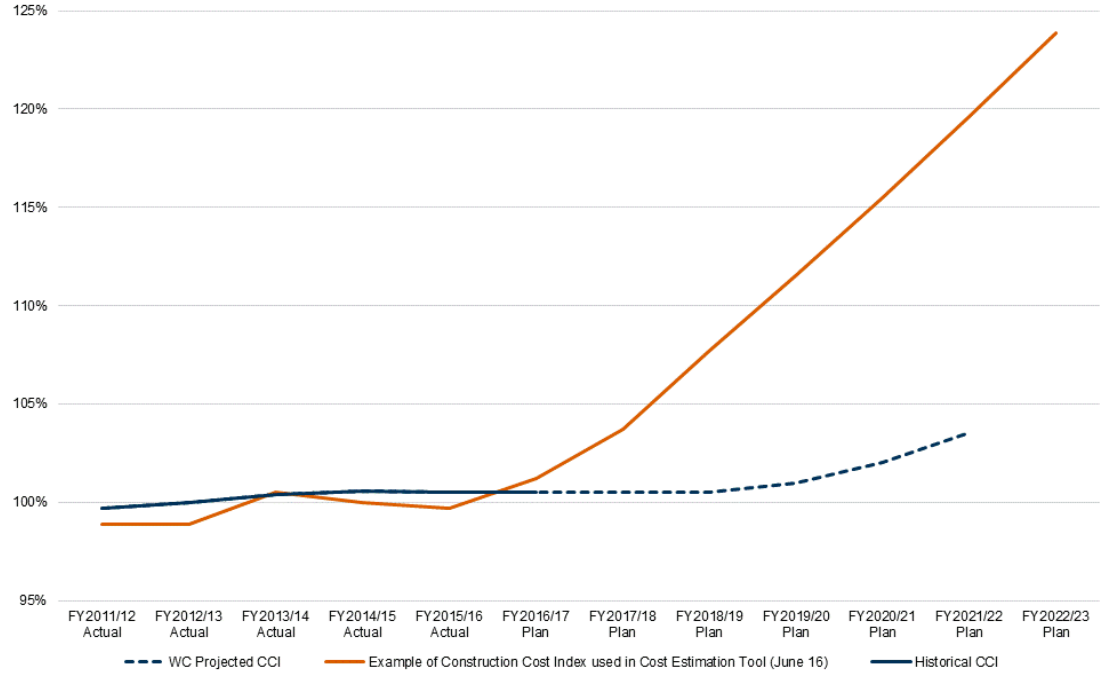

Figure 3-4: Comparison of capital cost index used in the submission and used in cost estimate tool

Note: 2010/11 is 100%. It is understood that the Construction Cost Index in the cost estimation tool is updated regularly so estimates produced on different dates will have different escalation rates.

Cost estimators can use it to produce average costs and or use the 'best fit' curves it generates to relate scale to unit cost. The cost estimates produced incorporate 'white collar' costs (e.g. design and approvals). The cost estimation team gather data each year on the average white collar cost by project and produce cost curves to inform planning level estimates.

Contingency is manually added by estimators for different lines in the estimation tool based on their experience of typical outturn variance and is not based on structured empirical analysis. Cost estimators develop advised values for specific risks. These risks do not explicitly link to the contingency calculation.

The team work to a confidence interval of -10% to +50% for scheme planning estimates. This is a wide, asymmetrical range because geotechnical investigations, the results of which can significantly increase schemes costs, are not generally in place at planning stage. As a guide the team work to a range of -5% to +10% for Approved Estimates (Cat A projects only). The team have a formal KPI for the Approval to Deliver (ATD) stage with the aim of achieving -5 to +20% accuracy. The KPI measure is adjusted for scope change after ATD.

The cost estimation team's major KPI target is for the aggregate outturn cost of approved estimates reaching PPC in a given year to be 5% below the sum of prior cost estimates, with a stretch target of 7% below prior estimates. From discussions with Water Corporation staff we understand that spend has been consistently close to the 5% underspend target. The cost estimation team considers that this provides validation of the overall approach and of the levels of contingency being applied.

Examples of the levels of contingency and/or outturn cost variation seen in the project reviews include:

Table 3-4 Examples of contingency and/or outturn cost variation in project reviews

Project	Comment
[redacted]	Expected outturn costs now ~$19M, circa 20% below ATD

[7] [redacted]

	estimate of ~$24M at ATD.
[redacted]	$7.3M requested at ATD stage, including 9.2% contingency. Outturn cost expected to be ~$4.8M, i.e. 34% below ATD estimate.
[redacted]	Circa 42% contingency incorporated in Planning Summary Business Case (pre-activation stage).
[redacted]	Contingency of circa 37% at Scoping phase (based on adding 50% allowances for a number of items),
[redacted]	Contingency of 11.9% in Project Delivery Business Case (ATD)
[redacted]	"So far, rates from PRA significantly cheaper than the cost estimators"
[redacted]	Circa 10% contingency at ATD stage.

To complement this review of cost estimating, we have undertaking benchmarking of the cost estimates prepared by Water Corporation for a sample of capital expenditure projects against Cardno's cost models and unit rates databases. These cost models and databases are comprehensive and are routinely updated using actual contract data. Factors from the Rawlinsons handbook are used to estimate regional cost differences. The findings of the analysis are shown in Table 3-5.

Table 3-5 Findings from benchmarking of sample of capital expenditure projects

Project ID	Project Name	Estimated Total Project Cost: Water Corporation	Estimated Total Project Cost: Cardno	Water Corp/ Cardno Variance (%)	Comments
CW03090	[redacted]	$5.1M	$6.9M	-26.1% ↓	▪ A regional uplift factor of 1.60 was applied to Water Corporation's cost estimate which appears to be conservative. ▪ Estimated costs derived in Water Corporations detailed options analysis[8] were sourced from 2009 unit rate schedules and were deemed to be applicable to FY2014 costs. There would have been material price movement since then which could contribute to the variance in benchmarked costs.
CS01088	[redacted]	$14.8M ($24.3M is total project cost, figure above excludes TWW Recycling components)	$11.7M (cost estimate excludes TWW Recycling components)	+26.5% ↑	▪ Benchmark results indicate Cardno's cost estimate compares relatively well with Water Corporation's estimates for direct costs. ▪ The variance is likely to be attributed to higher contingency costs incorporated in Water Corporation's estimate (i.e. 50% contingency factor). Such approach could be viewed as being overly conservative for an estimate that had been prepared as part of a detailed options analysis.
CW03388	[redacted]	$24.0M	$26.1M excluding locality factor (i.e. Perth) $37.9M with locality factor	-8.0% (excl locality factor) -57.9% (incl locality	▪ The forecast project estimate at completion is expected to be ~$17.2M (savings of approximately $6.8M). WaterCorp had attributed the difference between estimated and actual outturns to the following: – Contract savings (pre-bid estimate $15.1M vs awarded amount $9.5M – savings of approximately $5.6M) – A lot lower than expected impact of locality

[8] [redacted]

Project ID	Project Name	Estimated Total Project Cost			Comments
		Water Corporation	Cardno	Water Corp/ Cardno Variance (%)	
			included	factor	(WaterCorp assumed a locality factor of 1.45)
CS03433	[redacted]	$15.8M	$11.7M	+35.0% ↑	▪ Benchmark results indicate Cardno's cost estimate for direct costs compares relatively well with Water Corporation's estimates. ▪ The variance is likely to be attributed to contingency costs assumed in Water Corporation's estimate. The project is at a very early stage with no options appraisal yet carried out.

The preceding analysis shows considerable variance, both positive and negative, between Water Corporation's cost estimates and the benchmarks. For two of the four projects benchmarked, there was good agreement between the two direct cost components. The variance observed for these projects can largely be attributed to the contingency applied by Water Corporation. For one project, Water Corporation appears to have used unrealistically low unit rates from 2009.

Water Corporation's cost estimation system is impressive in its comprehensiveness, links to other processes and level of granularity. However, despite this, there is significant uncertainty in the contingency allowances and regional adjustments, and probably also the cost escalation factor applied, given that many recent tender prices have been lower than expected. This is demonstrated by our review of the build up of cost estimates and benchmarking of these estimates (Table 3-4 and Table 3-5). Best practice suggests a consistent, empirically-robust, approach to deriving contingency allowances, comparing full outturn costs to prior assumptions. We also consider that it would be prudent to carry out further validation of the regional adjustments to improve confidence in estimates outside of the Metro area.

Given that there is an incentive built in the cost estimating team's KPI to err on the side of caution in ATD cost estimates and the lack of empirical analysis underlying contingency and regional allowances, we consider it likely that there is a systematic bias towards overestimation of capex. As discussed in Section 5, in developing our view of the prudent and efficient level of future capex, we have made an adjustment to take account of this overestimation.

3.7 Procurement

Water Corporation follows the Government of Western Australia's, Department of Finance *Government Procurement Practice Guide* which informs the Water Corporation Policy *PCY216 Procurement of Goods and Services*. Procurement activities are generally split 50/50 between operational expenditure items and capital expenditure items.

The overall procurement; bidding and evaluation process follows seven stages as shown in

Figure 3-5.

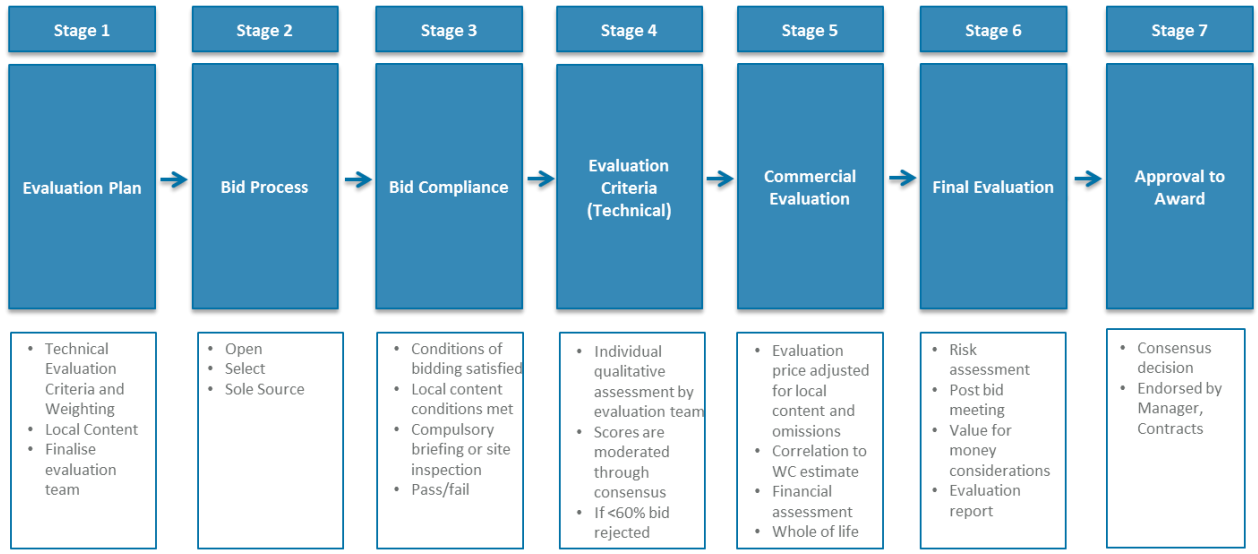

Figure 3-5: Water Corporation's procurement process

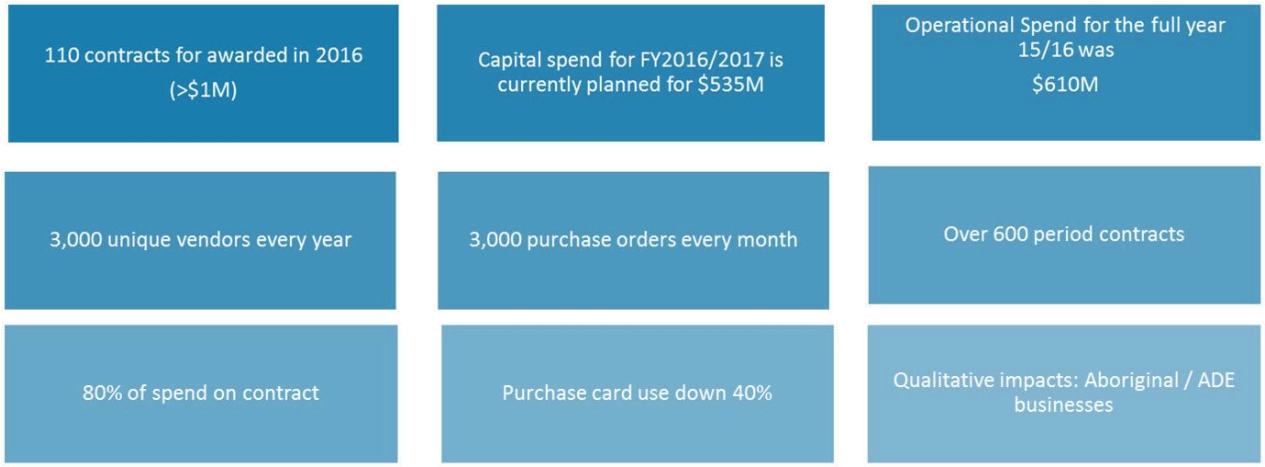

Figure 3-6: Water Corporation Procurement Activity Summary

Operational Procurement

The majority of operational procurement are based on period contracts where preferred suppliers are chosen for various tranches of goods. Water Corporation's Procurement Policy is unique due to be a wholly owned government institution, not bound by Department of Finance procurement rules. Water Corporation are able to leverage common use arrangements if needed but treated as benchmark or target to beat "more stringent" when do procure. For goods of value >$20k there is a need to undertake a competitive tender process; dependent on the markets for commodities but typically consisting of three suppliers.

We have been provided a number of examples which demonstrate where effective procurement practise has been applied and led to efficient outcomes and monetary savings for Water Corporation as follows:

Reticulation Fittings

Water Corporation recently retendered for these products resulting in a shift of supply to a vendor with a robust local and international supply chain delivering improved commercial value and quality outcomes

Freight/warehousing

Water Corporation recently undertook a sourcing exercise across its main freight and logistics contracts. As part of this process, only large providers with state-wide coverage were invited to bid due to Water Corporation's service level and safety requirements. It is thought that Water Corporation will realise $900k of savings over the five year contract term.

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Sodium hypochlorite

Supply of sodium hypochlorite was previously undertaken by multiple suppliers; Water Corporation has now moved to a single supplier. Whilst the cost of the product was considered important, the primary influence on shifting to a single source of supply was to improve product purity and therefore increased opex savings, via less downtime the Aroona Alliance plants.

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Inventory items

Water Corporation have been procuring these items of contract spending $26M with lots of supplier choice and varying quality and little standardisation. They are trying to get standing offer contracts rather than one off pieces. Water Corporation is looking to save $2.5M to $3M, with savings to be realised over two to three years. Proof of concept business case is being put forward, with estimates to save 10%.

Capital Procurement

Water Corporation employs a mixed approach to capital procurement. The approach is selected on a project and sometimes sub-program basis, including for example:

> A panel of approximately seven suppliers for cast iron mains renewal work. There are no fixed rates, instead Water Corporation generally approaches three suppliers for competitive tender.

> Competitive alliancing has been used for a number of large/specialist projects such as Woodman Pt WWTP Upgrade and Southern Seawater Desalination Plant.

> Use of PRA or Aroona alliance contracts, which allow for some capital works on a 'cost plus' basis. For example, Water Corporation is delivering 'Bassendean Design Block 7', a water efficiency/loss reduction project through PRA.

> "Place-based programming" to group different investment types in the same area into a package which will attract more competitive tenders. E.g. Murchison towns where there are five plants with water quality problems.

> "Preferred supplier agreements" for sewer relining which sets out fixed rates with a single provider over a 5 year period from 2016-2021.

> In some cases, Water Corporation engages in "Principal Supplied Items" e.g. Water Corporation supplies pipes free of charge to a contractor to leverage its economy of scales.

Water Corporation informed us that it has tried term contracts or similar, but that they were not considered successful. Water Corporation found that competitive tendering was beating term contract rates, potentially as the market was becoming more competitive. Water Corporation also found that a mid-tier panel, which was set up during the economic boom years, was more expensive than other options when contracting outside of Perth because of the distances involved.

Based on the projects and programs reviewed Water Corporation appears to put a reasonably significant amount of effort into optimal procurement at a project level. However, we found little evidence of rigorous quantitative evaluation of procurement options at aggregate level. It therefore seems likely that Water Corporation could make further efficiency gains by undertaking such a review.

3.8 Risk management

Corporate risk framework

Water Corporation maintains a holistic, integrated Risk Management Framework consistent with International Standard AS/NZ ISO 31000:2009 Risk Management – Principles and Guidelines. This attempts to link corporate governance, strategic and business planning processes and optimising operations with the aim of ensuring that risk based decision making is based on a consistent application of the Corporate methodology objectives.

As discussed in Section 3.5 above the line of sight blueprint (the blueprint) has been developed to demonstrate the linkage between risk and investment. The line of sight brings together three separate business processes to link corporate risks, strategic investment and investment programs. The aim is to be able to demonstrate a progression to improve alignment between internal risk and investment processes that will underpin future enhancements to investment strategy. Whilst our review confirms that the principles are in place the Water Corporation have been unable to demonstrate appropriately that such linkages between risk and investment exist.

There are 19 key risks identified in the corporate risk plan:

1. [redacted]
2. [redacted]
3. [redacted]
4. [redacted]
5. [redacted]
6. [redacted]
7. [redacted]
8. [redacted]
9. [redacted]
10. [redacted]
11. [redacted]
12. [redacted]
13. [redacted]
14. [redacted]
15. [redacted]
16. [redacted]
17. [redacted]
18. [redacted]
19. [redacted]

Water Corporation has mapped this to a risk heatmap based on consequence and likelihood and indicating on a risk level how these relate to the SIBC and the level of both the System Risk Assessment (SRA) and Asset Risk Assessment (ARA).

System Risk Assessment

A SRA is carried out for every system encompassing: Quality, Capacity, Asset, Growth and undertaken for seven points in time. Higher scores are allocated to larger risks, with a maximum risk score of 480.

For example, the forecast risks for the Woodman Point sewerage scheme are:

> QD – effluent quality

> QR – quality for reuse

> OD – odour

> OW – overflows

> UC – Unable to cope (hydraulic/biological)

> AP – asset performance e.g. failure

> GR – growth – specifically for planning e.g. capacity to deal with new developers and builders.

The scoring of risk is consistent with the corporate risk framework. Consequences are separate scored for financial, people, environmental, business, reputation and compliance categories. Asset owners in field then endorse the risk assessment and the risks are accepted.

4 Operating expenditure

4.1 Overview

Water Corporation's past and future operating expenditure is shown in Figure 4-1, along with the forecast efficient operating expenditure included in the ERAWA's 2012 Inquiry Final Report and the budget figure determined for each year[9].

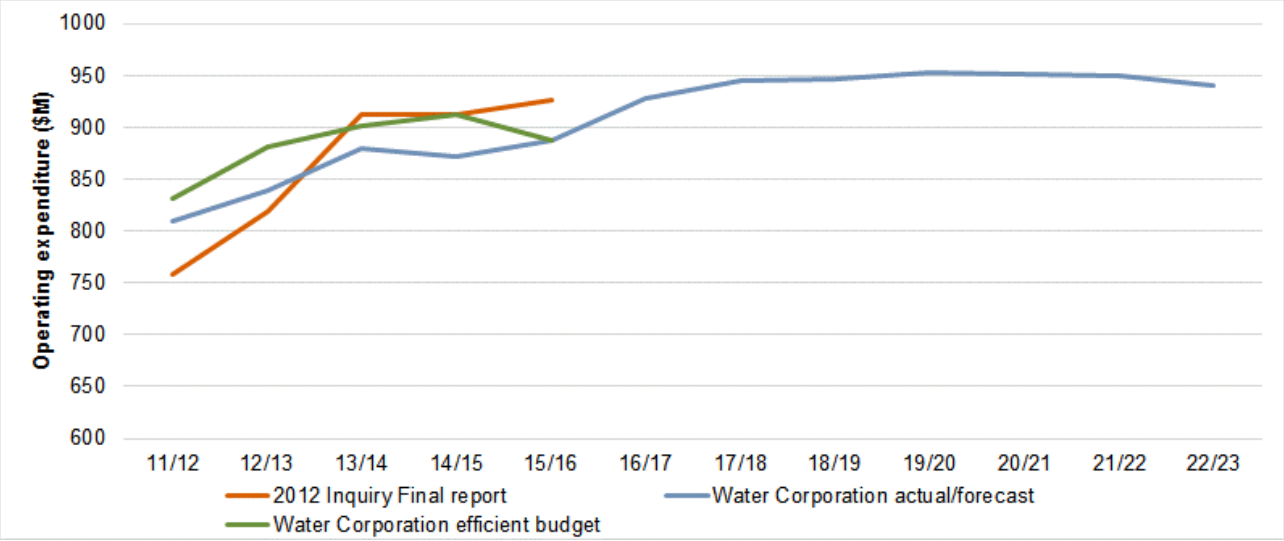

Figure 4-1 Past and future operating expenditure (Real $16/17)

Sources: Inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and the Busselton Water Board, ERAWA, 2012, Table 18, p. 51; Water Corporation operating efficiency model; Water Corporation presentation PM-#16778738-v1-ERA_Review_-_Opex.PPTX and Water Corporation submission

This figure shows that:

> In real terms, operating expenditure has been increasing, first through two step changes in 2012/13 and 2013/14 (totalling $70.1M) before a small decrease and then a $73.1M actual increase over three years from 2015/16 and forecast for 2017/18

> Beyond 2017/18, expenditure is forecast as being flat in real terms. In the four years from 2017/18 to 2021/22, a $5.0M real increase in operating expenditure is forecast, equating to an increase of 0.1% per year, despite a forecast average annual increase in property numbers of 1.8% per year (We comment further on this assumption at the end of this section).

> Expenditure in 2022/23 decreased in real terms compared with the prior year. Water Corporation explains in its submission that it has used a different approach for forecasting expenditure in this year compared with the prior years in the regulatory period. We consider that the decrease observed is a result of this forecasting approach and not reflective of Water Corporation's likely efficient costs. Accordingly, we recommend an adjustment to expenditure in this year in Section 4.6.

> Actual operating expenditure has been generally below the efficient budget in each year. Water Corporation advised that the reasons for this include lower than anticipated inflation and growth, delay in project commissioning and operating efficiency dividends imposed by the State government

> Actual operating expenditure has been below that deemed efficient at the time of the 2012 Inquiry for the three years from 2013/14 (the Inquiry recommendations were relevant from 2013/14). For these three

[9] Note that historical and forecast operating expenditure provided by Water Corporation includes two items of expenditure – 'reimbursable projects' and 'contestable business' which would appear to be outside of Water Corporation's regulated activities. These items are included in the total operating expenditure amounts in Water's Corporation's submission. To be consistent with Water Corporation's submission, we have not removed these items when discussion aggregate trends but do remove them in our final recommendations.

years, actual operating expenditure was an average of $37.2M per year below the level recommended as efficient

Figure 4-2 compares the year on year change in Water Corporation's operating expenditure in real terms compared with the actual and forecast change in the number of water connections. This figure shows that:

> There was a peak in water connections growth of 3.0% in 2013/14 but this has fallen since to 2.0% in 2015/16. For the period from 2016/17 forward, the growth rate is forecast to be consistent at around 1.8% per annum

> As seen above in Figure 4-1, step changes in operating expenditure in 2012/13 and 2013/14 were followed by a drop in 2014/15.

> For the forward regulatory period starting from 2018/19, the real change in operating expenditure is near zero and well below the forecast growth in connections. However, the two years prior to the forward regulatory period include step ups in operating expenditure.

> Overall, the trends in annual opex change and annual connections change show that growth is not a major driver for operating expenditure in the forward period.

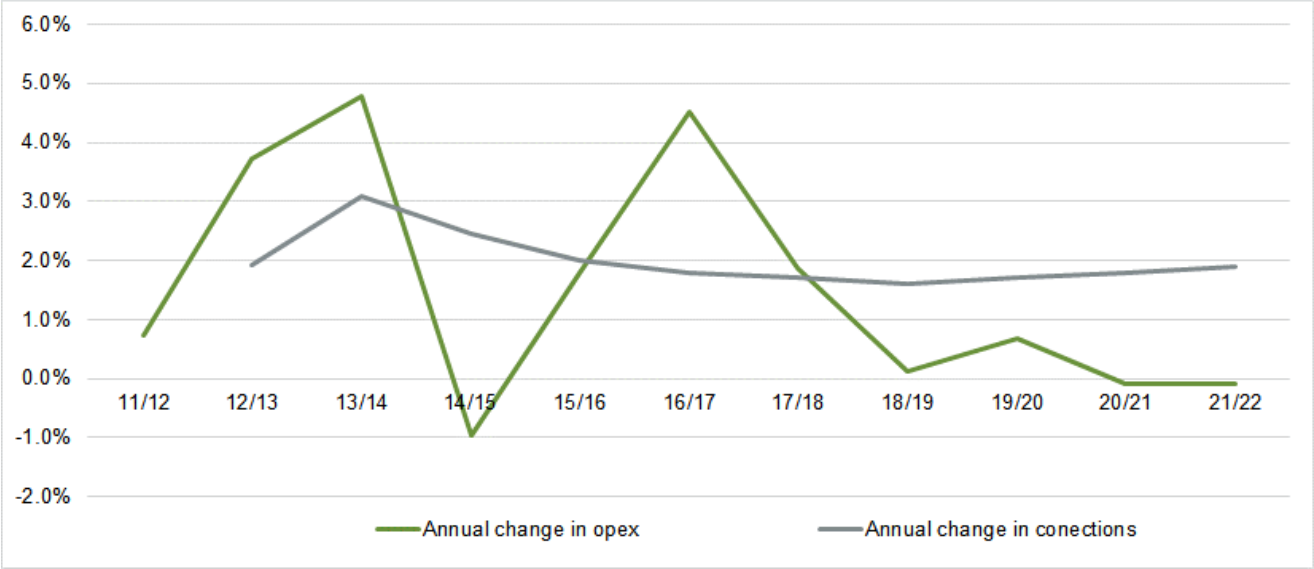

Figure 4-2 Annual real change in operating costs and connections
Source: Water Corporation Operating Efficiency Model

Water Corporation forecasts an increase in property numbers of 1.8% per year. Western Australia Treasury[10] forecasts initially lower state-wide population growth at 1.2% per annum in 2016/17 but rising to match Water Corporation's estimate of 1.8% per annum by 2019/20. Figure 4-3 shows historic levels of population growth in Western Australia separate for Perth and the rest of the state. The growth rate is clearly declining with a current growth rate of around 1.0% for the state as a whole and near zero outside of Perth. In light of these trends, the 1.8% per annum forecast appears optimistic. If economic growth in Western Australia does not improve, the actual population growth will likely be lower than forecast by Water Corporation.

[10] http://www.treasury.wa.gov.au/Treasury/Economic_Data/Economic_Forecasts/

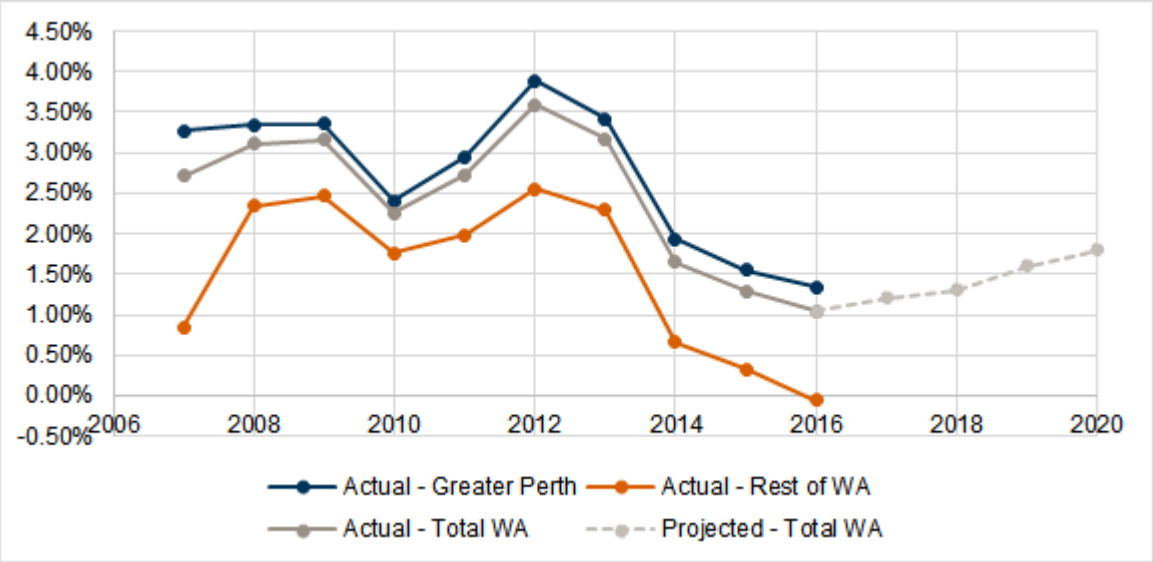

Figure 4-3 Actual and forecast population growth
Source: ABS Catalogue 3218.0 Table No. 5 sourced from www.abs.gov.au

4.2 Base year operating expenditure

As described in Section 3.2.3, Water Corporation adopts a budget on budget approach for developing its operating expenditure budgets with these bottom-up budgets developed to fall within the top down 'limit' determined by the Operating Efficiency Model. Adjustments are made in nominal terms for inflation and changes in service delivery. Therefore, our analysis needs to consider whether the expenditure items included in the 'base' budget are justified before considering the proposed year on year changes.

Water Corporation is currently finalising its operating budget for the 2017/18 financial year. The first year of the regulatory period is one year later, 2018/19. The most recent financial year which has been subject to independent financial audit was 2015/16. For the current financial year, Water Corporation has two quarters of actual costs.

We have adopted 2015/16, being the most recently concluded full year for which operating costs are available, as the base year for our analysis. The base year approach relies on the 'revealed cost' assumption, i.e. that a regulated business has an incentive for spending its most efficient level of operating expenditure in any given year as it will benefit from being able to maintain expenditure at the lowest level possible during the regulatory period – this will maximise profit as its level of revenue is largely outside of its control. Water Corporation's actual operating expenditure in 2015/16 was $39M (4%) below the efficient level of operating expenditure proposed by the ERAWA at the 2012 regulatory inquiry.

4.3 Movement in operating expenditure between base year and forward regulatory period[11]

The timing of this review is such that there are two financial years – 2016/17 and 2017/18 before the commencement of the forward regulatory period in 2018/19. In this section we analyse movements in these years before considering operating expenditure in the forward regulatory period in the next section.

[11] Analysis in this section is drawn from multiple financial models provided by Water Corporation. Water Corporation's submission has been used as the point of truth for operating expenditure forecasts. Analysis of year on year movements at the aggregate level are based on the submission. The movements in expenditure driven by capital expenditure and initiatives (i.e. the FIS and OIBC initiatives as described) are detailed in the Macro Budget Model and analysis of these movements is based on this model. However, this model does not reconcile exactly with Water Corporation's submission. The Operating Efficiency Model provides a useful breakdown of movements in level of service items and this model has been used where it provides useful insight into the reasons for observed movements. Our recommendations use Water Corporation's submission as the starting point and make a number of recommendations drawing on analysis from the different models. The consistency in our recommendations is based on the consistency of Water Corporation's forecasting and budgeting process between the different models.

Figure 4-1 and Figure 4-2 in the previous section show real increases in operating expenditure in 2015/16, 2016/17 and 2017/18 before flattening. Table 4-1 details the items that contribute the most significant changes in operating expenditure between 2015/16 and 2017/18 (positive and negative).

Table 4-1 Drivers for changes in operating expenditure 2015/16 to 2017/18

Year	Nominal increase over past year	Real increase ($16/17)	Drivers ($nominal)
2015/16	$21.6M	$15.7	▪ $32.1M increase in desalination costs driven by additional water production at the Southern Seawater Desalination Plant (+12.8GL) (OEM and OP) ▪ $8.3M increase for contaminated land remediation and asbestos removal (OEM) ▪ $3.4M one off cost for sale of the Engineering Construction business (BFM)
2016/17	$46.2M	$40.0	▪ $19.9M in costs for reimbursable projects and contestable business. These costs are included in the aggregate figure in Water Corporation's submission and hence are a major driver for the observed jump. We remove these two items in our recommended expenditure (OEM) ▪ $20.6M increase in operating costs for Dry Climate Response activities, including an increase in water production from the Southern Seawater Desalination Plant (SSDP) (OEM) ▪ $7.7M increase for bringing online the IWSS Perth GWR Stage 1 (OEM)
2017/18	$26.9M	$17.4	▪ $10M provision for future years FIS (BFM) ▪ $7.0M for "Utilisation of Transformation savings to fund Executive approved projects for 2016/17" (included in base funding for future years) (BFM) ▪ $2.5M for "Asset Infrastructure Monitoring, Deferred Capital Contingency Funding, and Outcomes from Optioneering Funding" (BFM)

Source: This analysis has been compiled from multiple sources. The year on year variances at aggregate level are sourced from Water Corporation's submission for the movement to 2017/18 and from the Operating Efficiency Model for the two preceding years. The drives for the variances are sourced from the various models and are denoted as follows:

1. *the Operating Efficiency Model (OEM)*
2. *Water Corporation presentation PM-#16778738-v1-ERA_Review_-_Opex.PPTX (OP)*
3. *Budgeting Financial Model, PM-#16831529-v1-P&L_tot_-_2016_17 _Corporate_Total_Budget_ Consolidation_ Spreadsheet.xls (BFM)*

We discussed the movements in Water Corporation's operating expenditure with the business and challenged major items. We reviewed the rationale behind the Corporation's Dry Climate Response activities. Water Corporation states in its submission and supporting documents that:

> *In 2015, the Integrated Water Supply Scheme (IWSS) was severely impacted by low rainfall and dam inflows - IWSS dams received inflows of just 16 gigalitres, compared with historical annual averages of 137 gigalitres (2001 to 2009), 238 gigalitres (1975 to 2000) and 424 gigalitres (1935 to 1974)*[12][13]

> *[In 2015/16], increased costs (were incurred) in relation to the Integrated Water Supply Scheme (IWSS) Dry Climate Response to ensure security of supply - additional water production at SSDP (+12.8 GL), PSDP (+1.1GL) and Groundwater (+8.4GL) together with additional demand management, water loss management and water efficiency initiatives as LoS*[14]*.*

[12] p11 of Water Corporation Submission

[13] Note that the 16GL inflows stated here includes Stirling Dam and Samson dam inflows for the Water year April – March. The total inflow can vary depending on the basis on which the inflows are measured, i.e. Water year (April – March) vs Financial year (July – June).

14 p15 of Water Corporation presentation PM-#16778738-v1-ERA_Review_-_Opex.PPTX

> *[the forecast] is predicated on an increase to the Corporation's operating budget to accommodate an additional 22 gigalitres of desalinated water production from the Southern Seawater Desalination Plant (SSDP)*[15]

We accept that the observed changes in operating expenditure in 2015/16 and 2016/17 are an appropriate response by the business to the drying climate. Increased production from non-rainfall dependent sources is a prudent measure given the observed reduction in yield available from Water Corporation's lowest cost sources, surface water storages, over a long period of time. It is possible that increased rainfall over the regulatory period will reduce Water Corporation's actual operating costs. We cannot predict this, but we consider that Water Corporation's proposed supply mix is reasonable given the level of service the business wishes to provide to its customers – noting that annual average residential water consumption in Perth is higher than for other metropolitan water utilities in Australia as shown in Figure 4-4.

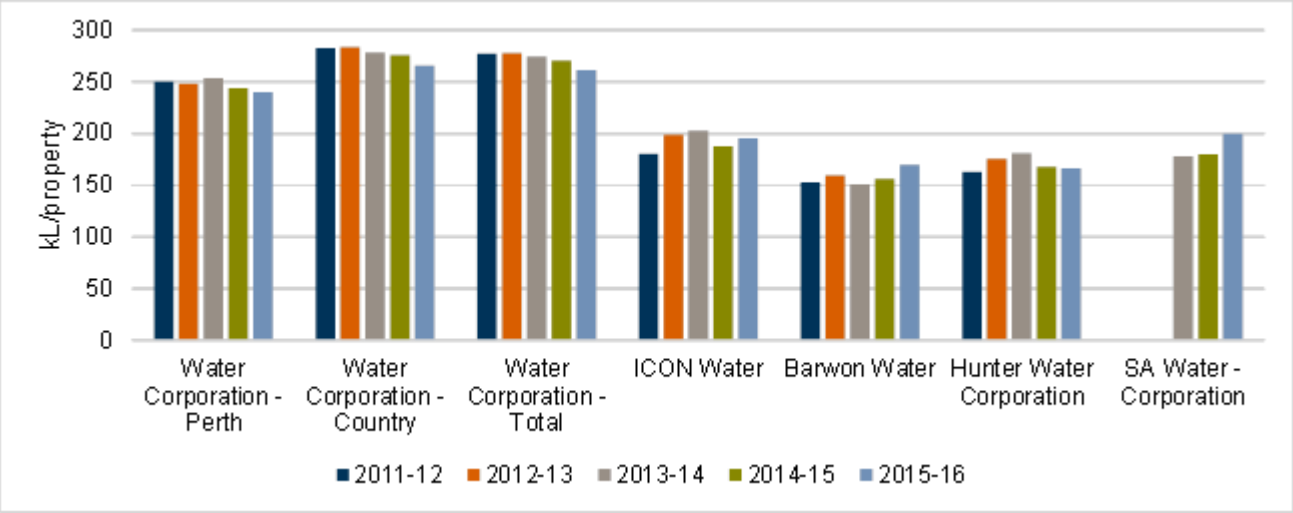

Figure 4-4 Average annual residential water supplied (kL/property)
Source: National Performance Reporting dataset

The major expenditure items for 2017/18 have a less clear justification. For example, the $10M provision for future years FIS (i.e. opex arising from new capital expenditure) is somewhat surprising given that there were four months between provision of the data and commencement of the financial year. We expect at this point in time that Water Corporation should have a good understanding of what new assets are planned to be commissioned in 2017/18. Figure 4-5 shows the amount arising from FIS in the Budgeting Financial Model from 2016/17 forward compared with the overall capital expenditure program. Note that there are forecasts for FIS impacts in the Corporate Financial Model that are higher than these figures but these are not linked to specific capital expenditure projects as they are in the Budgeting Financial Model.

[15] p43 of Water Corporation Submission

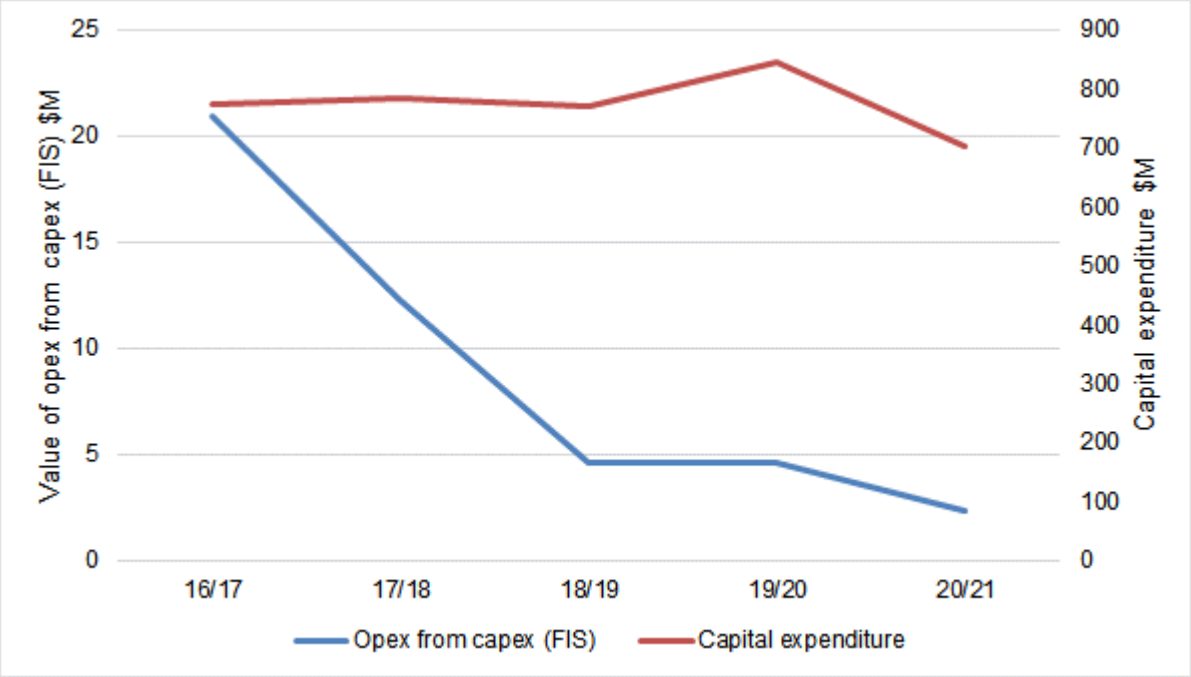

Figure 4-5 Comparison of capex and opex arising from capex

Source: Budgeting Financial Model, PM-#16831529-v1-P&L_tot_-_2016_17 _Corporate_Total_Budget_ Consolidation_ Spreadsheet.xls

The allowance for FIS in 2017/18 of $12.3M includes the $10M provision for future year FIS not yet known. While this figure appears low in comparison to the year before given that the magnitude of the capital expenditure program is unchanged, we accept that this is Water Corporation's best estimate for 2017/18. We note that an increased proportion of capital expenditure for renewals compared with growth and compliance should decrease the opex arising from capex. Nevertheless, we consider that the allowance for 2018/19 onward is too low and discuss this further in Section 4.4.3.

We are concerned that the $7.0M proposed by Water Corporation to be added into base operating expenditure in 2017/18 for "Utilisation of Transformation savings to fund Executive approved projects for 2016/17" has no identified service outcome. We would expect that savings from business transformation, where service delivery is not compromised, would be returned to customers. Responding to this challenge, Water Corporation advised:

> *$7.0m of Transformation savings were delivered back to government via reduced Opex in the 2014/15 SDP. A further $7.0m of Transformation savings was reinvested, mostly into maintenance programs, to better manage our asset risks. This benefits customers via service reliability and lower whole of life costs – and hence we believe this expenditure is prudent and should remain.*

While we note Water Corporation's comments, we still consider that the need for these savings to be reinvested is not clear. If savings needed to be reinvested to meet service needs, there were not any savings in the first place, just insufficient expenditure.

We requested and reviewed the OIBC for "Asset Infrastructure Monitoring, Deferred Capital Contingency Funding, and Outcomes from Optioneering Funding" which has an associated $2.5M per annum expenditure. This business case is for inspection and condition assessment of assets for which capital projects have been deferred. The inspections will monitor the condition of the assets to ensure that they do not pose an unacceptable risk to service delivery. The expenditure is for $1.5M per annum for monitoring, $0.5M per annum for deferred capital contingency funding and $0.5M per annum for 'outcomes from optioneering workshops'. Water Corporation reports that "in the previous year, an expenditure in the tens of thousands has deferred projects to the value of >$1M".

We do not understand why capital projects driven by asset condition are being initiated and pursued and then deferred. This suggests that there is an opportunity for Water Corporation to optimise its decision making for renewals projects and condition assessment program through a better understanding of asset

criticality. We suggest that this will lead to savings in capital expenditure and make this program unnecessary.

Based on the preceding analysis, we recommend that the following items be removed from Water Corporation's base operating expenditure:

> Removal of $7.0M for "Utilisation of Transformation savings to fund Executive approved projects for 2016/17"

> Removal of $2.5M for "Asset Infrastructure Monitoring, Deferred Capital Contingency Funding, and Outcomes from Optioneering Funding"

4.4 Operating expenditure forecast in the forward regulatory period

4.4.1 Overview

The regulatory period commences in 2018/19 and is proposed for a five year period to 2022/23. Water Corporation is finalising operating expenditure forecasts for the five year period from 2017/18 to 2021/22 as part of the State Government budget process.

Before analysis of variances in the forward period, it is important to revisit the discussion in Section 4.2 and crucially, that Water Corporation adjusts its operating expenditure to meet the top down efficiency target over a number a years. One way it bridges the gap between the top down target and the bottom up budget is to apply a 0.5% efficiency adjustment to all bottom up budget categories as a starting point for the next financial year. Where the bottom up budget identified through the Macro Budget process still exceeds the efficient level of operating expenditure, Water Corporation identifies the necessary saving required to achieve the 2% efficient budget.

Figure 4-6 provides a breakdown of operating expenditure for 2018/19, the first year of the regulatory period. Labour is the largest cost category at $347M (38% of the total) followed by the Alliance contracts at $142.7M (15% of the total). Note that total labour costs are higher at around $437M in 2018/19 (42% of gross operating expenditure).

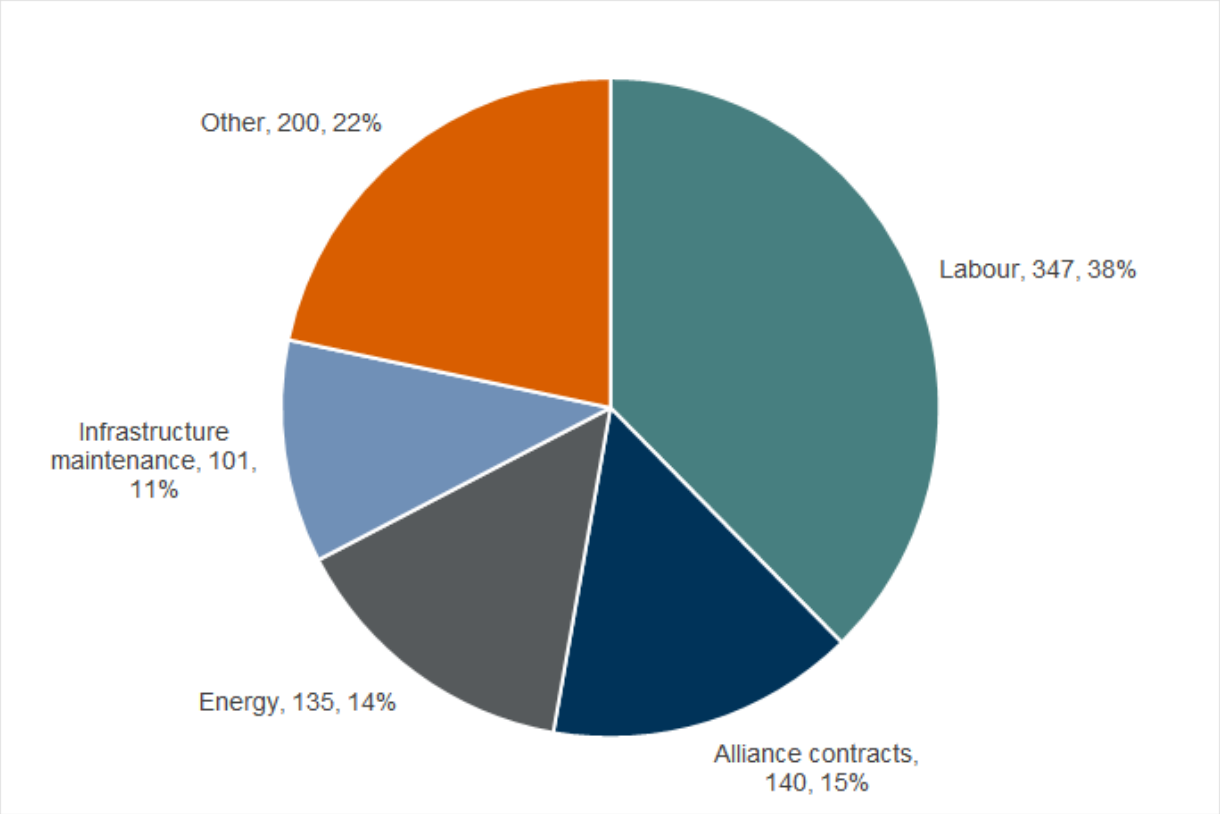

Figure 4-6 Breakdown of 2018/19 operating expenditure budget $M ($16/17)

The following sections discuss in more detail each element of the opex budget process: application of escalation and efficiency factors and then step changes due to capex (FIS) and business initiatives (OIBC). We have found, and discuss further following, that when considering these areas that there is considerably less certainty over adjustments in later years. This is to be expected but the level of justification over changes in later years is much less than what we would expect to find in a typical regulatory submission.

4.4.2 Cost escalation and efficiency

In its budgeting process, Water Corporation applies nominal escalation factors for each expenditure category to arrive at the nominal based budget for the following year. It also subtracts 0.5% from all expenditure categories as a means of driving efficiency across all areas of the business. Table 4-2 summarises the total change from 2017/18 to 2020/21 resulting from cost escalation and the efficiency adjustment as derived by the Macro Budget process. All figures are real $16/17 to enable comparison on a like for like basis. This breakdown is not available for the last two years of the regulatory period (2021/22 and 2022/23).

Table 4-2 Summary of changes in operating expenditure categories 17/18 to 20/21 ($16/17)

	Cost escalation ($k)	Efficiency adjustment ($k)	Notes on cost escalation assumptions [16]
Labour	27,461	-5,126-	2.75% per year escalation applied in all years
Alliance contract	7,721	-2,064	2.75% per year escalation applied for Alliance labour costs. 1.1% per year escalation applies for other costs
Energy	4,374	-1,988	1.1% per year escalation applied in all years
Infrastructure maintenance	3,060	-1,391	1.1% per year escalation applied in all years
Other	6,652	-3,120	Typically 1.1% per year escalation applied in all years
Total	**47,572**	**-13,985**	

Source: Budgeting Financial Model, PM-#16831529-v1-P&L_tot_-_2016_17_Corporate_Total_Budget_Consolidation_Spreadsheet.xls

As noted, Labour costs (including the employee expenses category) comprise 38% of Water Corporation's operating expenditure for 2018/19. Water Corporation employs labour through a combination of common law contracts (typically for senior positions) and an Enterprise Agreement. Table 4-3 summarises the number of employees (by headcount and full time equivalent) in each category.

Table 4-3 Summary of staff employment category

Employee Group	Headcount	FTE
Common law contract	317	313
Enterprise Agreement	2,173	2,072
Total	**2,418**	**2,294**

Source: Water Corporation email received 21 April 2017

We challenged why the forward forecasts allow for labour costs increases above general inflation given that the Western Australia economy is contracting. Water Corporation acknowledged that due to the mining industry downturn, labour costs are generally stagnating in Western Australia but that the escalator (2.75% per annum) was in line with its expectation for the changes arising from upcoming renegotiation of the Enterprise Agreement (due to expire March 2018) which covers most staff. Water Corporation argues that having a multiple year Enterprise Agreement leads to more moderated peaks in labour costs and therefore

[16] Water Corporation advised in response to the draft report that for its 2017/18 budget it had escalated Alliance labour costs by 1.5% and also capped internal labour increases to $1,000 per person per year in line with Government policy. As noted, our review is based on Water Corporation's submission; we have not reviewed these subsequent forecasts.

also more moderated troughs in labour costs during downturns as there is an element of 'catch-up' to the rises experienced outside the Enterprise Agreement.

Figure 4-7 shows the change in wage growth in Western Australia for the public and private sectors separately. This figure supports Water Corporation's contention that public sector wages do move separately to private sector wages. However, we note that wage growth in the public sector has been above that in the private sector since 2013 and there is no reason for this trend to continue in the current economic circumstances.

Figure 4-8 shows wage growth for selected industries across all of Australia. This figure shows that in recent years wage growth in the selected industries has been below 1.0% per annum in recent years with a generally declining trend overall. A notable exception is an uptick in wage growth in the public utilities sector but the latest change observed is still less than 1.0%.

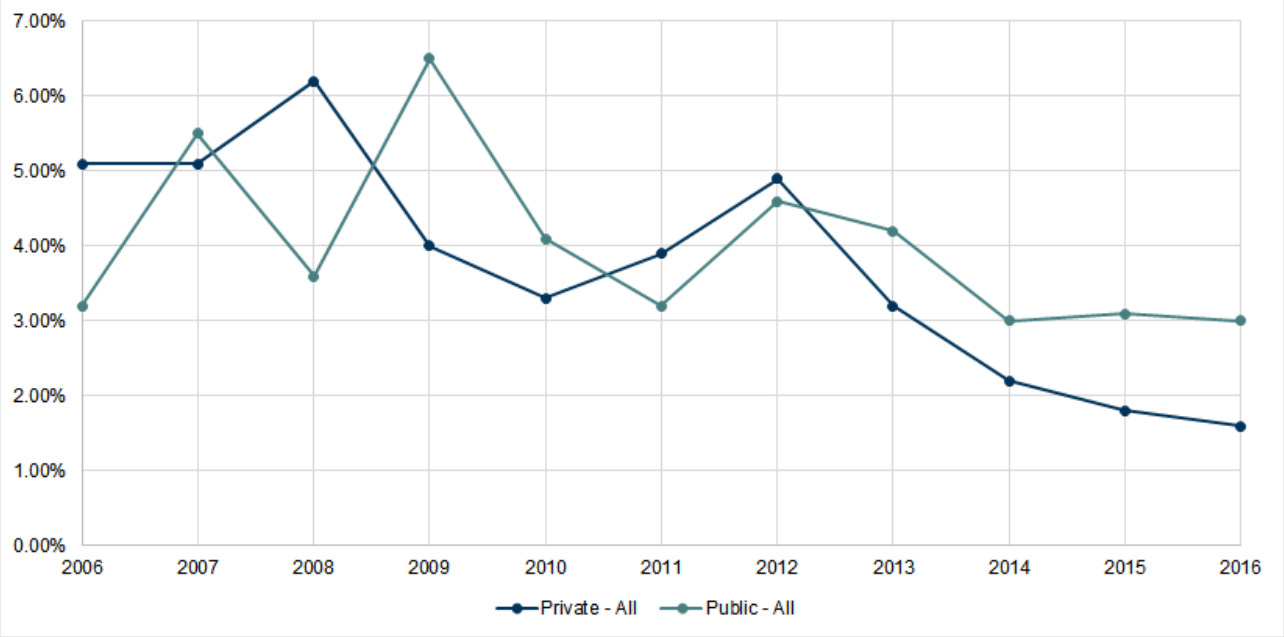

Figure 4-7 Change in wage growth in Western Australia
Source: ABS Catalogue 6345.0 Table No. 3B and 4B, sourced from www.abs.gov.au

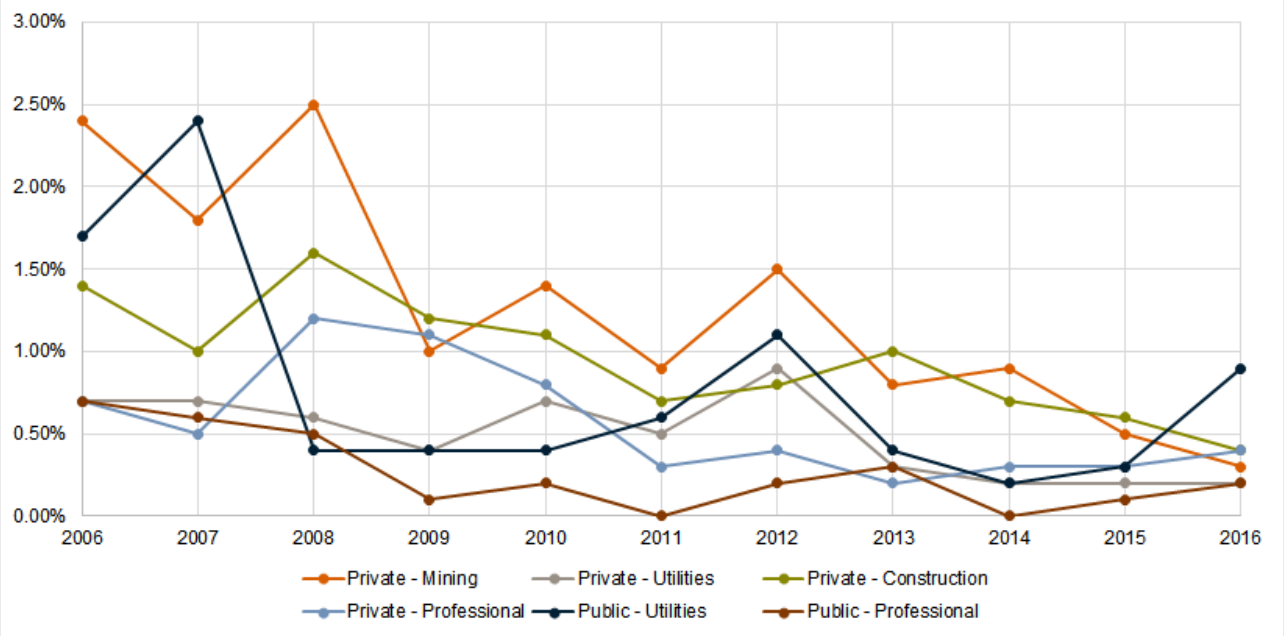

Figure 4-8 Change in wage growth by industry - Australia wide
Source: ABS Catalogue 6345.0 Table No. 5B sourced from www.abs.gov.au

On 12 May 2017, the State Government introduced a wages policy designed to limit increases in public sector labour costs. While the policy does not directly apply to Water Corporation, in announcing the policy, the Premier stated that[17]:

> *"I'll also be writing to Government Trading Enterprises indicating that the State Government expects all comparable positions to those covered by the Salaries and Allowances Tribunal will have a wage freeze imposed for four years."*

While we understand Water Corporation's argument regarding the cycle of the Enterprise Agreement, the business will now be under additional pressure and scrutiny to restrain labour costs increases following the announcement of the State Government policy. Further, we note that Water Corporation's approach to forecasting expenditure on labour focuses on labour costs only, there is no explicit consideration of productivity.

Our position is that making specific adjustments for labour costs removes an incentive for Water Corporation to manage its labour expenditure – cost and volume. We have noted recently that[18]:

> *In the UK it has been the practice of the regulator not to generally accept labour cost escalators on the basis that labour costs should be managed within the RPI envelope. In the most recent determination in 2014, Ofwat for the retail determinations removed the automatic RPI inflator on the basis that in a developing retail competition environment companies should become more efficient and that only where convincing evidence as to the company's competitive position within the regional economy would an escalator be allowed. In the event only two companies were allowed a cost pressure increase.*

We expect that Water Corporation will realise efficiencies in total labour expenditure through productivity improvements. We therefore propose that Water Corporation's total expenditure on labour should be held constant in real terms in the forward period. We also note that wage growth across Australia is currently low and typically less than 1.0% per annum in industries that employ staff of similar skill to those employed by Water Corporation. The trend of wage growth in Western Australia across both private and public sectors in recent years is similar to that applied by Water Corporation in its forecasts. However, we consider that wage pressures will decrease in coming years – an expectation stated explicitly by the State Government. We discuss our proposed adjustment to Water Corporation's labour expenditure further in Section 4.6.

For the Alliance contracts, Water Corporation advised that both had been recently renegotiated to allow a 1.3% per annum increase to salaries and wages for staff covered by the agreements, commencing 2017/18. This actual rate of escalation that will be incurred is less than the 2.75% forecast and is therefore an opportunity for Water Corporation to realise lower operating costs and we propose to make an adjustment for this, as discussed further in Section 4.6.

The escalation rate applied to most cost categories other than labour of 1.1% per annum is lower than the target rate of general inflation in Australia but higher than the 0.5% change in the consumer price index for Perth recorded for the 12 months to June 2016. Figure 4-9 compares historic levels of CPI and the operational cost index (OCI) applied by Water Corporation. While OCI lagged the fall in CPI observed in 2012, since this time it has been below CPI for Perth and All-capital cities. While the current trend for CPI is sharply downward, a sharp fall has historically been followed by a sharp increase. However, there is no clear driver for an increase in general inflation in Western Australia at this time. The State is adjusting to a decline in construction activity associated with increased capital investment in the mining sector. With the price of iron ore now declining from increases that commenced in late 2016, it does not appear that this capital investment will increase substantially in the forward period. Despite this outlook, we consider that Water Corporation's forecast of 1.1% per annum is not unreasonable. The Reserve Bank of Australia targets a range for general inflation of 2.0% to 3.0% in recognition that inflation lower than this level is undesirable, although the Reserve Bank's monetary policy cannot account for or target Western Australia in isolation. As an alternative to monetary policy, fiscal policy may be employed by Governments to maintain inflation and other economic indicators within target levels.

[17] See: https://www.mediastatements.wa.gov.au/Pages/McGowan/2017/05/New-wages-policy-another-critical-budget-repair-measure.aspx

[18] Cardno-Atkins, Review of capital and operating expenditure plans of SA Water, 2016

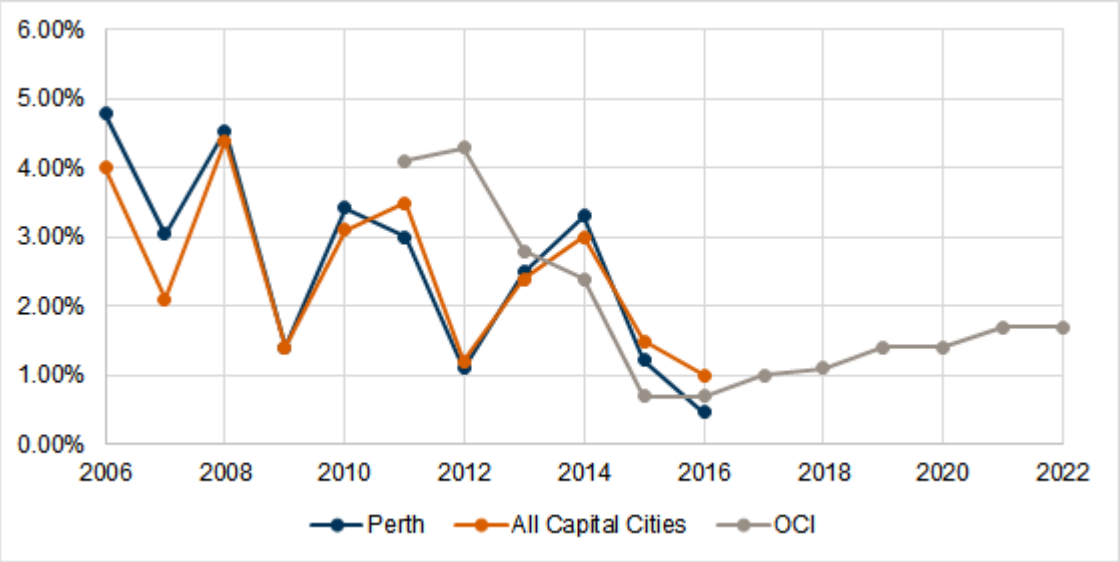

Figure 4-9 Comparison of CPI and OCI
Source: Water Corporation submission and ABS Catalogue 6401.0 Table No. 3-5 sourced from www.abs.gov.au

Water Corporation's general escalation rate of 1.1% per annum has also been applied to energy costs. Water Corporation advised that there are a number of features in its energy contracts, and the Western Australian South West Interconnected System energy market, that means that it faces less volatility and cost pressure than what other water utilities in Australia face. These features include a price cap in the local market, its long term power supply contract, and the favourable consumption rate within this contract. The contract also includes a fixed load assumption which makes energy efficiency initiatives less financially attractive than might otherwise be expected. Water Corporation advised that it is incurring higher energy costs in coming years as it will receive lower capacity payments (where Water Corporation was paid amounts to allow selected large energy consuming assets to be turned off during periods of high demand). We understand that Water Corporation is no longer eligible for these payments from its energy supplier. We consider that the 1.1% escalation applied to energy cost is reasonable.

4.4.3 Opex from capex and initiatives

Table 4-4 details major items that are driving changes in operating expenditure due to capital projects (through FIS) and due to business initiatives (through OIBC) for the major operating expenditure categories.

Table 4-4 Summary of changes in operating expenditure categories 17/18 to 21/22 ($16/17)

Cost categories	Opex from capex added to the base (FIS) ($k)	Initiatives added to the base (OIBC) ($k)	Notes on major cost items
Labour	302	881	▪ No major step changes
Alliance contract	416	2,388	▪ Initiatives totalling $3.2M over the period for "BFM / CFM reconciliation adjustments to achieve 2% Efficiency (future years)" added to the base
Energy	-13	6,262	▪ $3.4M reduction in energy costs due to "Beenyup WWTP energy recovery" ▪ $6.5M for "BFM / CFM reconciliation adjustments to achieve 2% Efficiency (future years)"
Infrastructure maintenance	476	7,947	▪ $3.7M for "BFM / CFM reconciliation adjustments to achieve 2% Efficiency (future years)" ▪ $3.0M for "Increased Reactive Maintenance due to Ageing Assets Without a FIS"
Other	2,925	3,912	
Total	4,106	21,390	

Source: Budgeting Financial Model, PM-#16831529-v1-P&L_tot_-_2016_17_Corporate_Total_Budget_Consolidation_Spreadsheet.xls

We make the following comments on the above analysis:

> The allowance for opex arising from capex over the first four years of the forward regulatory period is low - $4.1M in total compared with $20.9M for 2016/17 alone (see also Figure 4-5). Water Corporation acknowledges that it does not know opex arising from capex with much certainty beyond two years in advance. The actual operating expenditure required due to new capital projects is likely to be higher.

> Significant allowance has been made for the item "BFM / CFM reconciliation adjustments to achieve 2% Efficiency (future years)". Across all expenditure categories, this expenditure item results in an additional $8.8M in 2018/19, an additional $5.1M in 2019/20 and an additional $12.3M in 2020/21. That is, a total of just over $26M in the forward regulatory period. This is a material amount for what is in effect a balancing item. We understand that the top down efficiency target drives overall operating expenditure and the bottom up budgets move to meet these. The need for a positive balancing item in the Macro Budget reiterates that Water Corporation's focus is on its budgeting in the short term and that operating cost initiatives in later years are not well formed.

> The $3.0M for increased reactive maintenance due to aging assets appears quite arbitrary. This suggests that there is an opportunity for Water Corporation to better optimise the intervention point for renewal activities. As we also note in Section 5.2.1 that Water Corporation's infrastructure is performing well, there is little evidence of an increased need for reactive maintenance.

It is hard to draw conclusions regarding the appropriateness of Water Corporation's adjustments to operating expenditure forecasts out to 2022/23 when these have not been developed with bottom-up scrutiny for a regulatory review in mind and the last two years of operating expenditure forecasts are not included in the Budgeting Financial Model. Water Corporation has made clear, and it is apparent from the data presented, that its focus is on the coming financial year in line with the State Government budgeting process. The outer years meet the level of rigour required by the State Government budget process. They will be revisited before they are committed to. Some items in the outer years do not offer great resistance when pushed on – they are artefacts of the top down and bottom up budgeting process.

4.5 Efficiency

4.5.1 Operating expenditure efficiency achieved by Water Corporation

We described in Section 4.4 how Water Corporation develops its operating budgets, including how it demonstrates that it meets the operating expenditure efficiency target. The efficiency target is to reduce the real operating cost per property by 2% per annum, but this reduction only applies to non-level of service operating expenditure. Water Corporation also has to respond to government requests for efficiency dividends. The efficiency achieved (and forecast) is compared to 2010/11 as a reference year and cumulative efficiency achieved over this period annualised. This means that year on year fluctuations are smoothed out.

Figure 4-10 shows the actual efficiency achieved by Water Corporation in real terms since 2010/11 using the non-LOS definition. The figure shows both the efficiency achieved in the year and the average annual efficiency using 2010/11 as a reference point.

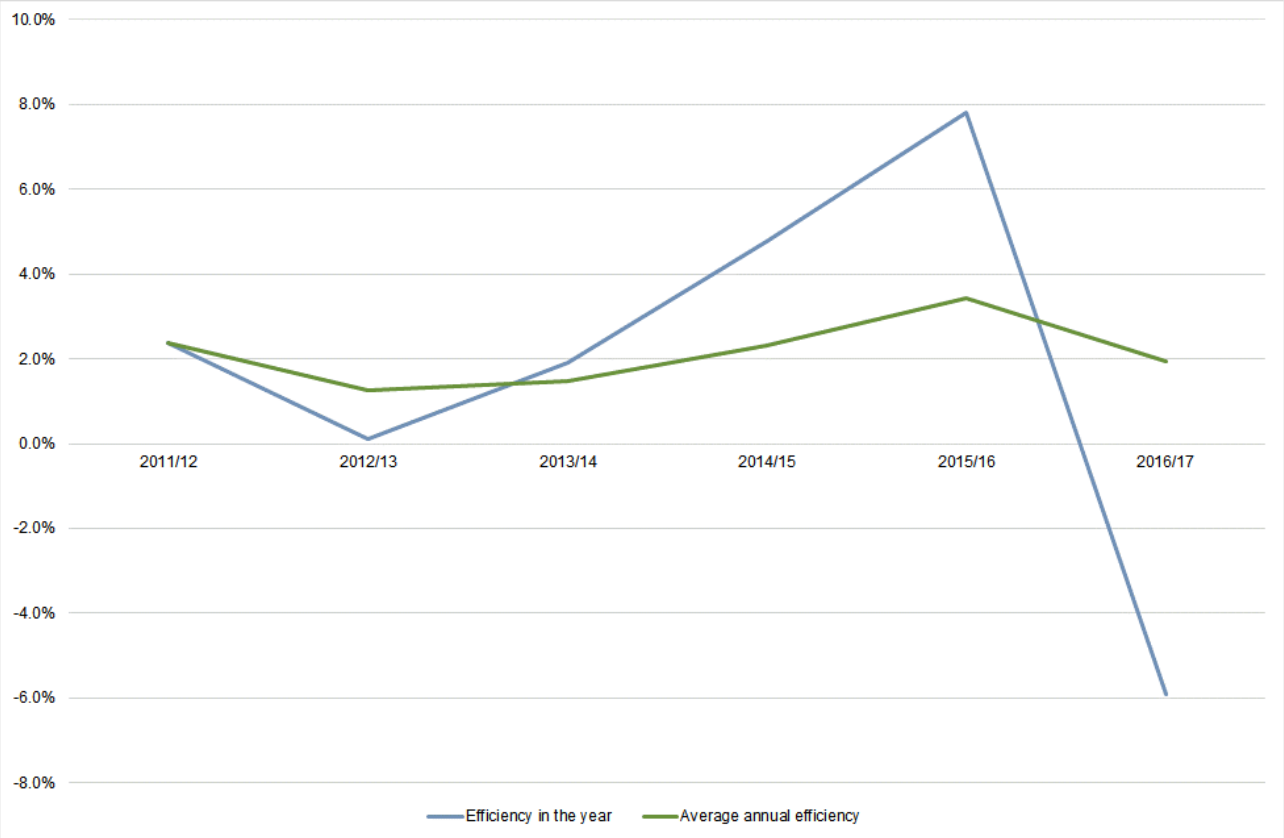

Figure 4-10 Operating expenditure efficiency achieved by Water Corporation (non-LOS) (real)
Source: Water Corporation Operating Efficiency Model

The large efficiency gain in 2015/16 can be explained by an overall increase in operating expenditure of $21.6M but an increase in Level of Service operating expenditure of $41.7M mainly due to increased operation of the Southern Seawater Desalination Plant. Non-Level of Service operating expenditure therefore was reduced substantially to achieve the efficiency result. Water Corporation details in its supporting material that the decrease in non-level of service operating expenditure in 2015/16 is due to *"Lower labour costs largely resulting from the Business Transformation Program including a delay in filling vacant positions while the program was progressing. In addition, there was a savings in relation to the revaluation of leave and superannuation liabilities mainly due to lower future inflationary projections".*

A significant increase (actual and forecast) in costs, including non-Level of Service costs, in 2016/17 reduces the average annual efficiency achieved since 2010/11 to 1.93%.

The efficiency target is applied to 'non-level of service' operating expenditure only. This is a somewhat arbitrary split in the expenditure. Level of service expenditure is described by Water Corporation in its Submission as including:

> Expenditure resulting in an improved level of service to the customer, community and environment
> Expenditure for regulatory / externally imposed obligations
> Expenditure for Ministerial requirements
> NPV justified expenditure.

Non-level of service operating expenditure is all else not in the above categories. An audit of whether expenditure has been correctly categorised between level of service and non-level of service is out of the scope of this review. We have inspected the expenditure split and note that it is questionable as to why some items have been allocated to being level of service. Most significantly, incremental operating expenditure incurred on the desalination plants since the 2010/11 is included within level of service expenditure, the reasoning being that it provides an improved level of water security. This argument is somewhat at odds with Water Corporation's future outlook for a drying climate that relies on desalination as a business as usual water source.

At the 2012 review we noted that Water Corporation has an incentive to allocate expenditure items to the Level of Service category. This observation is still true, no circumstances in this regard have changed.

The purpose of the efficiency target is to push Water Corporation to achieve productivity gains that it may not have otherwise realised given that it a monopoly business. Despite our concerns over the veracity of Water Corporation's operating expenditure forecasts over the outer years of the forward regulatory period,

Figure 4-10 provides evidence that Water Corporation is achieving efficiency gains under the measure set for it being on non-Level of Service expenditure in real terms.

Figure 4-11 shows the efficiency achieved by Water Corporation since 2010/11 across all operating expenditure (level of service and non-level of service) in real terms. This figure shows the same trend as but of a lower magnitude, the average annual operating expenditure achieved since 2010/11 is 1.5% per annum.

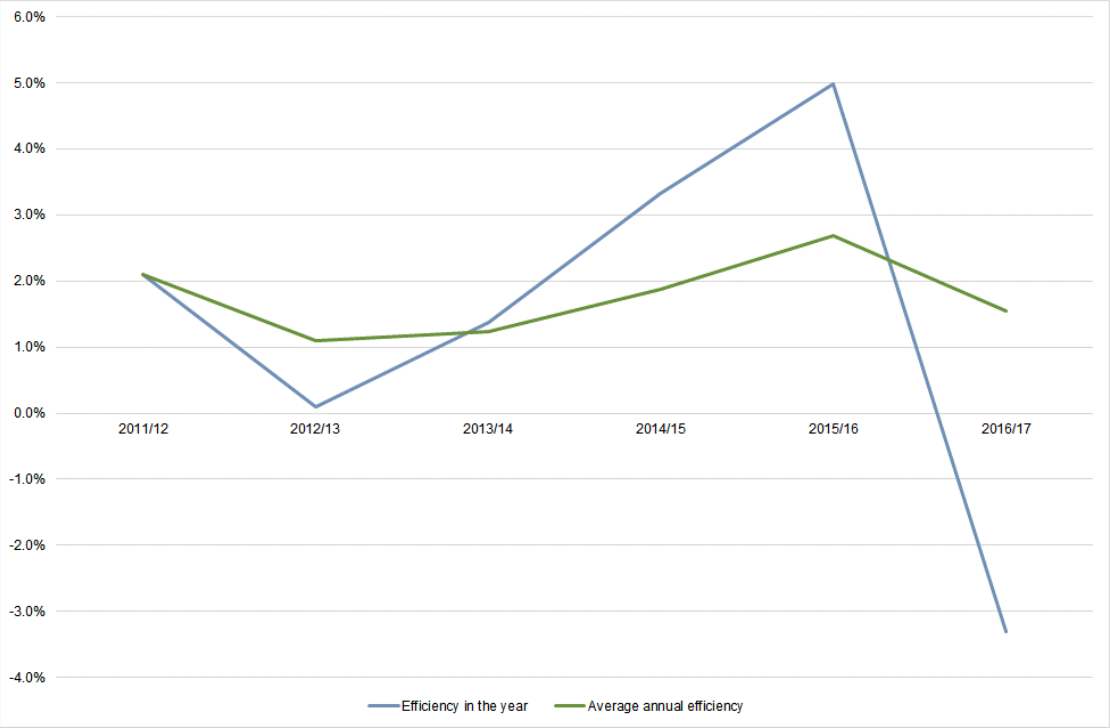

Figure 4-11 Operating expenditure efficiency achieved by Water Corporation (all expenditure) (real)
Source: Cardno-Atkins analysis of Water Corporation Operating Efficiency Model

4.5.2 Appropriateness of the efficiency mechanism

Despite the evidence that Water Corporation's efficiency target mechanism is successful at realising efficiency gains, we have concerns that the drawbacks of the mechanism are becoming more pronounced and may limit its effectiveness in the next regulatory period. Our concerns with Water Corporation's efficiency target mechanism are as follows:

> The current approach does not appear to have led Water Corporation to long term, holistic and coordinated strategies for achieving efficiency gains. Efficiency gains have been achieved but we consider that they have been mostly reactive to the mechanism. There is evidence that Water Corporation is moving in this direction through the FLOWS project but this is at early stages of development.

> As noted in our 2012 report, there is an incentive for Water Corporation to classify as much expenditure as possible as 'level of service'

> We also noted in 2012 that the definition and classification of costs between the categories is somewhat ambiguous

> Further, the application of the efficiency target to non-level of service expenditure only conceptually suggests that efficiency gains aren't achievable on level of service operating expenditure. This is not the case, Water Corporation is able to realise efficiency gains on its level of service operating expenditure.

> The top down nature of the mechanism means that it is not always possible to quantify the saving attributed to a specific initiative or change in practice

> Calculating the efficiency mechanism is relatively complex. This requires Water Corporation to allocate resources to this task and to reconciling with its bottom-up budget models. It also makes scrutiny by other parties difficult which reduces its transparency.

> Incorporating the efficiency mechanism in Water Corporation's long term forecasts leads it to include one-off adjustments and balancing items that do not reflect actual services delivered or activities undertaken.

There are strong similarities between the above discussion and the debate over efficiency dividends in the Commonwealth public sector[19].

We consider that an alternative mechanism may lead to better outcomes by encouraging Water Corporation to think more strategically about achieving efficiency gains across all of its business. The potential is that a more strategic approach realises operating efficiencies greater than the current target. It is striking for example that Water Corporation does not have an energy efficiency strategy and that there is a disconnect between the ICT strategy, the business redesign and the wider business strategy (noting that FLOWS is intended to fill this need but is not yet formulated).

We note however that in the case of the Commonwealth public service, despite the criticism of the mechanism, it is still in place.

In the following section and for our recommendations, our starting point is that efficiency should be considered against operating expenditure in its entirety rather than making a distinction between non-LOS and LOS expenditure. We consider that this better reflects the reality of Water Corporation's operating environment, e.g. desalination now being an integral part of the supply mix. Alternatively, ERAWA may consider revisiting the categorisation between non-LOS and LOS operating expenditure.

4.5.3 Continuing and catch-up efficiency

We apply a frontier approach to assess the level of efficiency that Water Corporation may achieve in the forward regulatory period. Under this approach, there are two components of efficiency gains that may be realised:

> Continuing efficiency is the gains that may be made all participants in an industry, e.g. through new technology

> Catch-up efficiency is that ability of a business to move towards the efficiency frontier. At the efficiency frontier, a business is achieving both technical and allocative efficiency and overall, providing its output for the lowest possible total cost.

Andrew Worthington of Griffith University in his National Water Commission sponsored paper 'Productivity, efficiency and technological progress in Australia's urban water utilities' published in October 2011 noted that:

> *For the most part, the input-output relationship modelled in urban water utility behaviour follows a production approach. This principally views water utilities as producers of physical water outputs, typically the volume of potable water and/or the number of properties supplied with water as a function of operating expenditure. Past studies have generally made little allowance for qualitative outputs such as customer satisfaction and water quality.*
>
> *Problematically, this specification is often the result of limited data availability and the inability of some methodologies to reflect the regulatory obligations of water utilities to provide water to*

[19] See: http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BN/2012-2013/EfficiencyDividend#_Toc343007823 and http://www.finance.gov.au/sites/default/files/measures_of_agency_efficiency.pdf

households in their services areas. It also seldom reflects the capital-intensiveness of water utilities or the fullest range of input factors upon which they draw in the production process.

These findings reflect that, in practice, there is next to no analysis available on which to assess the comparative and absolute efficiency of Australian water utilities using total factor, econometric approaches. In England and Wales, the regulator, Ofwat, undertakes econometric modelling of operating expenditure as part of its periodic review of prices. For the 2014 review, Ofwat's modelling considered total expenditure (totex), that is capital and operating expenditure, and applied an upper quartile efficiency challenge using benchmarking models. Such comparative modelling is not possible at the moment within Australia. Instead, benchmarking is limited to partial factor approaches, as included in Section 2.There is also evidence that Water Corporation has been able to achieve ongoing operating expenditure gains in the order of 1.5% per annum since 2010/11.

We propose that Water Corporation be set a continuing efficiency target of 0.25% per annum for operating expenditure applied to real aggregate operating expenditure. There are limited studies available that quantify movement at the frontier. A relatively recent comprehensive survey[20] considers a wide sample of global firms and suggests that movement at the frontier has averaged 3.5% per annum for firms at the frontier in the manufacturing sector and 5.0% in the service sector. Across all firms, i.e. not just those at the frontier, movement has been less pronounced averaging 1.7% per annum in the manufacturing sector and 0.3% per annum in the services sector. We therefore consider that 0.25% is a conservative and achievable forecast of the continuing efficiency that Water Corporation will be able to realise. This target is also consistent with regulatory decisions for water utilities in Australian in recent years as shown in Table 4-5 (note that some decisions involve a general efficiency rather than applying the continuing/catch-up approach).

Table 4-5 Summary of recent regulatory decisions for Australian water utilities

Regulated business	Regulator	Year	Continuing	Catch-up	General
SA Water	ESCOSA	2016			1.0 – 1.5
Sydney Water	IPART	2016	0.25	0.5 – 2.0	
Sydney Desalination	IPART	2017			0.75
Hunter Water	IPART	2016	0.25	0.25	
Melbourne Water	ESC	2016			1.0
All businesses	ESC	2012			1.0

We propose that Water Corporation be set a catch-up efficiency target of 0.25% per annum in addition to the labour cost adjustments. Combined, the 0.25% per annum adjustment and specific adjustment for labour costs, equate to an effective 0.93% per annum efficiency target in addition to the continuing efficiency target. The operating cost benchmarking data in Section 2.2.1 demonstrates that Water Corporation is already achieving relatively low operating costs compared with its peers. Accordingly we proposed a relatively modest catch-up efficiency target of 0.25% per annum.

The specific labour adjustment should be seen as a separate adjustment to the catch-up efficiency target. This adjustment has been made because there is no apparent justification for labour costs in total to rise in real terms. There are no planned changes to the level of service delivered by Water Corporation over the forward period, low wage growth is expected and Water Corporation has already made the step changes to its water production mix to meet the expected availability of water sources. We consider that the labour growth forecast by Water Corporation is the result of its forecasting approach, not a real reflection of the cost it will incur.

4.6 Recommendation

Our overall conclusions with respect to operating expenditure are:

[20] Frontier firms, technology diffusion and public policy: micro evidence from OECD countries, OECD Productivity Working Papers No. 02, November 2015.

> 2015/16 is an appropriate base year but there should be a reduction of $9.5M to base operating expenditure due to unjustified expenditure items occurring between the base year and the start of the regulatory period as detailed in Section 4.3.

> Operating expenditure in the forward regulatory period is substantially increased over current levels due to step changes in 2016/17 and 2017/18 which Water Corporation explain are primarily due to its drying climate response and increased operation of its desalination plants

> However, for the regulatory period, the operating expenditure forecast is relatively flat in real terms

> We believe that Water Corporation should manage labour expenditure so that there is no real increase in total expenditure over the forward regulatory period

> It is hard to draw conclusions regarding the appropriateness of Water Corporation's adjustments to operating expenditure forecasts out to 2022/23 when these have not been developed with bottom-up scrutiny for a regulatory review in mind and the Macro Model does not cover the last two years of the regulatory period. It appears that Water Corporation has underestimated opex arising from capex in the regulatory period.

> Despite the evidence that Water Corporation's efficiency target mechanism is successful at realising efficiency gains, we have concerns that the drawbacks of the mechanism are becoming more pronounced and may limit its effectiveness in the next regulatory period.

Our recommended level of efficient operating expenditure has been derived as follows consistent with our review methodology:

- Removal of expenditure associated with reimbursable projects and contestable business which are not regulated activities. This adjustment has been made using the figures in the Operating Efficiency Model. As this model only covers the period to 2021/22, we have assumed that the level of expenditure for 2022/23 will be the same as for 2021/22.
- **Adjustment to reflect our assessment of the prudence, timing and efficient level of expenditure of specific projects**

  We propose the following specific adjustments to operating expenditure items:

  - Removal of -$9.5 from base operating expenditure for two initiatives with unclear justification (See Section 4.3)
  - An increase to operating expenditure arising from capital expenditure to make all years consistent with the 2017/18 budget (See Section 4.2)
- **Adjustment of any top down factors applied to expenditure categories where we believe that the factors applied by Water Corporation are unreasonable.**
  - A reduction in labour costs for alliances to reflect the recently renegotiated Enterprise Agreement which has a lower annual increase than that included by Water Corporation in its forward forecasts (See Section 4.4.2)
  - A reduction in the forecast labour expenditure so that there is no real increase over the regulatory period (See Section 4.4.2).
- **Efficiency**
  - We have applied an annual compounding efficiency factor of 0.5% per annum. As Water Corporation's forecasts include an efficiency factor, these are added back in.

Our recommended level of efficient operating expenditure is summarised in Table 4-6.

Table 4-6 Recommended efficient operating expenditure (Real $16/17)

	18/19	19/20	20/21	21/22	22/23
Water Corporation forecast	942.2	948.6	944.9	943.9	939.8
Remove contestable business and reimbursable projects	-39.3	-39.3	-39.1	-39.0	-38.3

	18/19	19/20	20/21	21/22	22/23
Water Corporation forecast (adjusted)	902.9	909.3	905.7	905.0	901.5
Adjustments					
Adjustments to base operating expenditure	-9.5	-9.5	-9.5	-9.5	-9.5
Increase FIS to reflect trends	7.7	7.7	9.9	12.1	12.1
Lower labour cost escalator for alliance	-0.9	-1.9	-2.9	-3.9	-5.0
Maintain no real increase in labour costs	-2.1	-3.8	-7.8	-11.9	-11.9
Sub-total	*898.0*	*901.9*	*895.4*	*891.8*	*887.2*
Efficiency	0.50%	0.50%	0.50%	0.50%	0.50%
Efficiency factor	0.995	0.990	0.985	0.980	0.975
Efficiency adjustment	-4.49	-9.00	-13.36	-17.70	-21.96
Add back Water Corporation efficiency	10.77	14.15	9.67	9.32	9.32
Recommended operating expenditure	904.2	907.0	891.7	883.4	874.6
Adjustments made compared with forecast	1.4	-2.3	-14.0	-21.6	-26.9
Adjustments made compared with forecast (%)	*0.1%*	*-0.2%*	*-1.5%*	*-2.3%*	*-2.9%*

5 Capital expenditure

5.1 Overview

Water Corporation's capital program has varied between approximately $451M p.a. in 2015/16 to $819M in 2013/14[21]. At an average of just under $652M p.a. between 2017/18 and 2022/23, Water Corporation's proposed expenditure is broadly consistent with historical averages as seen in Figure 5-1.

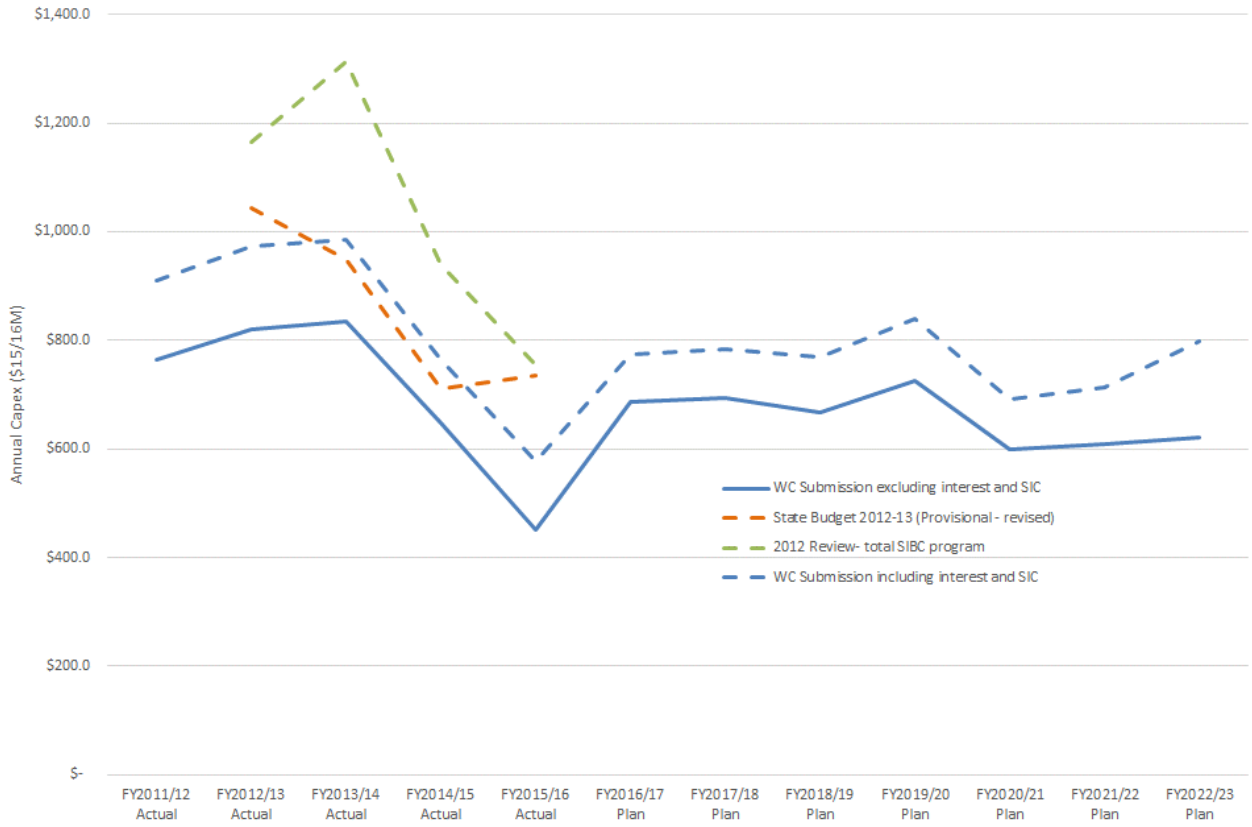

Figure 5-1: Trends in historical and projected capex
Source: Water Corporation submission, rebased to $15/16 and excluding capitalised interest and SIC

As can be seen in this figure, spend over the 2012/13-15/16 period has been lower than both the provisional State Budget as projected in 2012 and Water Corporation's aggregate SIBC program.

We examine historical and proposed capex in more detail in the following sections.

5.2 Historical expenditure

Approximately half (50%) of recent capex has been directed at the water service, with 29% on the wastewater service and 16% on 'common' assets. Drainage and irrigation together make up approximately 4% of recent capex.

[21] All in end 15/16 $ and excluding SIC capex

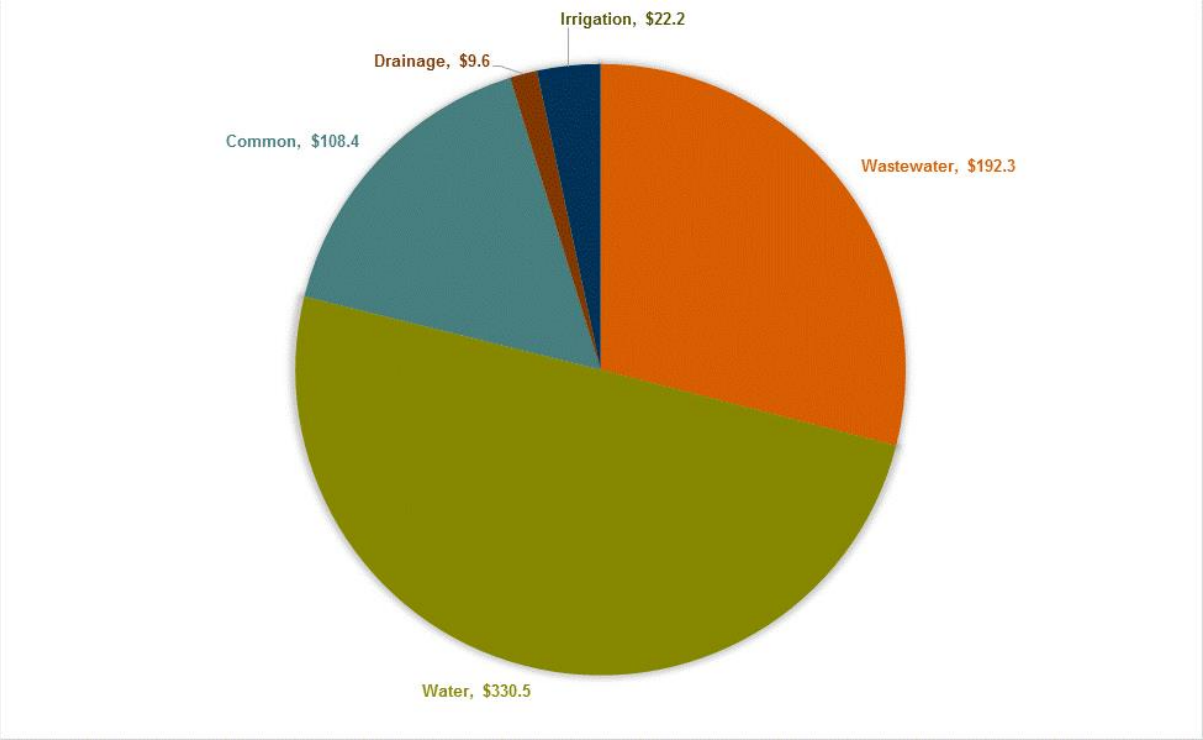

Figure 5-2: Recent capex by line of service (2013/14 to 17/18)

Source: Water Corporation submission, rebased to $15/16 and excluding capitalised interest and SIC.

There appears to have been a slightly reducing trend in water expenditure, whereas wastewater expenditure has varied but without a strong discernible trend. 'Common' capex has been broadly constant or reducing, whereas irrigation and drainage has been fairly 'lumpy' as shown below. Irrigation spend in 2014/15 related to the 'Ord River Irrigation Channel Stage 2' project whose cost was accounted for entirely in that year.

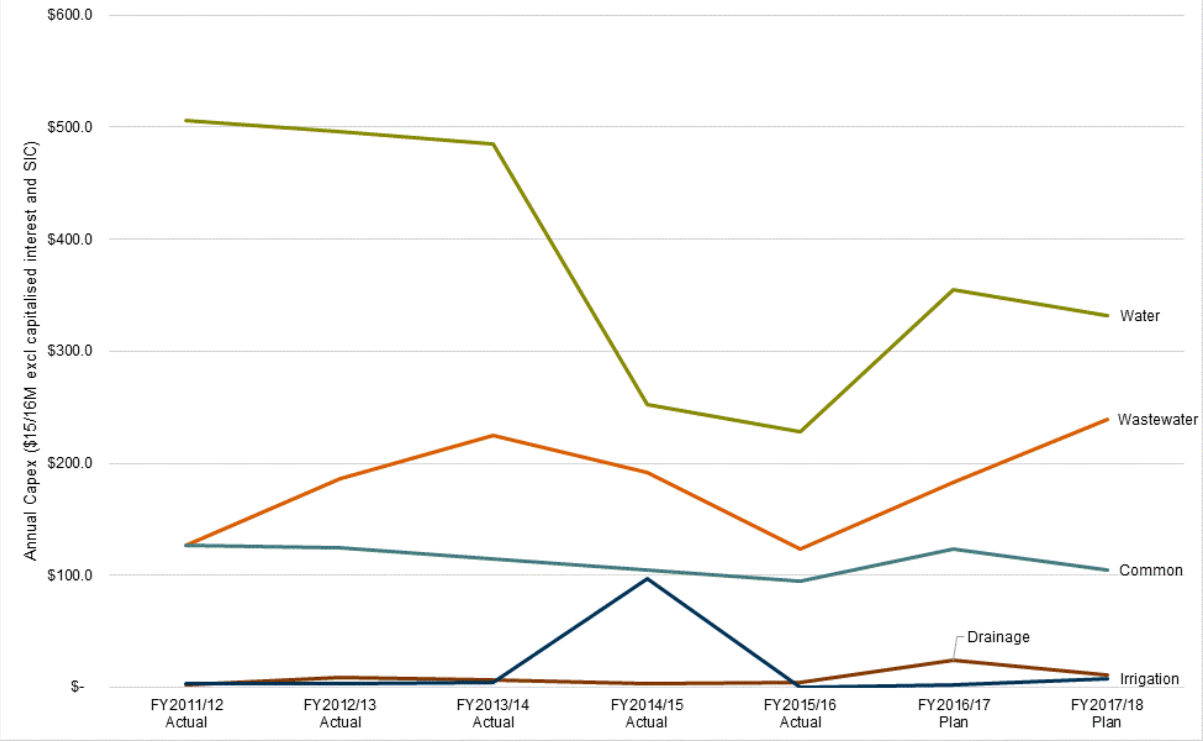

Figure 5-3: Trends in historical capex by line of service
Source: Water Corporation submission, rebased to $15/16 and excluding capitalised interest and SIC

Water Corporation classifies its capex into four project drivers, as summarised in its submission:

> Base capital maintenance (BC): works required for renewal, repair or improvement of assets to maintain condition or performance;

> Enhanced service (ES): works that will enhance the level of service being provided to existing customers;

> Supply/demand (SD): works required increasing capacity or satisfying demand.

> Quality & standards (QS): to meet mandatory standards imposed by external regulators or Government.

Supply-demand and base capital dominate recent expenditure, making up 38% and 41% respectively.

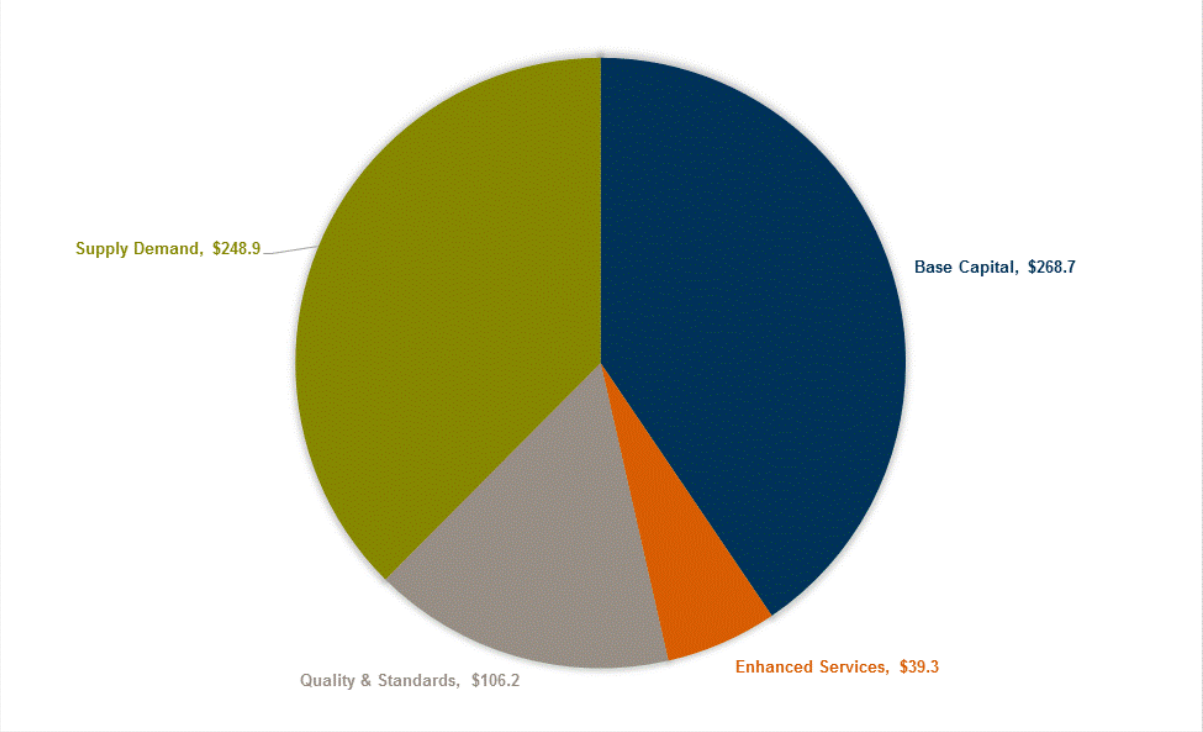

Figure 5-4: Recent capex by cost driver (2013/14 to 17/18)
Source: Water Corporation submission, rebased to $15/16 and excluding capitalised interest and SIC

With the exception of 2017/18, capex driven by supply-demand has seen a reducing trend in recent years. The increase in 2017/18 appears to be driven by ramping up of expenditure on a number of projects, most notably Woodman Point WWTP Upgrade ($65.0M in 2017/18) and Perth GWR Stage 2 Plan (($55.2M in 2017/18).

Conversely, base capex has seen an increasing trend, with 2016/17 and 17/18 significantly higher than previous years. The high level of base capex in 2016/17 is caused by a number of projects entering the most expensive delivery phase in that year, including a number of water mains renewals projects/programs, which appear to be ramping up.

The level of quality and standards capex spiked in 2013/14 due to the Mundaring WTP water service project, which fell mostly in that year and is reviewed below.

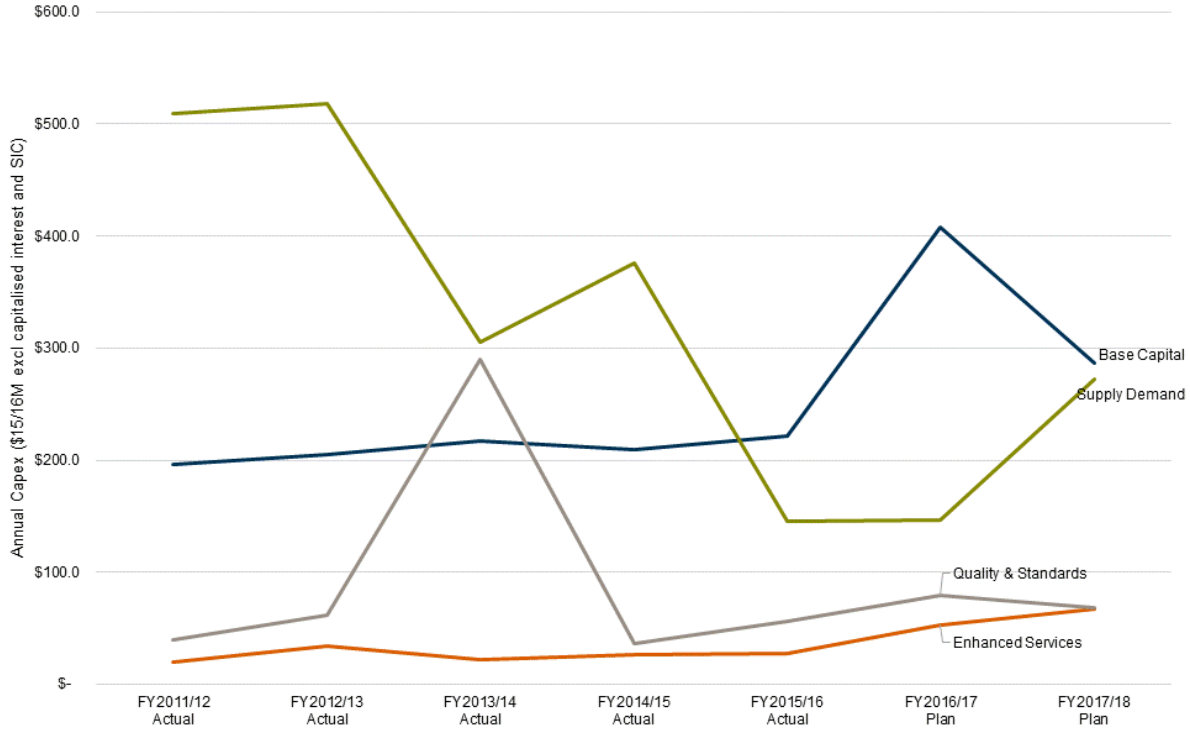

Figure 5-5: Trends in historical capex by cost driver
Source: Water Corporation submission, rebased to $15/16 and excluding capitalised interest and SIC

5.2.1 Performance trends

Recent "Deliver Service" and "Manage Infrastructure Assets" KPI trends suggest that water and wastewater service performance is broadly stable and Water Corporation is exceeding its KPI targets, as summarised at company level below.

Water service performance trends

The KPI performance for leak and burst rates and continuity of supply is better than target and broadly stable over the last few years. Flow restoration performance is significantly better than target and no strong trend is discernible from three years of data. The microbiological water quality performance has also been strong with 100% compliance reported for all years from 2012 to 2016.

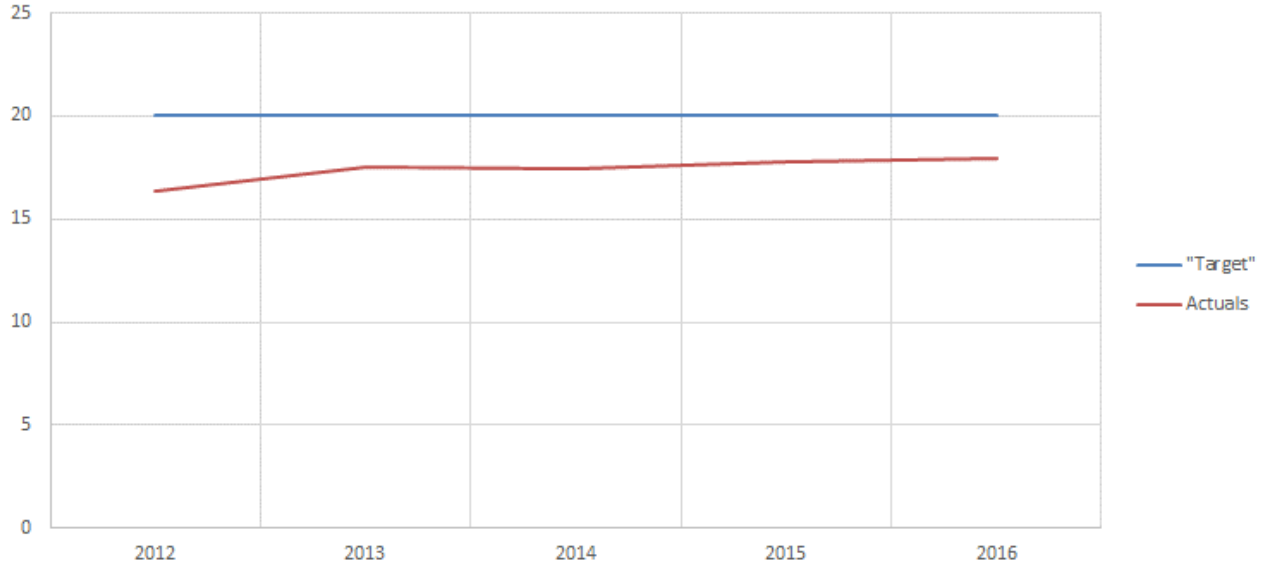

Figure 5-6 Leaks and bursts performance consistently better than target
Source: Leaks and bursts per 100km of main (Water Corporation level) from "DS MI #16826553-_Performance_information_for_the_ERA_(based_on_PM-#16824158)_XLS"

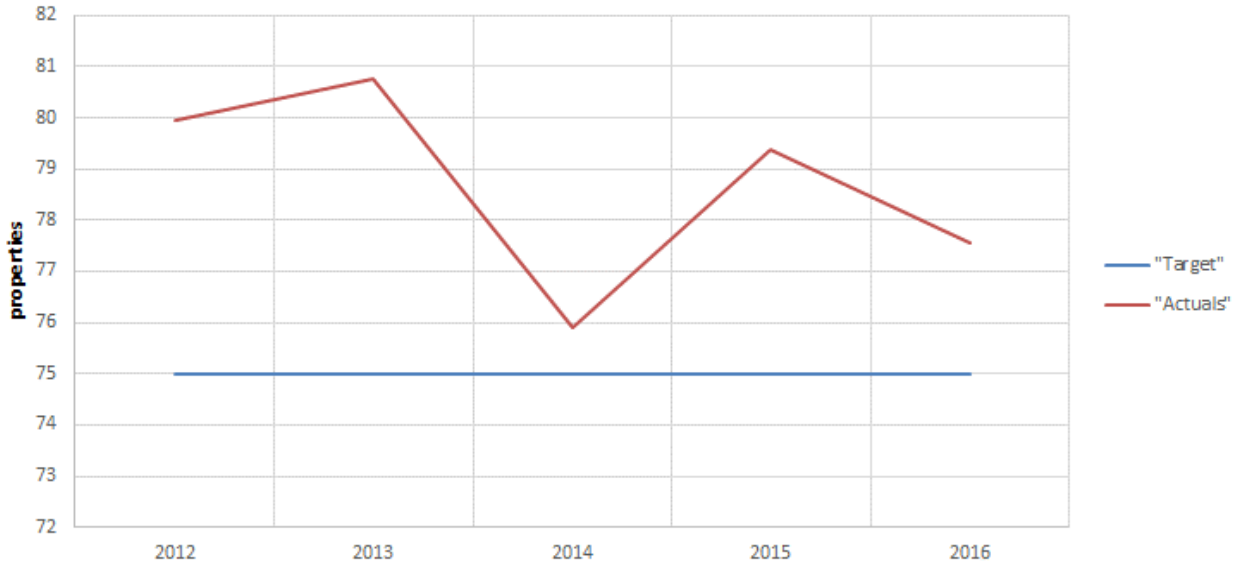

Figure 5-7 Continuity of supply performance (properties not affected by interruption) consistently better than target

Source: Properties not affected by interruption > 1hr; Water Corporation level, from "DS MI #16826553-_Performance_information_for_the_ERA_(based_on_PM-#16824158)_XLS"

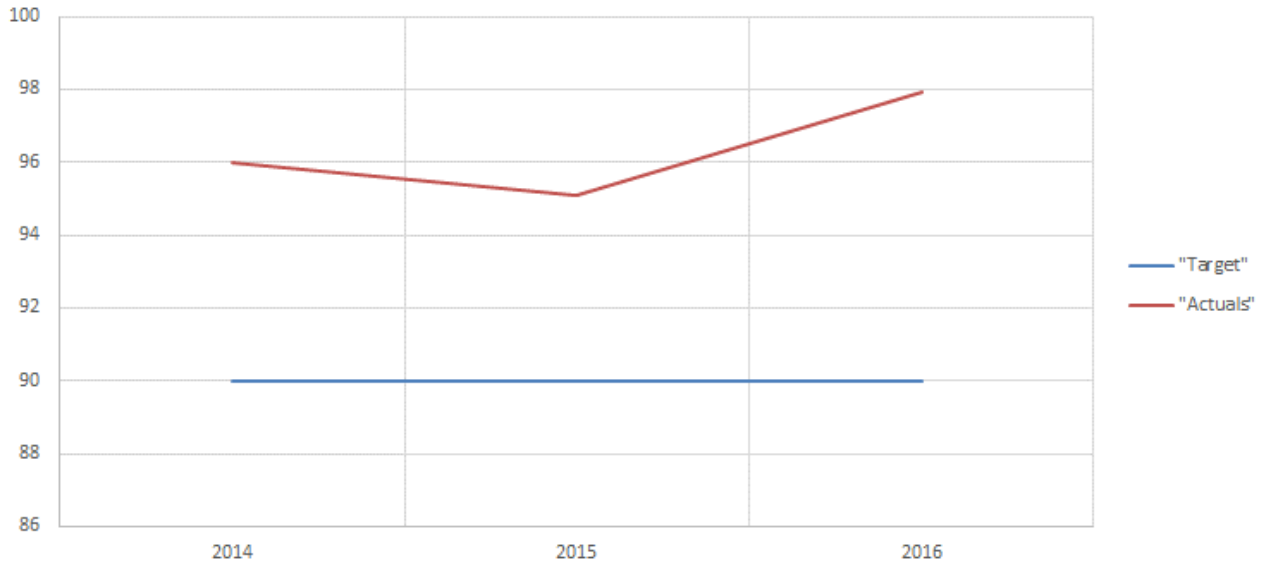

Figure 5-8 Flow restoration (responsiveness) consistently better than target

Source: "DS MI #16826553-_Performance_information_for_the_ERA_(based_on_PM-#16824158)_XLS"

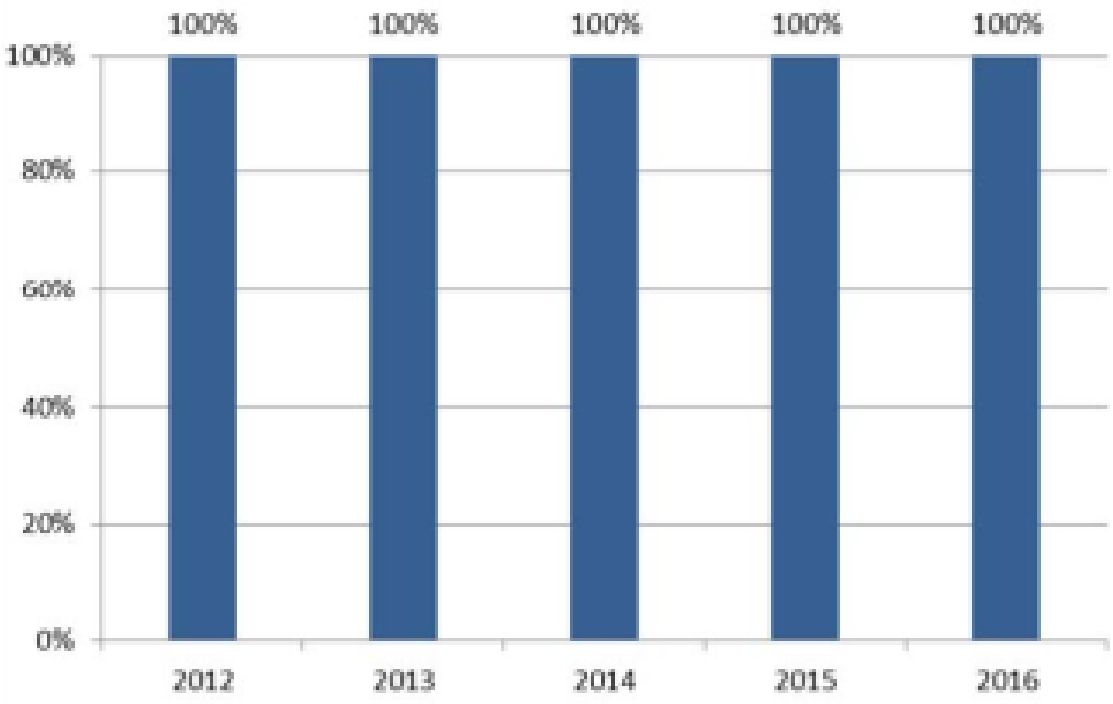

Figure 5-9 Consistently excellent microbiological water quality performance

Source: PM-16370458-v1-Drinking_Water_Quality_Annual_Report_2015-16 [thermotolerant coliforms in 2011, E.coli for all other years]

Wastewater service performance trends

Sewer blockage performance is significantly better than target and shows no significant trend. Similarly, wastewater overflow performance is better than target and appears to show no consistent trend.

Wastewater treatment performance trends are not available, with the Wastewater Quality Annual Report 2015-2016 simply stating that *'Further development of the WWIMS reporting system will provide increased visibility and reporting capability into the performance of wastewater schemes.'*[22]

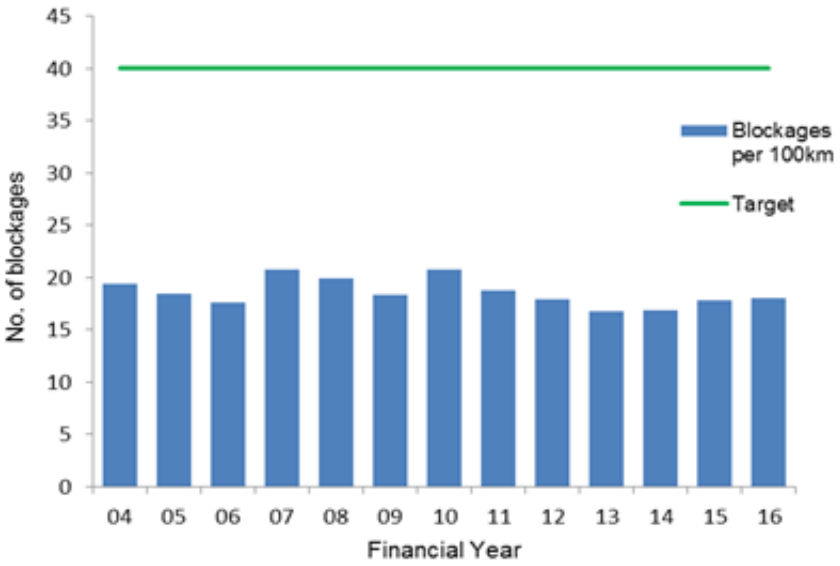

Figure 5-10 Sewer blockage rates consistently better than target

Source: PM-15614705-v1I-Wastewater_Quality_Annual_Report_2015-2016_(Final_Version)

[22] Source: PM-15614705-v1I-Wastewater_Quality_Annual_Report_2015-2016_(Final_Version)

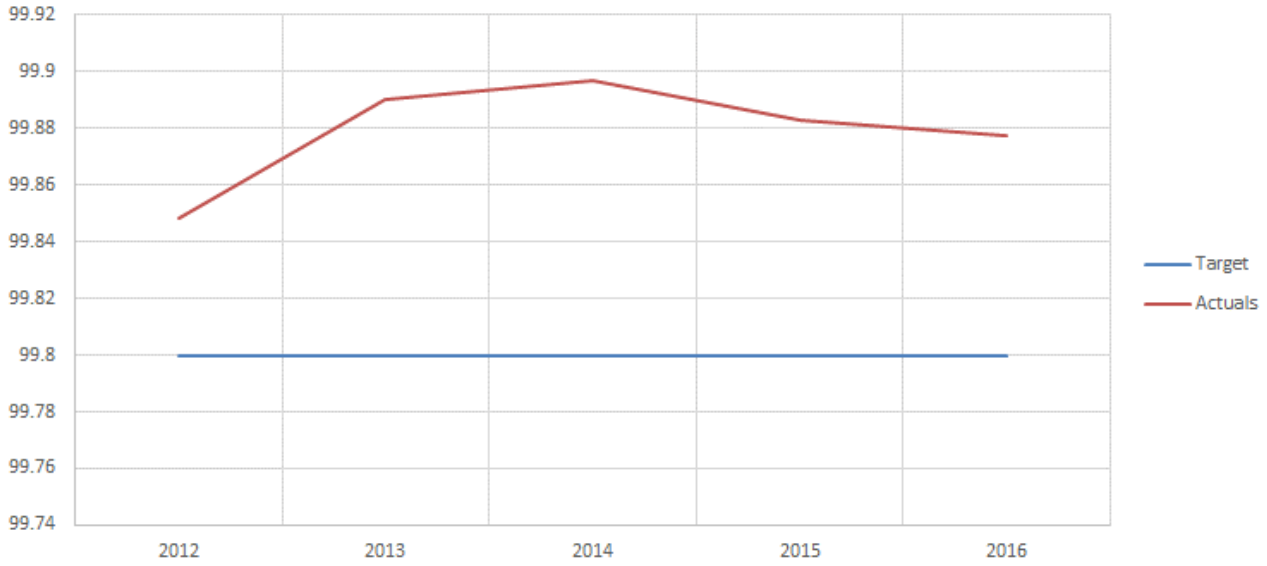

Figure 5-11 Properties without wastewater overflow performance consistently better than target

Source: "DS MI #16826553-_Performance_information_for_the_ERA (based_on_PM-#16824158)_XLS"

5.2.2 Findings from review of sample of historical capital expenditure projects

We have reviewed a number of historical capex projects as summarised below.

Table Historical capex projects reviewed

Project	Title	Line of business	Cost driver	Region	Capex spend to end 16/17 ($nominal)	Projected capex from 17/18 to 22/23 ($nominal)
CW00031	Mundaring WTP & PS C	Water	QS	MWP	$276,483,218	$-
CI00034	Ord River Irrigation Channel Stage 2	Irrigation	SD	NWR	$97,500,000	$-
CC00707	Vehicle Tool Modules for Leased Vehicles	Common	ES	FIN	$6,400,000	$-

Source: 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects - Draft sample'

Note: where there is significant proposed as well as past spend, these are covered under 'proposed capital expenditure' below. Region fields are spelt out below[23].

Mundaring WTP & PS C

This project was implemented to improve compliance with Australian Drinking Water Guidelines. The water produced from this site was not meeting the guidelines, mainly because of disinfection byproducts due to organics in the raw water and the presence of amoeba naegleria in the raw water source which meant that disinfection was required. Whilst we have not seen a copy of the options appraisal document, we understand

[23] Region fields: FIN: Finance & Corporate Services Group, MWR: Mid-west region, BATS: Business and Technology Solutions, OG: Operations Group, PR: Perth Region, OSG: Operations Services Group, CCG: Customer and Community Group, SWR: South West Region, NWR: North West Region, MWWT: Metro Wastewater Treatment, GAR: Goldfields Agriculture Region, GSR: Great Southern Region, DSB : Development Services Branch, APG: Asset Planning Group, ADG: Asset Delivery Group, SSG: Strategy & Stakeholder Group, ECS: Engineering & Construction Services.

that it compared four technology options and selected the least whole life cost option. The scheme was delivered under a 35 year Design, Build, Operate (DBO) model following public sector comparison and open market competition and commenced operation in 2013. The project appears to be prudent and efficient.

Ord River Irrigation Channel Stage 2

This project did not appear to be in the program for the last review we undertook back in 2012 as it was not initiated by Water Corporation. Construction of the channel is necessary for the establishment of irrigation in the area straddling the NT/WA border. It was built and paid for by the State Government and ownership transferred to the Water Corporation from the Department of State Development. Water Corporation did not undertake any of the planning, design or construction. There will not be any additional ongoing additional maintenance costs except for some minor works such as weeding. As there are no costs involved in this project it is deemed prudent and efficient.

Program *Vehicle Tool Modules for Leased Vehicles*

This project was essentially a refinancing project for 100 light vehicle tool modules on the rear of Toyota Hilux'. The vehicle tool modules were financed by State Fleet, a government owned financing entity. The modules were fully depreciated in parallel over the life of vehicle but would often outlast the vehicle lifespan with State Fleet receiving an uplift on disposal. Through refinancing and treating them as company own assets, Water Corporation are able to align the functional asset life of assets with estimated savings of $12k/pa. This appears to have been a prudent and efficient project as such we have not made any adjustments based on this.

5.2.2.1 Conclusion

The review of historical capex projects undertaken has not found any imprudent or inefficient expenditure. As such, we have not proposed any adjustments to historical capex in Section 5.5 below.

5.3 Proposed capital expenditure

5.3.1 Drivers for proposed capital expenditure

Water Corporation has used its five-year Strategic Development Plan (SDP) and 10 year Strategic Asset Plan (SAP) as the basis of the capex components of its submission for 2017/18-2021/22 and 2022/23 respectively. The capex for 2022/23 are based on the average of the SAP projections for years 2023/24 to 2027/28.

The SDP was defined by a process of preparing 20 year SIBCs, applying the 'Select' process to document justification review for specific projects followed by ' top-down, bottom-up evaluation'. Having reviewed the October 2016 Board Paper[24] it is not clear how the ' top-down, bottom-up evaluation' was carried out and how the service/risk/cost trade-off was optimised. It appears that one of the broad objectives was to maintain a capital program at similar levels to the previous SDP. The Board Paper sets out a number of reasons for maintaining expenditure at similar levels despite a reduction in economic activity and demand reduction, as follows:

> The **drying climate**, necessitating increased planning activities for future water sources. The SDP includes funding for *planning and pre construction* based on zero inflow into the metropolitan surface water sources and funding for *construction* of future water supply sources on an assumed average annual surface water inflow of 25 GL per year and achievement of the target of 115 KL/person water demand by 2030.

> **Land development** activity that continues to drive investment in essential infrastructure, particularly sewerage pump stations required at initial subdivisional stages.

> **Asset renewals** expenditure given an increasing proportion of the Corporation's assets are approaching the end of their economic and serviceable lives. This is compounded by higher regulatory standards and

[24] 'PM-#15320713-v17-3_2_-_Asset_Investment_Program_2017-18_to_2021-22_-_Board_Meeting_-_18_October_2016'

the paramount need to provide safe operating environments, including assets such as electrical switchboards.

Overall the average projected capex for the period from 2016/17 to 22/23 is slightly (7%) lower than the average between 2011/12 and 2015/16. The biggest absolute reductions are in the water service and in supply-demand, with 'base capital' and 'enhanced service' capex projected to increase.

Table 5-1: Change in average capex spend (end $15/16M, excluding SIC and capitalised interest)

	Average Capex 2011/12 to 15/16	Average projected capex 2016/17 to 22/23	Variance $	Variance %
Service				
Wastewater	$170.4	$176.7	$6.3	4%
Water	$393.6	$322.6	$-71.0	-18%
Common	$113.3	$121.3	$8.1	7%
Drainage	$4.7	$26.4	$21.7	463%
Irrigation	$21.6	$10.3	$-11.3	-52%
Cost Driver				
Base Capital	$210.1	$307.9	$97.8	47%
Enhanced Services	$26.0	$56.6	$30.5	117%
Quality and Standards	$96.8	$55.4	$-41.4	-43%
Supply Demand	$370.7	$237.5	$-133.2	-36%
TOTAL	**$703.6**	**$657.3**	**-$46.3**	**-7%**

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

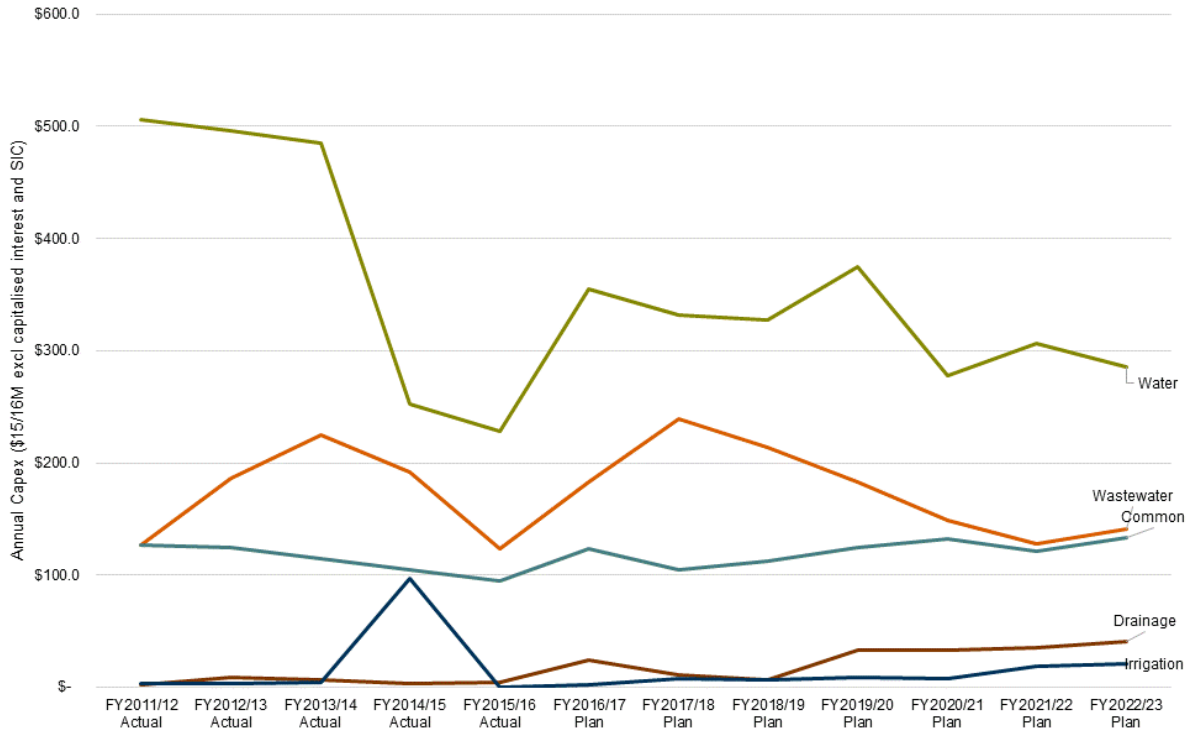

Figure 5-12: Projected capex by line of service

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIC spend) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (drivers/service)

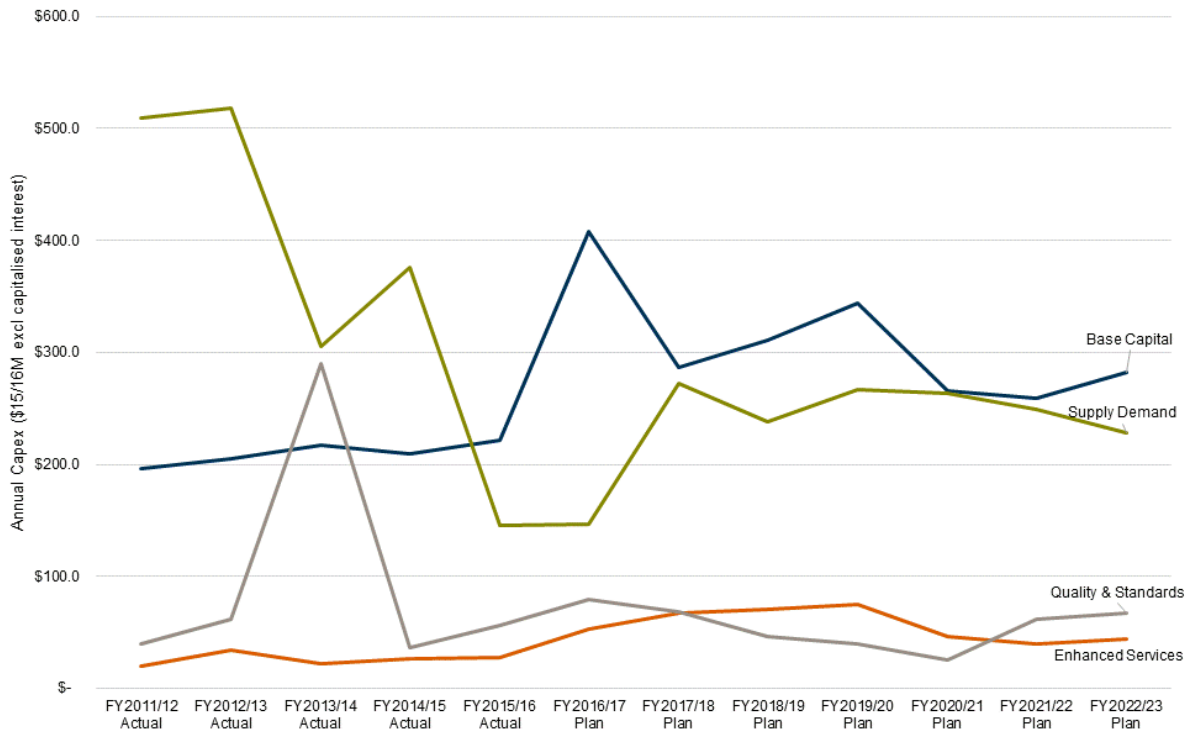

Figure 5-13: Projected capex by cost driver

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIC spend) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (drivers/service)

The reduction in projected supply-demand expenditure is consistent with the outlook for new dwelling construction in Western Australia as highlighted below. This suggests that, at 21.3 thousand new dwellings per annum, the rate of new development is expected to be lower in 16/17 to 19/20 (the extent of the projections) than the average rate of 25.8 recently experienced in the 2011/12 to 15/16 period.

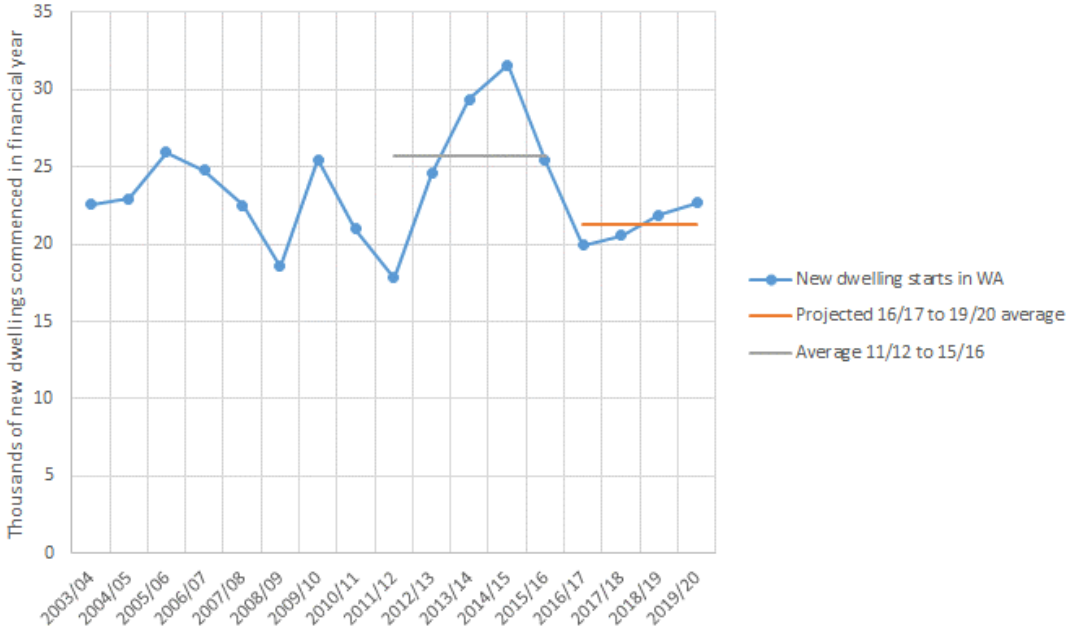

Figure 5-14: Historical and projected new dwelling starts in Western Australia

Source: New Housing Outlook, HIA, March 2017. Dwelling Starts by State and Financial Year.[25]

We comment further on the case for increasing 'base capital' expenditure in Section 5.5.1 below. However, in general, we note that Water Corporation's assets appear to be relatively young, with high average remaining asset lives in the higher cost asset categories as summarised below.

Table 5-2: Inferred average remaining asset life

Useful life range (years)	Asset class % of aggregate book value (replacement cost)	Average remaining asset life (years)
<15	2%	3
15-30	9%	16
30-50	3%	10
50-100	60%	44
>=100	27%	81
TOTAL	**100%**	

Source: Inferred from book and acquis values in 'Book 25 2016' tab of 'CONFIDENTIAL - USB - Water Corporation -~se to WC4 - PM-#16300653-v1-WC4a_-_Existing_asset_register_for_ERA_Inquiry_2016'

The 30 June 2016 existing asset register also suggests a lower replacement cost of assets 'expiring' (i.e. reaching full depreciation) in year than Water Corporation's projected base capital spend as summarised below.

Figure 5-15: Comparison of 'base capital' projections and replacement cost of assets expiring in year

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIC spend) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (driver) and 'CONFIDENTIAL - USB - Water Corporation -~se to WC4 - PM-#16300653-v1-WC4a_-_Existing_asset_register_for_ERA_Inquiry_2016' (replacement cost).

[25] See https://hia.com.au/BusinessInfo/economicInfo/housingForecasts

Some caution is required in relying on this analysis as the asset lives are averages used for accounting purposes, many assets are already fully depreciated and it only takes account of existing assets. However, it does reinforce the impression that the increase in projected base capital spend is not driven by a large number of assets coming to the end of their useful life in the next few years.

5.3.2 Use of SIBCs to derive the capital program

The capital program in Water Corporation's submission is based on the aggregation of a number of cost types. Each project level expenditure line is allocated to a SIBC and a one-line balancing adjustment is applied to each SIBC area equal to the difference between the SIBC expenditure projections and the sum of project lines. ***This has the effect of making the capital program equal to the sum of the SIBC projections and NOT the sum of project level projections***.

Using strategic modelling to derive expenditure requirements and constrain project level expenditure is not unusual. For example, program-level modelling is often used to derive the envelope of expenditure requirements for capital maintenance. What is unusual, however, is the scale and breadth of adjustments applied, as discussed further below. If Water Corporation continues with this approach, we recommend that future capex reviews focus effort on the robustness of SIBCs (including their link to projects) rather than a review of project expenditure.

Water Corporation's forecast asset investment program in its submission incorporates capitalised interest and Standard Infrastructure Charge (SIC) expenditure. These items have been removed in our analyses as SIC is paid for by third parties and capitalised interest would double count the return that Water Corporation is allowed to earn on its regulated asset base.

The make-up of the capital program is summarised below. There are some minor discrepancies between the figures in the spreadsheet used as the source for this analysis and WC's submission as highlighted in the bottom line below. These are assumed to be due to minor reforecasting updates.

Based on discussion with Water Corporation[26] and the Water Corporation note on capital program escalation[27], we understand that, whilst project lines are in a mix of nominal and real prices, the SIBC forecasts used to derive the balancing adjustments are in nominal amounts (i.e. incorporate inflation projections). As such the aggregate capital program is understood to be in nominal dollars.

Table 5-3: Makeup of the capital program ($M end 15/16 $)

Element	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Project lines	$822.0	$945.9	$785.9	$687.8	$379.0	$386.9	$-
Capitalised interest	$12.3	$18.0	$18.0	$17.9	$17.7	$17.5	$20.2
Capitalised overheads	$25.8	$26.0	$26.0	$25.9	$25.6	$25.2	$26.3
SIC capex	$82.5	$96.8	$87.1	$126.2	$75.1	$88.7	$-
Balancing adjustments (non-SIC)	$-164.3	$-279.8	$-149.4	$4.7	$191.7	$192.2	$596.2
Balancing adjustments (SIC)	$-4.7	$-22.6	$1.9	$-23.3	$2.9	$2.8	$155.7
Total with balancing	$773.6	$784.3	$769.5	$839.2	$692.1	$713.3	$798.4
WC submission total	$775.0	$784.3	$769.4	$839.2	$692.1	$712.8	$798.0
Difference	$-1.4	$-0.0	$0.1	$0.0	$0.0	$0.5	$0.4

Source: PM-#16828656-v15-Capital_Program_Update and Table 12/page 37 of Water Corporation's submission

Note: balancing adjustments rows exclude capitalised interest and overheads.

Although project level expenditure projections exist for 2022/23[28], the expenditure projections in the submission for this year are made through SIBC balancing adjustments, overheads and interest, with no spend brought in from project lines. This accounts for the overall scale of the balancing adjustments on the

[26] Teleconference with Water Corporation, Economic Regulation Authority and Cardno/Atkins, 8 May 2017
[27] Transmitted by email 8 May 2017
[28] As provided in, for example, PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects

proposed capital program, with $596.2M of non-SIC adjustments in 2022/23 alone, compared to the overall effect of the balancing adjustments of an additional $564.4M (nominal) of non-SIC capex i.e. c14%. However, the adjustments also have the effect of significantly 'smoothing' out total projected expenditure over time as highlighted below.

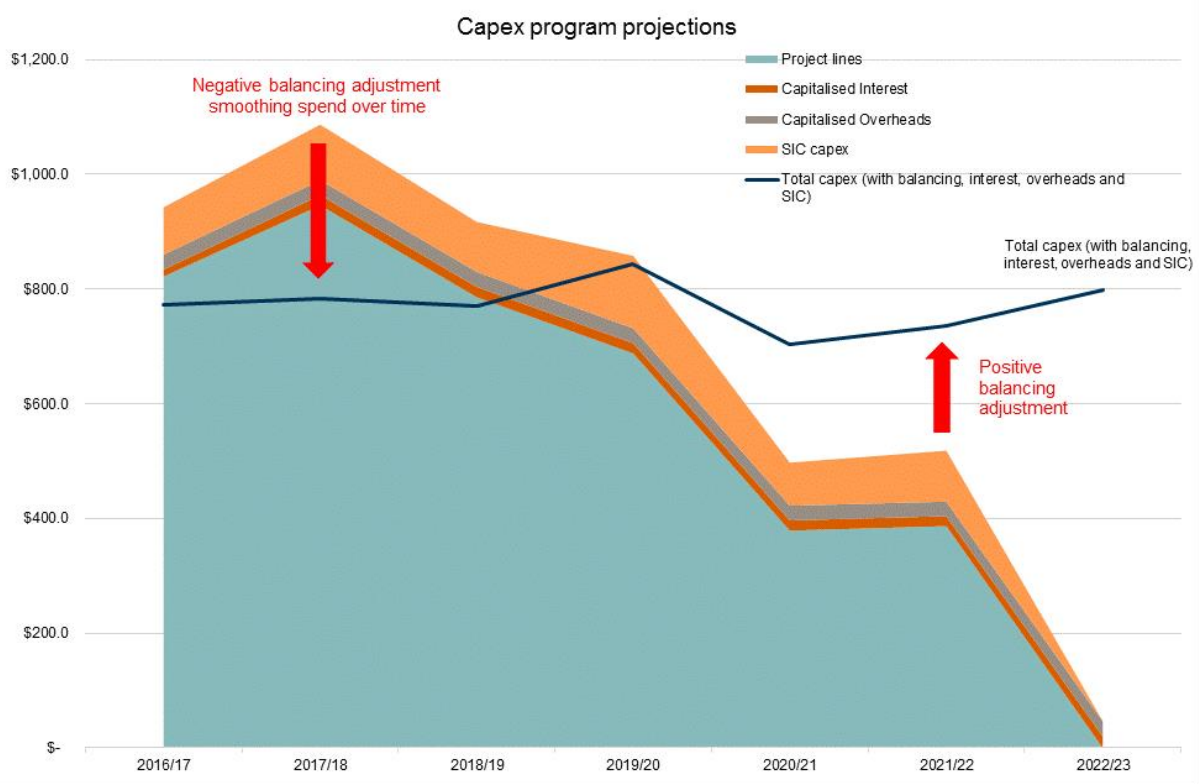

Figure 5-16 Smoothing impact of 'balancing' adjustments

Source: PM-#16828656-v15-Capital_Program_Update.

The impact of the balancing adjustments varies significantly at a SIBC level, with a number of SIBC areas seeing very large adjustments above or below the sum of associated projects, see below. For example, $235.3M of the Metropolitan Water Supply and Demand SIBC spend and 69% of the Metropolitan Drainage SIBC spend is not assigned to existing projects in the capital program but has been added as balancing adjustments.

At the other end of the spectrum $31.8M (or 68%) of the total 'Operational Information and Control' project spend has been adjusted out of the program.

Table 5-4: Significance of balancing adjustments for individual SIBC areas ($M end 15/16)

SIBC	Total projected spend (2017/18 to 22/23)	Of which balancing adjustment	Balancing adjustment as % of spend
Metropolitan Drainage	$67.2	$46.3	69%
Regional Drainage	$72.6	$43.3	60%
Capitalised Overheads	$155.0	$67.3	43%
Retail	$70.8	$28.3	40%
Capitalised Interest	$109.3	$39.1	36%
Metropolitan Water Supply & Demand	$766.3	$229.2	30%
Regional Wastewater Treatment, Disposal & Re-use	$315.5	$86.8	28%
Irrigation	$77.4	$18.9	24%
Drinking Water Quality	$257.3	$47.6	18%
Regional Wastewater Networks	$70.0	$12.0	17%
Regional Water Supply & Demand	$239.4	$31.4	13%
Regional Water Networks	$325.8	$38.4	12%
Metro Wastewater Treatment, Disposal & Re-use	$412.6	$45.6	11%
Real Estate Facilities	$83.4	$2.8	3%
Metropolitan Wastewater Networks	$293.2	$6.6	2%
Fleet And Plant	$38.8	-$0.8	-2%
Information Technology	$202.4	-$10.6	-5%
Metropolitan Water Networks	$367.2	-$25.6	-7%
Occupational Safety And Health	$11.9	-$3.7	-32%
Strategic Land	$22.8	-$9.0	-39%
Operational Information and Control (OIC)	$46.5	-$31.9	-68%

Source: PM-#16828656-v15-Capital_Program_Update, excluding SIC capex

Whilst we are supportive of strategic program level planning providing the framework for investment and defining the envelope of funding requirements, ***the large scale of these balancing adjustments casts significant doubt on the robustness and usefulness of one or both of the project or SIBC level projections.*** This is not an ideal backdrop for undertaking a review of proposed capital expenditure. However, we have taken this into account by carrying out pre-efficiency adjustments at a mixture of project and SIBC level and examining the link between them as discussed in Section 5.5.1. Assuming that Water Corporation maintains its approach we recommend that future reviews focus on the SIBC projections, rather than on individual projects, as the building blocks of the capital program.

5.3.3 Findings from review of sample of proposed capital expenditure projects

Table 5-5: Proposed capex projects reviewed

Project	Title	Line of business	Cost driver	Region	Capex spend to end 16/17 ($nominal)	Projected capex from 17/18 to 22/23 ($nominal)
CS02357	Woodman Pt WWTP Upgrade to 180 MLD	Sewerage	SD	MWWT	$16,643,254	$138,019,943
CW03480	IWSS SSDP Expansion to 114 GL/y	Water	SD	MWP	$-	$145,800,000

Project	Title	Line of business	Cost driver	Region	Capex spend to end 16/17 ($nominal)	Projected capex from 17/18 to 22/23 ($nominal)
CW02788	Perth GWR Stage 2 Plant	Water	SD	MWP	$8,350,182	$105,723,185
CC00242	Grange Enhanc/Replacement - Future Est	Common	BC	BATS	$-	$75,000,000
CI00033	Ord Dam Spillway Upgrade	Irrigation	QS	NWR	$-	$47,094,000
CW01625	MC Moorine-Southrn Cross 304.938-326.014	Water	BC	GAR	$297,597	$43,094,713
CW03428	Perth GWR Stage 2 Recharge Bores	Water	SD	MWP	$6,277,906	$29,147,997
CS00062	Quinns MS L-M 1900m of DN1800	Sewerage	SD	PR	$79,637	$32,254,359
CS02682	SWR Long Term Sludge Treatment Facility	Sewerage	BC	SWR	$-	$28,937,222
CW03253	SSDP Plant Asset Replacement 2020-2024	Water	BC	MWP	$-	$19,194,312
CS01088	Exmouth North 2.5MLD WWTP & TWWM	Sewerage	SD	MWR	$1,595,462	$22,753,687
CC00680	ARC Flash Mitigation Plan	Common	BC	PR	$-	$24,000,000
CW03388	DN600 Yule Collector Main Renewal 2km	Water	BC	NWR	$15,061,075	$5,033,059
CW01923	Walpole: New Source	Water	SD	GSR	$732,744	$17,431,580
CW02281	NK Extension Upgrade Stage 3	Water	QS	GSR	$-	$18,927,756
CS03433	Broome South WWTP & TWWM Upgrade	Sewerage	QS	NWR	$-	$15,865,000
CW02264	NK Extension Upgrade Stage 2	Water	BC	GSR	$5,911,623	$9,917,017
CD00116	Busselton Upgrade Vasse Diversion Drain	Drainage	QS	SWR	$1,646,935	$12,074,323
CW03413	City of Vincent CI Retic Renewals 18/19	Water	BC	PR	$-	$14,093,000
CW03048	Tank sealing 2019FY-2023FY	Water	BC	OG	$-	$6,040,260
CW03249	Bassendean Design Block 7	Water	ES	PR	$459,984	$8,124,936
CC00715	IMAS Program	Common	BC	BATS	$2,794,000	$4,206,000
CW03507	Metro Water Main Renewals 19/20	Water	BC	PR	$-	$7,000,000
CS02955	Gnangara Branch Sewer Section 2	Sewerage	SD	PR	$-	$6,982,738
CS03365	Broome South WWTP Holding Pond Lining	Sewerage	ES	NWR	$3,365,167	$2,109,806
CW03090	Kununurra New Storage Tank	Water	SD	NWR	$-	$3,102,685
CC00721	Digital Integration	Common	ES	CCG	$-	$5,000,000

Woodman Pt WWTP Upgrade to 180 MLD

Woodman Point is Water Corporation's largest WWTP. The treatment plants currently receiving an average of 141ML/d, meaning it is operating over its nominal capacity of 120ML/d. This project involves increasing the capacity of the plant to 180Mld. It has been procured by competitive alliancing. The works are currently running to program and no Variation Order (VO) requests have been issued to date as the alliance agreement clearly sets out the scope/performance. The pain/gain share arrangement in place provides a strong incentive to the constructor to deliver efficiently and means that Water Corporation's customers should benefit from any efficiencies the constructor makes. We consider that it is good practice to work up and compare the cost implications of the options in some detail, especially considering the scale of investment involved. This analysis may exist but was not evident from the Project Delivery Business Case document provided. It would also have been useful to see more detail of current performance risk and flow trends to validate the driver/urgency of investment. However, in the absence of this documentation, we cannot see any reasons to consider the project imprudent or inefficient.

IWSS SSDP Expansion to 114 GL/y

The scheme is part of a wider program to address the water supply-demand imbalance in the IWSS driven largely by declining surface water inflows. The aim of the scheme is to increase supply from SSDP by 12 GL/yr through capacity enhancements at the plant and in the network. This in addition to the 2 GL/yr capacity increase assumed to be realised through a separate project to upgrade variable speed drives and will increase the capacity from the current nameplate capacity of 100 GL/yr to 114 GL/yr. The scope is not yet well defined and is subject to pilots being undertaken and regulatory requirements affecting ocean works. The cost estimate is therefore at a very early stage of maturity. There is a clear need to improve the supply-demand balance in the IWSS. However, as the scope firms up, Water Corporation will need to consider how it ensures efficiency in procurement and delivery and will need to demonstrate that this is an optimal solution using the least cost model it has developed for the IWSS.

Perth GWR Stage 2

On 14 July 2016, the State Government announced Australia's first Groundwater Replenishment Scheme will be expanded from 14 billion to 28 billion litres of water a year. The first stage of the scheme is currently in the final stages of commissioning and will recharge 14 billion litres of recycled water each year into Perth's groundwater supplies through the Leederville and Yarragadee Aquifers. We reviewed the projects and business cases for the GWR Stage 2 Expansion of the Plant and Recharge Bores to the North. The principal objective of both projects is to allow a sustainable increase in Water Corporation's groundwater abstraction, at least equivalent to the volume of recycled water that is recharged as part of delivering the Corporation's Integrated Water Supply Scheme water source development strategy. [redacted]

Stage 2 Plant

Stage 2 is being procured as a Design/Construct contract. With a lower risk profile since stage 1 as ground conditions are now better understood. WC had 10 submissions in July'16 EOI 5 JVs and 5 with a main lead contractors and sub-contractors – shortlisted to four in Sept 16. This was further shortened to two in November 2016 with WC staff seconded into both teams developing design. Water Corporation has approved award of this contract subject to Ministerial approval. To offset any delay in the final contract award due to environmental and other approvals an early works contract has been entered into to progress engineering of the proposal.. We consider this planned expenditure to be prudent and the contract has been procured efficiently although we have not looked at the contract as this was still being finalised at the time of our review.

Stage 2 Recharge Bores

Four deep bore sites, each with additional well monitoring, have been identified around Lake Joondalup to recharge the aquifer from the GWR plant. The hydro level was chosen as the preferred solution with an appraisal undertaken to see that it would not interfere with Groundwater quality being in a *P1 – groundwater protection zone.* The project is being competitively tendered and procured under separate packages of work

including: drilling; casings; pumping etc. This project forms 22 wells with potentially 7 work packages with a number of potential efficiency savings to be made. There are wider environmental benefits including supporting the local wetlands. This scheme appears to be prudent and efficiencies should be realised through the procurement process and economies of scale.

Grange Enhance/Replacement - Future Est

Water Corporation informed us at our review meeting that there is no existing business case or identified need to replace Grange in the forward regulatory period. A project (Grange Modernisation Phase 1 - $4.0M capex) is currently underway to make Grange more robust by moving the system to a new platform and rewriting the code. Water Corporation expects that this expenditure will be sufficient to maintain the system through the upcoming regulatory period. Water Corporation advised that the existing system delivers the functionality required of it. During the upcoming regulatory period Water Corporation will develop a strategy for replacement or renewal of Grange aligned with its wider ICT strategy. Based on the advice of Water Corporation, we have removed the $75M of capital expenditure included in forecasts.

Ord Dam Spillway Upgrade

Dam Safety has a separate SIBC, within this the Ord Dam has been identified [redacted]. The Corporation has adopted the Australian National Committee on Large Dams (ANCOLD) guidelines[29] to tackle the highest risk first but this is tempered by staging remedial works where feasible and using benefit/cost ratio and cost to save a statistical life to evaluate staging options. They are not stringent standards but it is a key issue for the board to manage that risk. At this stage the project was deemed to be more to allocate a pot of money for the future based on risk profile. The SIBC demonstrates that WC are managing dam risk similarly to other Australian Water providers. At this stage we would consider the forecast expenditure to be prudent based on the risk profile however we cannot comment whether this forecast expenditure would be efficient as only a feasibility study has been undertaken to date. It seems reasonable to allocate expenditure for this going forward but estimates should be refined as further scoping and investigative studies are undertaken in the future.

MC Moorine-Southern Cross 304.938-326.014

This project relates to rehabilitation of part of the Kalgoorlie pipeline of the Goldfields conduit between Merredin and Southern Cross This section was identified due to the significant number of repairs over the last 5-10 years and together with CCTV, other inspections and understanding of the pressure fluctuations, was given an overall risk rating.

This project was ready to start being delivered but it was considered preferable to bring other projects forward, meaning that this expenditure has been suspended for a year. Water Corporation has allowed for buffers within the budget to slow down or speed up spend as it is not considered time critical, with contingency included in the business case of around 10% of base costs, but what the specific contingency costs are for is not identified in the business case. The project appears to be prudent and is going out to open tender to best ensure it is procured efficiently.

Quinns MS L-M 1900m of DN1800

This project is part of a broader program to serve significant greenfield developments with sewerage. It will connect a pressure sewer to the existing Quinns mains sewer so that sewage from new developments can reach Alkimos WWTP for treatment and disposal. Without solving this issue development in some locations would be stopped. Significant tunnelling will be required, hence the relatively high cost. However, it is less costly than the alternatives examined. This scheme appears to be prudent and efficient. Savings may emerge as the scope is firmed up.

SWR Long Term Sludge Treatment Facility

This proposed scheme is to develop a regional wastewater sludge facility for Water Corporation's South West region. Sludge from these sites is currently disposed of by composters or taken to landfill by a contractor. This project appears to be a contingency plan, with higher cost than the current situation, which it

[29] ANCOLD guidelines https://www.ancold.org.au/?page_id=334

would not be prudent to undertake the project unless the current disposal routes become unavailable. We have therefore recommended an adjustment to the expenditure as discussed below.

SSDP Plant Asset Replacement 2020-2024

SSDP was procured as a Design Build Operate (DBO) contract with a 25 year operating period. This project line relates to replacement of SSDP assets in the years from 2020 to 2024. Asset replacement in 2015-2017 and 2018-19 are covered in separate project lines in AIP. The DBO was chosen as part of a competitive tender based on whole of life costs (including asset replacement) with pain/gain share. The expenditure appears to be prudent and efficient, subject to ex-post review.

Exmouth North 2.5MLD WWTP & TWWM

Exmouth WWTP is in the centre of town in a tourist location, with a population which doubles in the tourist season. The plant is being relocated to reduce odour problems and allow development. The cost estimate indicates 37% contingency allowance in addition to 40% regional uplifts for some costs, suggesting that the cost estimation is conservative.

It would have been useful to examine the costs and benefits of this project in the context of its impact on tourism, development and odour. However, in the absence of this evidence, given the nature of the tourist activity in the area it does not seem unreasonable to assume that the benefits do indeed outweigh the costs and that it therefore constitutes prudent expenditure.

ARC Flash Mitigation Plan

The main driver for this expenditure is management of health and safety and damage risk associated with switchboard arc flashes. The program covers mitigation measures emerging from a program of risk assessment.

Based on discussions with Water Corporation staff the expenditure appears to be prudent, subject to ex-post review of the extent of work justified by the assessments undertaken. However, by including spend for the 'child' lines as well as the 'parent' line, the expenditure appears to have been double counted in Water Corporation's submission. We have therefore made an adjustment to the projected spend to take account of this double-counting.

DN600 Yule Collector Main Renewal 2km

The Yule collector main is approximately 16 km in length. There have been numerous failures along the collector main that supplies the Yule river storage tanks. A 2km section of the collector main directly before the storage tanks has experienced 37 pipe failures for 2013 to 2016. Therefore, this project is part of a wider program of replacement of 6km of Asbestos Cement pipe with Polyethylene pipe along the Yule collector main and to make best use of timings and replacement was considered to bring this expenditure forward while other work was ongoing. The total budget was originally $24M with $19M spent due to the competitive market for capital works. The 17/18 and 18/19 projections are based on the lower reforecast costs. There is some ongoing work to finish and commission the main. This project appears prudent and with the revised forecast now appears efficient.

Walpole: New Source

This scheme relates to a new water source for Walpole. Walpole water supply has been unable to meet full summer demand periods and Water Corporation has concerns about water quality risks. Peak demand is being met by carting at present. Water Corporation is still undertaking investigations. The cost estimate assumes offline storage from Walpole River. Water Corporation hope that the solution will be much cheaper than the current budget. They are optimistic but not confident yet so have not changed the estimates in SAP/AIP. We do not consider that it would be prudent to spend the full sum included in Water Corporation's submission ($19.1M including investigations etc.) on avoiding seasonal carting for ~300 connections and have recommended an adjustment to the $19.1M incorporated in the submission as discussed below.

NK Extension Upgrade Stage 2

The NK (Narrogin to Katanning) extension is part of the Great Southern Towns Water Supply (GSTWS) Scheme. The main driver of this project is water quality. There was previously a local source and local treatment but over time catchment degradation has increased risk and there is consideration of abandoning

local sources. To cater for the future growth in towns downstream of Katanning, the NK Extension needs to be upgraded under three different stages. We have been provided evidence of extensive Optioneering on this project with a variety of options considered. There was an original $16M business case and there has not been much reduction in costing since and appears to be running on budget. Based on what we have seen, this scheme appears prudent and efficient.

NK Extension Upgrade Stage 3

To cater for the future growth in towns downstream of Katanning, the NK Extension needs to be upgraded under three different stages. NK3 relates to a further 14km of 350mm steel main, Stage 2 and Stage 3 are two sections of the same pipe. The project is at planning phase and there may be a need to re-scope as it is linked to a number of other projects which may reduce the size of those projects.

The planning estimate is $12M which is less than in the current forecast SAP table. The cost projection in the submission ($18.9M) seems high and there is a need to reflect the stages of projects against current estimates which were forecast during boom times. This may be prudent and should be efficient when the estimates are reforecast to $12M. We have recommended an adjustment to this effect as discussed below

Broome South WWTP & TWWM Upgrade

This project is a follow-on to Department of Environment Regulation (DER)'s review of the license described under 'CS03365- Broome South WWTP Holding Pond Lining'. Water Corporation are carrying out an investigation and will make a proposal to reduce the nutrient load being discharged to the golf course/bay, which is classified as a Ramsar site, i.e. a wetland of international importance under the Ramsar Convention.

The project is at very early stages with no options appraisal yet carried out. The cost allowance is based on an early view of the likely outcome of the investigations and negotiations with DER. WC's internal timeframe is aiming for practical completion by December 2021 (i.e. in 21/22). This is later than assumed in the AIP. We have therefore made an adjustment to reflect the expected later completion date.

Busselton Upgrade Vasse Diversion Drain

This project relates to the diversion drain for Vasse River which was built in the 1920s to protect Busselton from flooding. It was upgraded in 1993 but floods in 1997 and 1999 caused the drain to overtop. The project envisages reinforcing the existing structure (a 6km long drain with 12km of 2m high levy banks). The objective is to manage overtopping, provide adequate capacity and rectify structural defects in the levies.

Although designing for a 1 in 100 year event is conservative the cost analysis carried out suggests that the project is economically justified and the cost estimate appears reasonable. Open tender should allow for efficient procurement.

City of Vincent CI Retic Renewals 18/19

The City of Vincent Cast Iron (CI) replacement project is part of a wider program of CI replacement which was triggered to be investigated back in 2011 when a pipe in Wellington Street in the CBD 'catastrophically' failed. Water Corporation thought the pipes were not as old as they actually were i.e. date of refurbishment was considered to be the date they were laid in the ground originally. Water Corporation initiated a program of corrective works to account for the actual lay date, for many, these were thought to be laid in 1930s whereas this was subsequently discovered to be the date of *refurbishment*.it is considered that many of the pipes were actually laid in the 1890s. We have not been provided enough evidence to indicate that levels of service have deteriorated significantly or bursts have risen significantly to justify the levels of expenditure in the program to comment appropriately on the prudence or efficiency of this expenditure. We have recommended an adjustment to the base water capex as discussed further below.

Tank sealing 2019FY-2023FY

This is driven from the Water Quality SIBC, linked to the Barrier Risk Assessment process (BRA). A BRA undertaken for each scheme which feeds into the water safety plan. Cost estimates are not sophisticated but simply comprise limited information from regional managers with very indicative prices. These are placeholder values and deemed to be a 'bucket project'. $9.5M has been allocated in the budget with more detailed inspection process up front which has been subject to capital check select review. There is a parallel renewals driver for replacing tank roofs rather than just quality. Based on the aforementioned, it is hard to

judge whether this expenditure would be prudent and efficient. We have recommended an adjustment to the base water capex as discussed further below.

Bassendean Design Block 7

This project is part of a broader pressure management program to help to balance supply and demand in the IWSS. It has just moved into scoping phase and the cost estimate is at the preliminary phase. The project will be delivered by PRA.

The project appears to be prudent given its cost effectiveness in the context of the IWSS supply-demand situation and the procurement route used appears to be efficient.

IMAS Program

The Information Management and Analytics strategy is a program of initiatives that respond to ICT needs identified bottom up by the business. Water Corporation forecasts capital expenditure of $7.0M over 2016/17 and 2017/18. Initiatives have been bundled and prioritised. Initiatives are being pursued progressively but the work is still in its early stages. Water Corporation outlined how it investigates the initiatives, potential solutions and determines the benefit in implementing the solution before committing to expenditure. That is, it has not committed to the total $7.0M expenditure, it will commit to small elements as each is demonstrated to be cost beneficial. We challenged Water Corporation on the governance over this decision making and we are satisfied that Water Corporation has an appropriate approach to ensure that this planned expenditure is spent prudently and efficiently.

Metro Water Main Renewals 19/20

This project aims to take a more planned approach to renewals, whereas before many of the renewals were undertaken on a reactive basis. It was unclear from our review how this program of works and allocated chunk of money is treated as it appears as there is additional money for other reactive works even though this project is supposed to have a more planned approach to reactive works and a more preventative maintenance approach so deemed to be doubling up on expenditure for similar drivers. We have recommended an adjustment to the base water capex as discussed further below.

Gnangara Branch Sewer Section 2

The project involves construction of a gravity sewer as part of a broader investment to connect the sewage from large development taking place rapidly at Ellenbrook to Alkimos WWTP. It is currently at planning stage. There are no reasons to consider this project imprudent or inefficient.

Broome South WWTP Holding Pond Lining

This project involves lining the holding ponds at Broome South WWTP to help to protect Roebuck Bay, a RAMSAR site for migratory birds. It is at asset acquisition (i.e. delivery) stage and is expected to finish in August 2017. Procurement was through a ‘select tender’ process and the outturn cost is looking likely to be approximately $4.8M, significantly lower than the AIP figure of $5.5M and the ATD budget request of $7.3M. This is because of lower priced tenders than anticipated.

Based on the information available during the review the expenditure appear to be prudent and efficient. However, we have made an adjustment to take account of the earlier delivery and lower expected outturn cost.

Kununurra New Storage Tank

This project is part of the wider Kununurra Water System Plan review. Kununurra is an isolated small town not far from the Northern Territory border. There are two distinct zones in the Kununurra water supply system – Kelly’s Knob Zone and Lakeside Zone Existing storage tanks have a capacity of 2.25Ml (Kelly’s Knob) and 6.3Ml (Lakeside Tank)and serve a population of 4,500 (2011 census). Due to the elevation that Lakeside Tank was installed at it cannot provide the required level of service to all properties in the zone by gravity feed. Increasing storage capacity to meet growth projections is the main driver of this project. The exact location for the storage tank is yet unknown but would likely be in Lakeside Zone. Average Dry Peak Week demand is 6.5MLD overall with significant growth forecast in the Lakeside Zone and by 2027 is projected to be 7.5MLD when there may be a deficit at Lakeside. This project sits within regional water networks SIBC and covers capacity and renewals. Due to the isolation of the project a regional cost inflator of 1.6 is used.

The majority of planned expenditure falls outside the five year program with the full program running until 2024 with another $2M allocated. This project is far enough in advance to push back if necessary but seems to have relatively robust demand forecast projections. Growth projections would need to be reviewed closer to the time of investment to check forecast accuracy but seem reasonable at the current time.

Digital Integration

Digital Integration is on the program for next year which is 1 of 51 initiatives in the retail SIBC. Developed as part of the wider customer strategy 18 months ago in 2015 and launched one year ago around needs and expectations around retail service delivery. This project is still being defined as to exactly what it is. E.g. Marketing cloud and customer journey automated software. There are questions to be resolved over whether this cloud based marketing software licensing and number of users likely within the business. There are potential opex benefits such as reduced cost to serve through automation and reducing calls into contact centre. It is unclear whether this is a capex driven solution or opex due to no capital assets being procured it is unclear what lives Water Corporation should give to these assets, given that they are predominantly cloud software licenses for staff. There is certainly a need for this type of software going forward so it does seem prudent to invest but as the exact nature and quantum of licences are not known we are unable to comment on how efficient this forecast expenditure is.

5.4 Capital cost escalation

Water Corporation uses a CCI to escalate its Fixed Asset Register and capex estimates in the AIP which have not yet been activated. The CCI is based on the following elements.

Table 5-6: Indices and weightings used to derive CCI

Index	Weighting
Producer Price Index - Non Residential Building Construction (WA)	82%
Wage Price Index consisting of:	15%
1 - Professional, Scientific and Technical Services (WA)	*10%*
2 - Administrative and Support Services (WA)	*5%*
Consumer Price Index (Perth)	3%

Source: “capital program escalation 080517”

The makeup of the CCI appears appropriate and is reasonably consistent with the proportion of white collar and other costs in the capex cost estimates we have seen.

The Water Corporation submission provides a forecast for CCI *‘assumed in the 2016/17 to 2021/22 asset investment program’* as summarised below.

Table 5-7: Water Corporation historical and projected CCI

Year	CCI growth per annum
2011/12	-0.3%
2012/13	0.3%
2013/14	0.4%
2014/15	0.2%
2015/16	-0.1%
Historical arithmetic mean	**0.1%**
2016/17	0.0%
2017/18	0.0%
2018/19	0.0%
2019/20	0.5%
2020/21	1.0%

2021/22	1.5%
Projected arithmetic mean	**0.5%**

Source: Water Corporation submission

The average projected CCI growth rate is higher than the average since 2011/12, but lower than the average since 2012/13 (0.8% p.a.). Whilst the basis of the forecast is not made clear in the submission, the overall level of projected CCI escalation appears reasonable.

However, it appears that there is a ***mismatch between the cost escalation being used to derive cost estimates and the CCI applied to the AIP***. This is because Water Corporation's cost estimation team generally applies the Construction Cost Index Forecast (CCIF) rather than CCI.

As an example, the figure below presents the CCIF cost escalation used in a cost estimate for Exmouth North 1 ML/d WWTP & TWWM. The estimate was prepared in June 2016 using price escalation factors dated March 2016. Assuming a scheme outturn date of September 2019, the cost estimate applied an increase for escalation equivalent to approximately 9% from June 2016 prices, compared to Water Corporation projected CCI growth of approximately 0%. This can cumulate to a significant difference over time as show in this Figure.

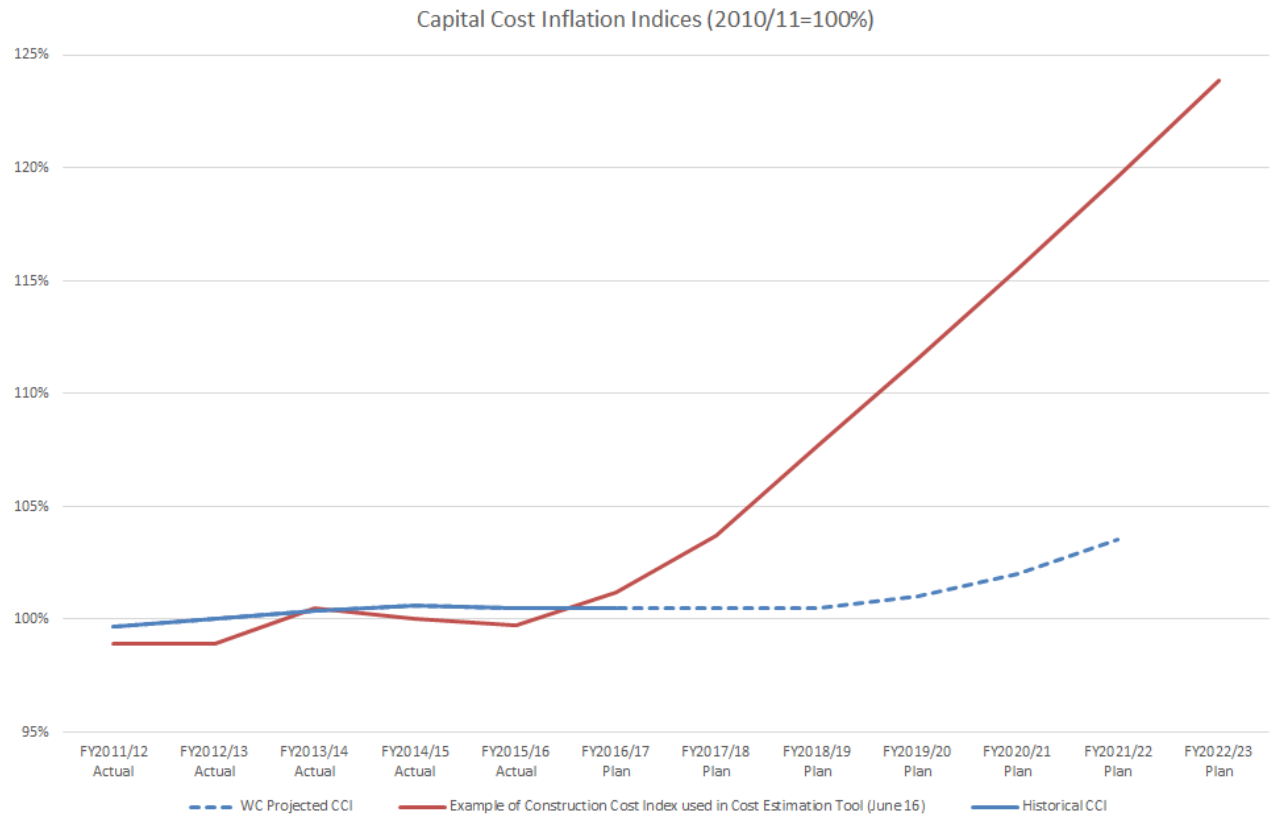

Figure 5-17 Comparison of CCI with index used for cost estimation (2010/11=100%)

Source: Water Corporation Submission and 'PM-#16818856-v1-PM-#7918582-v5-CS01088_Exmouth_North_1_MLD_WWTP_&_TWWM_ATS_Estimate_Revised_June_2016'

Another example of a different approach is the quoted 2% per annum compounding escalation in the SSDP Expansion Planning Business Case[30] in October 2016.

If SIBCs contain cost estimates based on CCIF or 2% then it is likely that they are being 'over-escalated' compared to recent CCI growth and the CCI factor used to bring nominal costs in the AIP back to real dollars. However, the SIBCs we have reviewed do not set out clear assumptions on the escalation applied to cost estimates. As such, it is difficult to assess the extent of this issue.

[30] PM-#14819756-v6-SSDP_-_Expansion_to_120GL_per_annum_-_Planning_Report

We strongly recommend that Water Corporation improves the consistency of its capital cost escalation**,** ensuring that project and SIBC cost estimates and AIP/ Fixed Asset Register (FAR) adjustments are made on a consistent basis. Sometimes a different index may be appropriate for cost estimation (e.g. for large 'specialist' costs which are known to differ from general construction). However, it may be more consistent and robust to at least default to the same escalation index or for the CCI to better capture changes in specialist costs if they are significant.

Unless otherwise stated the capital expenditure program figures quoted below (including efficiencies) are presented in an end of 2015/16 price base.

5.5 Efficiency and adjustments

The process we have followed in deriving our recommended expenditure is summarised below:

1. Allocation to drivers/service. Capex has been allocated to cost driver and line of service based on the summary in 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects', which reconciles well with Water Corporation's submission document. The only year for which there is variance is 2016/17 ($1.5M higher than the submission value) which is assumed to be due to improved assessment for that year, so the figures in 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' have been retained.
2. Removal of capitalised interest. Interest has been removed as this is treated separately in the regulatory approach. The amount of interest is based on Tables 10 and 12 of Water Corporation's submission, except for 2022/23 which is based on the SIBC breakdown in 'PM-#16828656-v15-Capital_Program_Update'. Capitalised interest is a single line so has been deducted from expenditure breakdowns pro-rata based on proportion of spend.
3. Removal of Standard Infrastructure Charge (SIC) expenditure. This has been removed as it is paid for by third parties. For 2015/16 to 2022/23 SIC spend has been removed using the SIC lines in 'PM-#16828656-v15-Capital_Program_Update'. For prior years, the average % of SIC spend has been deducted (e.g. 36% of wastewater and drainage supply-demand spend and 13% of water supply-demand).
4. Conversion to consistent price base. A price escalation factor has been applied to convert all costs to an end 2015/16 price base.
5. 'Pre-efficiency adjustments'. We have applied pre-efficiency adjustments setting out our recommended project or program-specific adjustments. These are summarised in the next section.
6. Efficiencies. We then make full capital program level adjustments based on our view of the potential for Water Corporation to realise savings which are not specific to particular projects or individual programs.

The result of this process is our recommended prudent and efficient forecast capex excluding SIC and capitalised interest.

5.5.1 Pre-efficiency adjustments

We recommend a number of pre-efficiency adjustments as summarised below.

5.5.1.1 IT & Retail adjustments

Adjustments based on reviews undertaken

The reviews undertaken have suggested two project level adjustments in the IT/retail area to reflect prudent and efficient expenditure:

> The case for, and scope of, enhancement or replacement of the Grange system is not yet developed. We consider that it would not be prudent to include this expenditure in the next price period. This means deferring $73.4M of project expenditure.

> Similarly, we consider that it would be prudent to defer other major IT capex such as ODSS until there is a clear roadmap in place to ensure that expenditure is part of an integrated strategy and does not risk creating stranded assets. We recommend deferring $16.7M ODSS project from 2017-19 to 2020-23.

Interaction with SIBC balancing adjustments

There is significant cross over between the retail and IT SIBCs, as evidenced by the classification of projects such as 'Billing Reform Stage 2' under the IT SIBC and 'Digital Integration' under the retail SIBC[31]. We have therefore examined the SIBC balancing adjustments applied to IT and retail in combination.

For 2017/18 to 2022/23 Water Corporation has applied a balancing adjustment of -$10.6M to its Information Technology SIBC portfolio and a positive adjustment of +$28.3M to its retail SIBC portfolio, leading to an aggregate increase in capex of +$17.7M or +7%.

The net effect of our recommended adjustments is to reduce capex in 2017-2023 by -$73.4M. The overall effect is in the opposite direction to the aggregate balancing adjustment made by Water Corporation. We have therefore assumed that our adjustments do not double-count the SIBC balancing adjustments made by Water Corporation and have applied our adjustments to Water Corporation's proposed expenditure after balancing as summarised below.

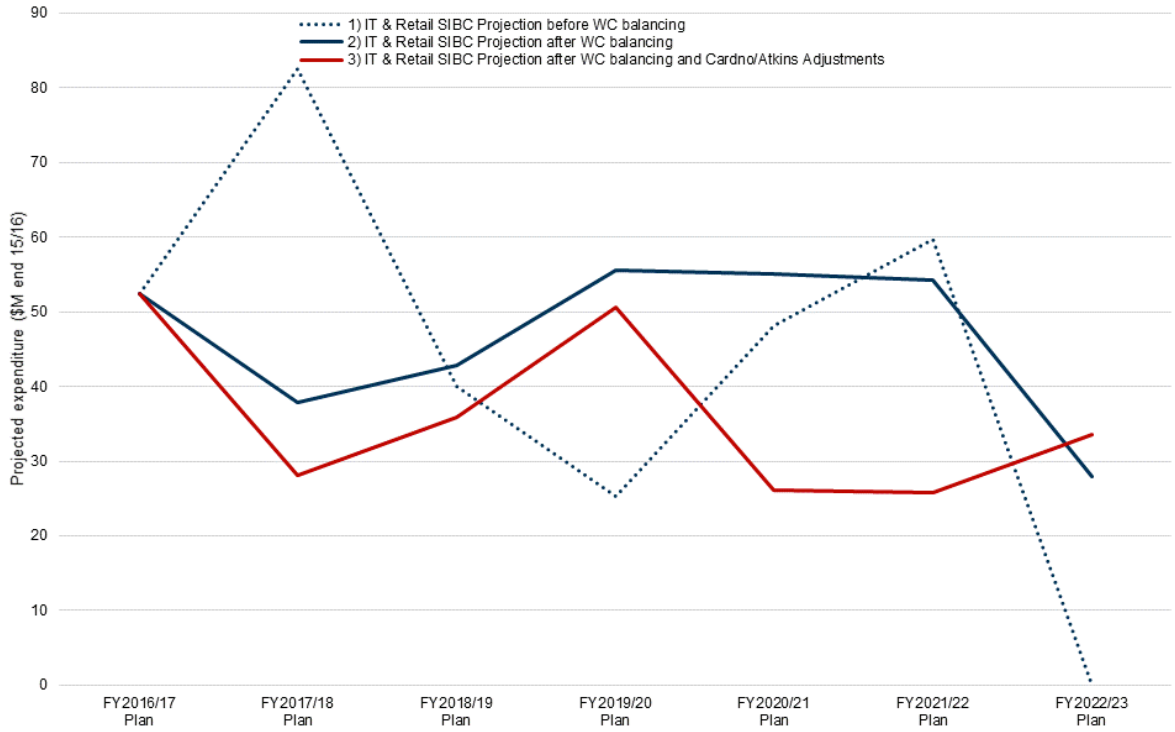

Figure 5-18 Adjustments to the IT & Retail SIBC Portfolio

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

Table 5-8: Adjustments to the IT & Retail SIBC Portfolio

All in end $15/16M	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan	Total 2017/18 to 2022/23
Cardno/Atkins Proposed Project Adjustments								
Defer Grange Enhancement		0.0	0.0	-5.0	-34.5	-34.0	0.0	-73.4
Defer major IT capex until roadmap (defer ODDS)		-9.7	-7.0	0.0	5.6	5.6	5.6	0.0
Combined IT & Retail SIBC Projections								

[31] Source: PM-#16828656-v15-Capital_Program_Update

All in end $15/16M	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan	Total 2017/18 to 2022/23
1) IT & Retail SIBC Projection before WC balancing	52.4	82.5	40.0	25.3	48.1	59.7	0.0	255.6
2) IT & Retail SIBC Projection after WC balancing	52.4	37.8	42.8	55.5	55.0	54.2	28.0	273.3
3) IT & Retail SIBC Projection after WC balancing and Cardno/Atkins Adjustments	52.4	28.1	35.8	50.5	26.1	25.8	33.6	199.8

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

5.5.1.2 ARC Flash double counting

Adjustment based on reviews undertaken

Based on discussions with Water Corporation staff, AIP is understood to include the 'child' lines as well as the 'parent' line for some ARC flash items, thereby double counting elements of the proposed expenditure. Based on the project breakdown we estimate that $23.8M is double counted and should be removed[32].

Interaction with SIBC balancing adjustments

The ARC Flash projects are allocated to a mix of SIBCs including 'Regional Water Networks', 'Regional Wastewater Treatment, Disposal & Re-use' and 'Metropolitan Wastewater Networks'[33]. They are not allocated to the 'Occupational Safety and Health' SIBC. It is not therefore possible to robustly link our proposed adjustment to the balancing adjustments made by Water Corporation.

We therefore recommend making the -$23.8M adjustment to the 'common' base capex element to which the project line is assigned.

5.5.1.3 Regional Wastewater Treatment, Disposal & Re-use

Adjustments based on reviews undertaken

The reviews undertaken have suggested three project level adjustments in the regional wastewater treatment, disposal & re-use area to reflect prudent and efficient expenditure:

> "SWR Long Term Sludge Treatment Facility" is understood to be a contingency plan which will only be required if current disposal routes stop accepting sludge. As such we consider that it is not currently prudent to incorporate it in proposed expenditure. This reduces capex expenditure by $28.0M.

> Based on discussions with Water Corporation staff we understand that the profile of spend under 'Broome South WWTP & TWWM Upgrade' is likely to be later than currently assumed in the AIP. We therefore recommend making an adjustment to reprofile the spend without changing the overall cost estimate.

> Our review of "Broome South WWTP Holding Pond Lining" suggests that it will be delivered earlier and at lower outturn cost than assumed in the AIP. This results in a -$0.7M reduction in expenditure.

Interaction with SIBC balancing adjustments

For 2017/18 to 2022/23 Water Corporation has applied a positive balancing adjustment of $86.8M or 28% to its 'Regional Wastewater Treatment, Disposal & Re-use' SIBC portfolio.

The net effect of our recommended adjustments is to reduce capex in 2017-2023 by $28.7M. This is in the opposite direction to the balancing adjustment made by Water Corporation. We have therefore assumed

[32] Spend under project CC00680 ARC Flash Mitigation Plan in $ end 15/16 using PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects
[33] Source: 'PM-#16828656-v15-Capital_Program_Update'

that our adjustments do not double-count the SIBC balancing adjustments made by Water Corporation and have applied our adjustments to Water Corporation's proposed expenditure after balancing as summarised below.

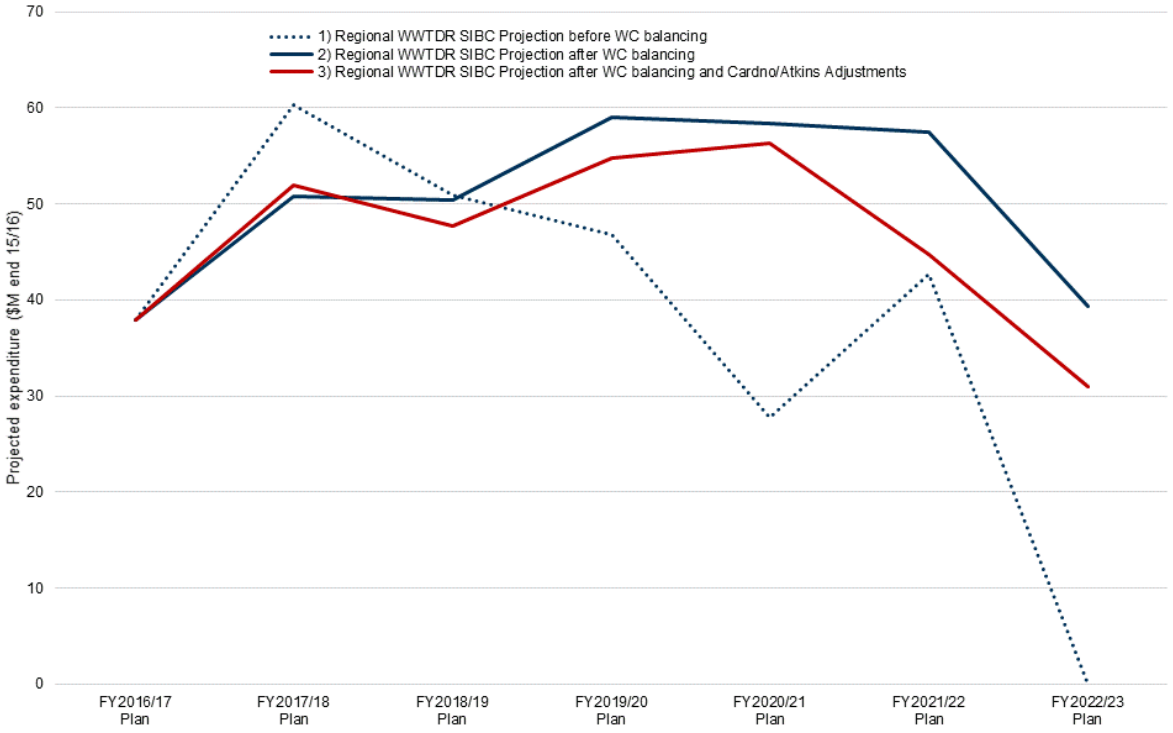

Figure 5-19 Adjustments to the 'Regional Wastewater Treatment, Disposal & Re-use' SIBC Portfolio

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

Table 5-9: Adjustments to the 'Regional Wastewater Treatment, Disposal & Re-use' SIBC Portfolio

All in end $15/16M	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan	Total 2017/18 to 2022/23
Cardno/Atkins Proposed Project Adjustments								
Defer "SWR Long Term Sludge Treatment Facility"	0.0	0.0	0.0	-0.2	-2.1	-17.7	-8.4	-28.4
Reprofile spend on 'Broome South WWTP & TWWM Upgrade'	0.0	0.0	-0.9	-4.0	0.0	4.9	0.0	0.0
Reduce and reprofile "Broome South WWTP Holding Pond Lining" costs	0.0	1.1	-1.8	0.0	0.0	0.0	0.0	-0.7
'Regional Wastewater Treatment, Disposal & Re-use' SIBC Projections								
1) Regional WWTDR SIBC Projection before WC balancing	38.0	60.4	50.9	46.9	27.8	42.8	0.0	228.7
2) Regional WWTDR SIBC Projection after WC balancing	38.0	50.8	50.3	59.0	58.4	57.5	39.4	315.5
3) Regional WWTDR SIBC Projection after WC balancing and Cardno/Atkins Adjustments	38.0	52.0	47.7	54.7	56.3	44.8	31.0	286.4

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

5.5.1.4 Water base capex

The level of water service base capital expenditure is projected to increase significantly in 2016/17. This appears to be largely driven by a ramp up in spend on a number of significant mains renewals projects/programs. The expenditure is then projected to remain at a higher level than recent levels for a number of years as summarised below.

Recent performance trends suggest that water service performance is broadly stable and Water Corporation is exceeding its KPI targets. As such, and given the average remaining asset lives and lack of robust compelling case for increases in expenditure during the project reviews undertaken, we consider that there is no justification for increasing expenditure.

We therefore recommend making an adjustment to keep water base capex equal to the average level of spend between 2011/12 and 2015/16. We recommend phasing this adjustment in by 2018/19 to take account of committed spend.

Figure 5-20 Projected water base capex (excluding SIC

Sources: 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects'. Capitalised interest from WC submission (removed pro-rata) and SIC removed using breakdown in 'PM-#16828656-v15-Capital_Program_Update'

5.5.1.5 Wastewater base capex

As with the water service, the level of wastewater service base capital expenditure is projected to increase significantly in 2016/17. The spend is then projected to remain at a higher level than recent historical levels for a number of years as summarised below.

Based on the data available, recent performance trends suggest that wastewater service performance is better than target and shows no significant deterioration trend. As such, and given the average remaining asset lives and lack of robust compelling case for increases in expenditure during the project reviews undertaken, we consider that there is no justification for increasing expenditure.

We therefore recommend making an adjustment (in addition to the deferral of 'SWR Long Term Sludge Treatment Facility' discussed above) to keep wastewater base capex equal to the average level of spend between 2011/12 and 2015/16. We recommend phasing this adjustment in by 2018/19 to take account of committed spend.

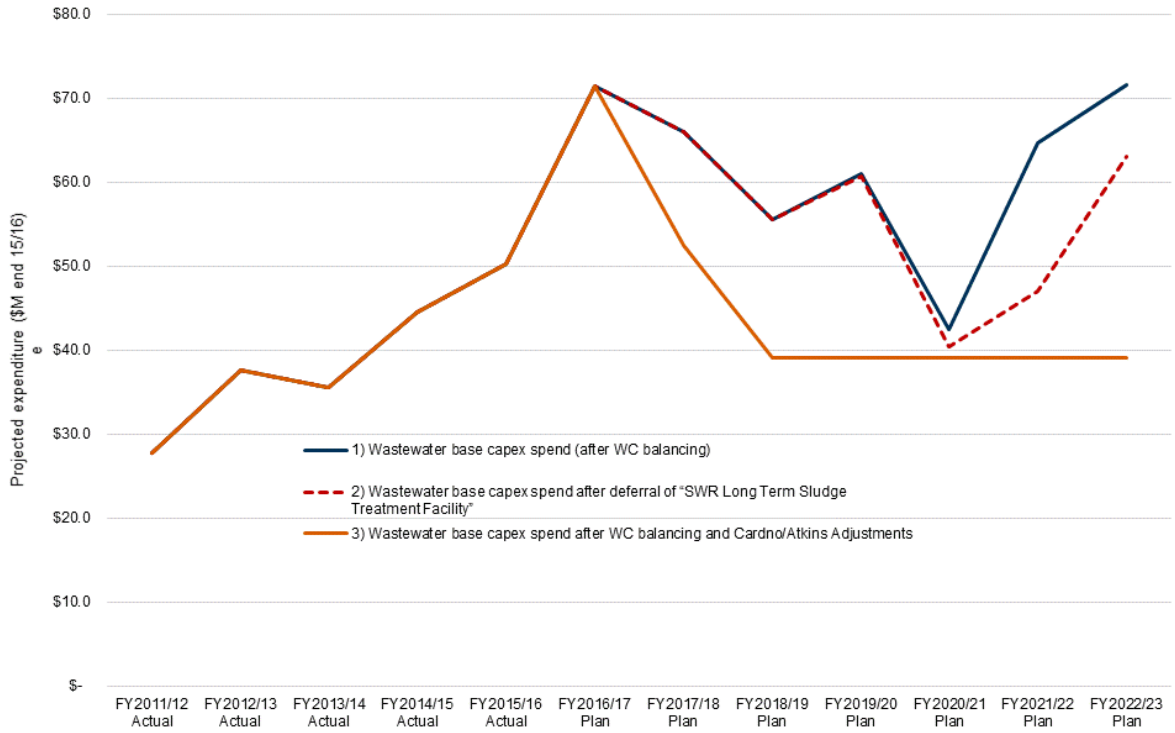

Figure 5-21 Projected wastewater base capex (excluding SIC)

Sources: 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects'. Capitalised interest from Water Corporation submission (removed pro-rata) and SIC removed using breakdown in 'PM-#16828656-v15-Capital_Program_Update'

5.5.1.6 Regional Water Supply and Demand

Adjustment based on reviews undertaken

The reviews undertaken have suggested one project level adjustment in the regional water supply and demand area to reflect prudent and efficient expenditure. Water Corporation's AIP currently allows $17.5M (nominal) for a scheme which will deliver benefits to only approximately 300 connections. As such as we recommend a $14.0M reduction in expenditure on this scheme.

Interaction with SIBC balancing adjustments

For 2017/18 to 2022/23 Water Corporation has applied a balancing adjustment of +$31.9M to its 'Regional Water Supply and Demand' SIBC portfolio. The overall effect is in the opposite direction to our recommended adjustment. We have therefore assumed that our adjustment does not double-count the SIBC balancing adjustments made by Water Corporation and have applied our adjustments to Water Corporation's proposed expenditure after balancing as summarised below.

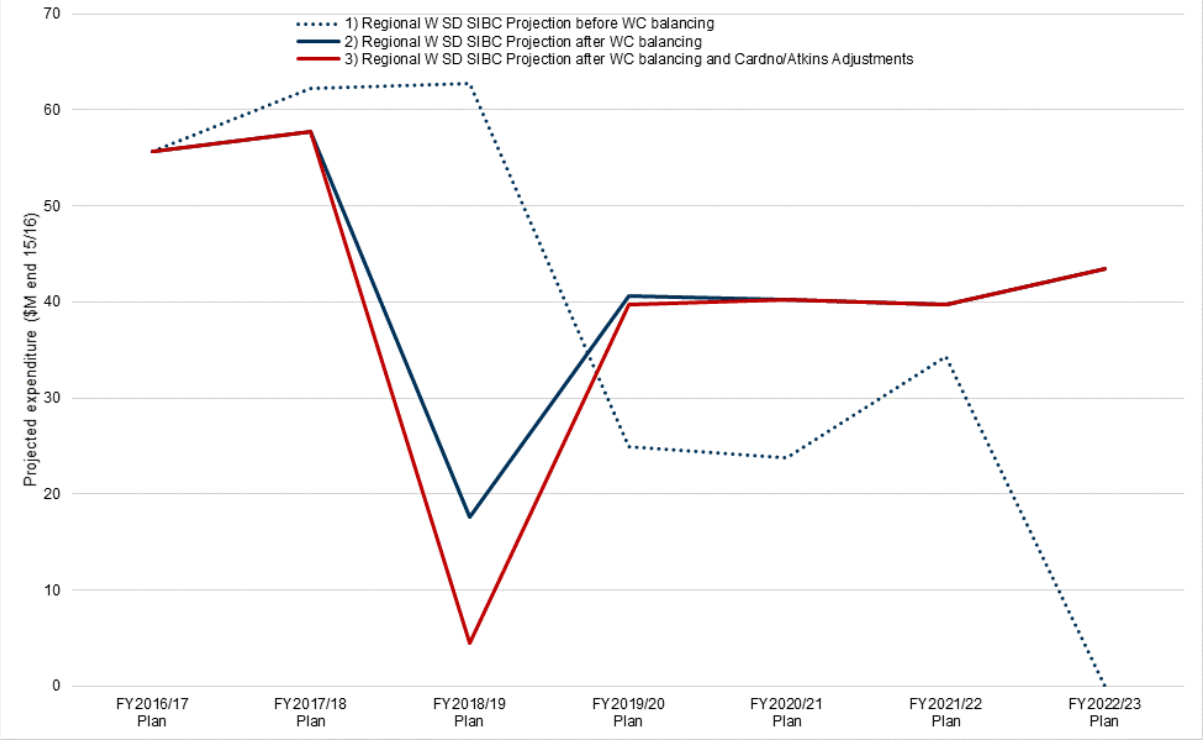

Figure 5-22 Adjustments to the regional water supply and demand SIBC Portfolio

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

Table 5-10: Adjustments to the 'Regional Water Supply and Demand' SIBC Portfolio

All in end $15/16M	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan	Total 2017/18 to 2022/23
Cardno/Atkins Proposed Project Adjustments								
Prudent capex for Walpole New Source	0.0	0.0	-13.0	-1.0	0.0	0.0	0.0	-14.0
'Regional Water Supply and Demand' SIBC Projections								
1) Regional W SD SIBC Projection before WC balancing	55.7	62.2	62.7	25.0	23.8	34.3	0.0	208.0
2) Regional W SD SIBC Projection after WC balancing	55.7	57.7	17.6	40.7	40.3	39.7	43.4	239.4
3) Regional W SD SIBC Projection after WC balancing and Cardno/Atkins Adjustments	55.7	57.7	4.5	39.7	40.3	39.7	43.4	225.4

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

5.5.1.7 Regional Water Networks

Adjustment based on reviews undertaken

The reviews undertaken have suggested one project level adjustment in the regional water networks area to reflect prudent and efficient expenditure. Water Corporation's planning estimate for 'NK Extension Upgrade Stage 3' is $12M which is significantly less than the expenditure in the submission of $18.9M (nominal, i.e. $18.8M in end $15/16). We have recommended a reduction of $6.8M to take this into account.

Interaction with SIBC balancing adjustments

For 2017/18 to 2022/23 Water Corporation has applied a balancing adjustment of +$38.4M to its 'Regional Water Networks' SIBC portfolio. The overall effect is in the opposite direction to our recommended

adjustment. We have therefore assumed that our adjustment does not double-count the SIBC balancing adjustments made by Water Corporation and have applied our adjustments to Water Corporation's proposed expenditure after balancing as summarised below.

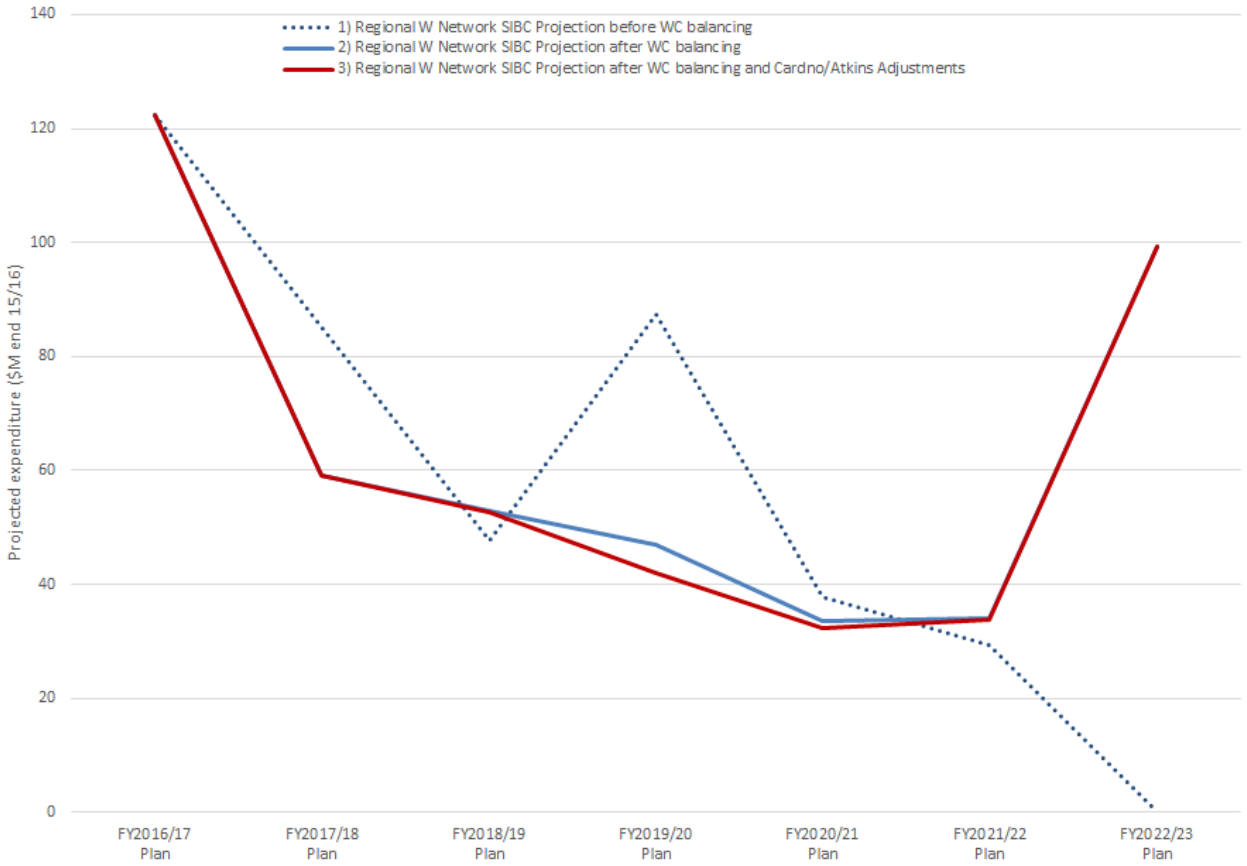

Figure 5-23 Adjustments to the regional water network SIBC Portfolio

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

Table 5-11: Adjustments to the 'Regional Water Network' SIBC Portfolio

All in end $15/16M	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan	Total 2017/18 to 2022/23
Cardno/Atkins Proposed Project Adjustments								
Reduce NK Extension Stage 3	0.0	0.0	-0.2	-4.9	-1.4	-0.3	0.0	-6.8
'Regional Water Network' SIBC Projections								
1) Regional W Network SIBC Projection before WC balancing	122.4	85.2	47.8	87.3	37.7	29.4	0.0	287.4
2) Regional W Network SIBC Projection after WC balancing	122.4	59.0	53.0	46.9	33.7	34.0	99.2	325.8
3) Regional W Network SIBC Projection after WC balancing and Cardno/Atkins Adjustments	122.4	59.0	52.8	42.0	32.3	33.7	99.2	319.0

Sources: 'PM-#16828656-v15-Capital_Program_Update' (SIBC projections) and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects' (project spend)

5.5.1.8 Summary of pre-efficiency adjustments

Our recommended pre-efficiency adjustments are summarised below.

Table 5-12: Summary of pre=efficiency adjustments (excluding SIC and capitalised interest)

All in end $15/16M		FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan
Defer Grange Enhancement	BC- Common				-5.0	-34.5	-34.0	
Defer major IT capex until roadmap (defer ODDS)	BC- Common		-9.7	-7	0.0	5.6	5.6	5.6
Double counting of ARC Flash parent and child	BC- Common		-4	-4	-4.0	-3.9	-3.9	-4.0
Defer “SWR Long Term Sludge Treatment Facility”	BC- Wastewater				-0.2	-2.1	-17.7	-8.4
Wastewater base capex adjustment	BC- Wastewater		-13.4	-16.4	-21.6	-1.2	-7.9	-24.0
Reprofile spend on ‘Broome South WWTP & TWWM Upgrade’	QS- Wastewater		0	-0.9	-4.0	0.0	4.9	0.0
Reduce NK Extension Stage 3	QS- Water			-0.2	-4.9	-1.4	-0.3	0.0
Reduce and reprofile “Broome South WWTP Holding Pond Lining” costs	ES- Wastewater		1.1	-1.8	0.0	0.0		
Water base capex adjustment	BC- Water		-27.0	-73.8	-75.0	-9.1	10.0	3.6
Prudent capex for Walpole New Source	SD- Water		0.0	-13.0	-1.0	0.0	0.0	0.0
TOTAL		0	-53.0	-117.1	-115.6	-46.7	-43.1	-27.3

Source: Adjustments made on basis of ‘PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects’

5.5.2 Efficiency adjustments

We consider that there are a number of areas in which it should be possible for Water Corporation to achieve efficiencies beyond the adjustments outlined above. These are described below.

Cost estimation

As set out in Chapter 3, Water Corporation has developed a cost estimation system which is impressive in its comprehensiveness, links to other processes and level of granularity. However, there is significant subjectivity in the contingency allowances and regional adjustments, and probably also the cost escalation factor applied.

We also understand that there is an incentive built in the cost estimating team’s KPI to err on the side of caution in cost estimates and understand from our discussions with the team that their aggregate estimates have generally been higher than outturn costs at a company level.

We therefore consider it likely that there is a systematic overestimation of capex. We have therefore made an ‘efficiency’ adjustment across the capex program to take account of this overestimation. We have made a 5% one-off adjustment effective from 2017/18 consistent with the KPI target held by the cost estimation team.

Benefits case challenge and program optimisation

We found that Water Corporation was not able to demonstrate evidence of strong challenge of the urgency, need and scope of expenditure required for many of the projects we reviewed. For example, when we challenged ‘why now, why not defer?’ the answer was quite often ‘we could defer this if needed’. This impression is further strengthened by the scale of balancing adjustments applied over time at SIBC program level, which suggests that Water Corporation has limited confidence in the justification, timing and/or scale of expenditure required at project level.

We consider that stronger internal benefits challenge would lead to reduced capex and have recommended phasing this in from 2018/19 at 1% per annum cumulating over time. This is typical of the levels of efficiency we have seen realised by other similar utilities.

Competitive supplier environment

In addition to the systemic cost overestimation challenge, we heard from many project managers that recent tenders were coming in at a lower rate than previously experienced because of excess supply in the construction sector. Water Corporation's CCI and CCIF forecast does not reflect this reduction beyond a small reduction in CCI in 2015/16. We have therefore applied a one-off adjustment of 2% in 2018/19 to reflect the difference between the CCI forecast applied and the anecdotal stories of recent tenders received.

Continuing efficiency

We recommend that Water Corporation be set a continuing efficiency target of 0.25% per annum to reflect the savings which can be made through innovation and continuous improvement. This target is consistent with recent regulatory decisions in Australia (e.g. Sydney Water, SA Water) as well as by Ofwat in its 2009 Determination for water companies in England and Wales.

A recent comprehensive survey[34] considers a wide sample of global firms and suggest that movement at the frontier has averaged 3.5% per annum for firms at the frontier in the manufacturing sector and 5.0% in the service sector. Across all firms, i.e. not just those at the frontier, movement has been less pronounced averaging 1.7% per annum in the manufacturing sector and 0.3% per annum in the services sector. We therefore consider that 0.25% is a conservative and achievable forecast of the continuing efficiency Water Corporation will be able to realise.

We note that there is significant desire in the Australian water industry, the wider Australian economy and internationally to pursue innovation to reduce the cost of service delivery. Water Corporation is well placed to drive and benefit from innovation in the water sector and the wider economy.

Table 5-13: Recommended efficiencies

	FY2016/17 Plan	FY2017/18 Plan	FY2018/19 Plan	FY2019/20 Plan	FY2020/21 Plan	FY2021/22 Plan	FY2022/23 Plan
Cost-estimation contingency (one-off)		5%					
Benefits case challenge and program optimisation (phased in)			1%	1%	1%	1%	1%
Competitive supplier environment not reflected in Construction Index used in cost estimation tool (one-off)			2%				
Continuing efficiency			0.25%	0.25%	0.25%	0.25%	0.25%
Efficiency factor to apply	**1.00**	**0.95**	**0.92**	**0.91**	**0.90**	**0.89**	**0.87**

5.6 Recommendation

Our recommended prudent and efficient capex is summarised by driver and service in Table 5-13.

[34] Frontier firms, technology diffusion and public policy: micro evidence from OECD countries, OECD Productivity Working Papers No. 02, November 2015.

Table 5-14: Recommended prudent and efficient capex (end $15/16 M)

Line of Business	Cost Driver	FY11/12 Actual	FY12/13 Actual	FY13/14 Actual	FY14/15 Actual	FY15/16 Actual	FY216/17 Plan	FY17/18 Plan	FY18/19 Plan	FY19/20 Plan	FY20/21 Plan	FY21/22 Plan	FY22/23 Plan
Common	Base Capital	$114.2	$99.3	$90.5	$87.1	$83.6	$104.4	$68.6	$82.0	$82.0	$64.9	$62.2	$97.4
Common	Enhanced Services	$5.5	$19.9	$14.0	$7.3	$8.8	$14.4	$16.6	$9.6	$20.2	$21.1	$18.7	$20.5
Common	Quality & Standards	$1.2	$1.3	$1.8	$0.6	$0.7	$1.6	$1.0	$-	$-	$-	$0.1	$0.1
Common	Supply Demand	$5.7	$4.1	$8.6	$10.0	$1.9	$2.5	-$0.2	$1.0	$2.5	$2.6	-$2.8	$-
Drainage	Base Capital	$1.2	$1.1	$1.4	$1.5	$3.4	$19.5	$1.1	$2.9	$25.8	$27.7	$26.5	$28.9
Drainage	Enhanced Services	$0.3	$4.3	$0.9	$-	$0.0	$-	$-	$-	$-	$-	$-	$-
Drainage	Quality & Standards	$0.1	$0.5	$0.2	$0.8	$0.4	$3.8	$8.5	$1.5	$-	$0.5	$1.2	$1.3
Drainage	Supply Demand	$0.0	$3.3	$3.5	$0.5	$0.0	$1.0	$0.8	$1.6	$4.6	$1.1	$3.9	$5.4
Irrigation	Base Capital	$3.7	$3.2	$3.8	$2.4	$0.5	$2.2	$7.3	$6.2	$7.5	$5.1	$-	$-
Irrigation	Enhanced Services	$-	$-	$0.0	$-	$-	$-	$-	$-	$-	$-	$-	$-
Irrigation	Quality & Standards	$0.0	$0.1	$0.0	$-	$-	$-	$-	$-	$-	$1.5	$16.7	$18.3
Irrigation	Supply Demand	$-	$-	$-	$94.3	$-	$-	$-	$-	$-	$-	$-	$-
Wastewater	Base Capital	$27.7	$37.6	$35.6	$44.6	$50.2	$71.4	$49.9	$36.0	$35.5	$35.1	$34.6	$34.2
Wastewater	Enhanced Services	$4.9	$2.5	$1.8	$2.8	$5.7	$19.2	$34.5	$30.5	$12.0	$0.8	$2.2	$2.4
Wastewater	Quality & Standards	$20.6	$33.7	$15.1	$15.6	$13.7	$34.4	$24.1	$15.4	$3.7	$14.7	$15.6	$12.3
Wastewater	Supply Demand	$73.2	$112.5	$172.5	$128.2	$53.5	$57.9	$107.1	$97.1	$91.5	$79.9	$42.2	$46.4
Water	Base Capital	$49.8	$63.8	$86.1	$74.1	$83.9	$210.7	$93.7	$65.8	$64.9	$64.1	$63.3	$62.5
Water	Enhanced Services	$9.5	$7.4	$5.3	$16.5	$12.7	$19.6	$13.8	$23.3	$35.5	$19.1	$14.4	$15.7
Water	Quality & Standards	$17.3	$26.2	$273.1	$19.5	$41.4	$39.8	$31.3	$24.4	$24.3	$4.3	$24.7	$27.2
Water	Supply Demand	$429.8	$398.2	$120.2	$142.8	$90.5	$84.8	$150.5	$107.1	$142.3	$152.0	$177.5	$147.2
Total		**$764.7**	**$819.0**	**$834.7**	**$648.7**	**$451.0**	**$687.3**	**$608.5**	**$504.6**	**$552.5**	**$494.7**	**$501.2**	**$519.9**

Sources: Adjustments applied to 'PM-#16828656-v15-Capital_Program_Update' and 'PM-#16652717-v1-WC14_-_Capital_Expenditure_Projects'

We consider that this is an appropriate level of expenditure considering the economic backdrop to this review and the lack of justification for Water Corporation's proposed increase in base capex.

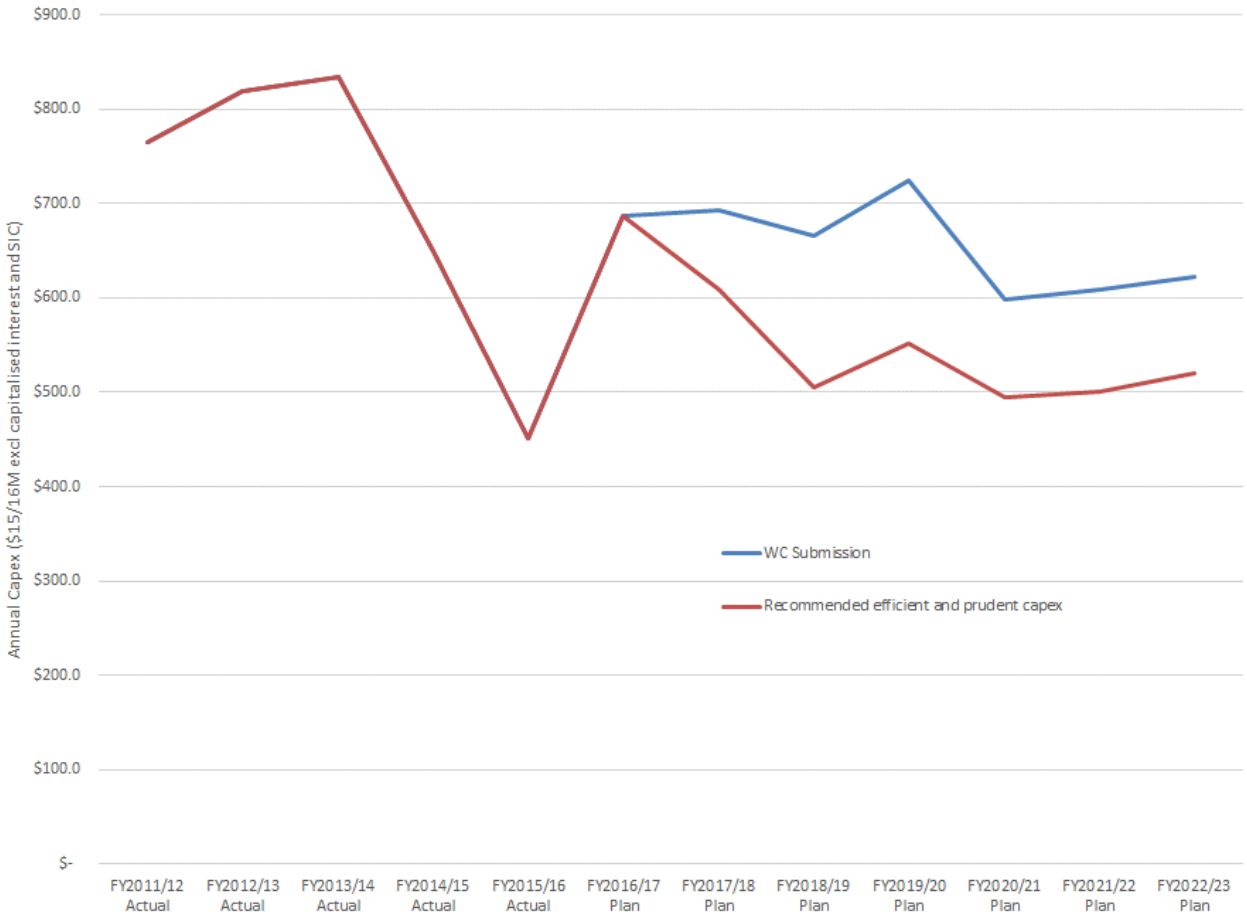

Figure 5-24 Recommended prudent and efficient expenditure

6 Special items

6.1 Asset useful lives

As per the Terms of Reference, we are required to review Water Corporation's relevant depreciation scheduled and depreciation criteria. Our review of Water Corporation's useful lives is detailed in Table 6-1.

Table 6-1 Evaluation of Water Corporation's useful lives

Asset Class	Description	Useful Life (years)	Recommendation
B1	Buildings (offices, depots, etc.) Brick, stone, concrete	50	We consider that the useful life adopted is reasonable.
B2	Buildings (offices, depots, etc.) Steel, asbestos, timber	30	We consider that the useful life adopted is likely to be reasonable but Water Corporation should consider a different useful life in different climates for these materials.
B3	Buildings (offices, depots, etc.) Temporary	10	We consider that the useful life adopted is reasonable.
B4	Roads and car parks - sealed	50	We consider that the useful life adopted is broadly reasonable. We suggest there may be benefit in greater componentisation for these assets into pavement and basecourse as these typically have differing useful lives.
B5	Roads and car parks - unsealed	30	We consider that the adopted useful life may be optimistic.
B6	Fencing, public facilities, etc.	30	We consider that a marginally lower useful life of around 25 years may be more reasonable.
B7	Tanks - underground petrol	40	We consider that this useful life is reasonable.
COMPUTER	Computers - personal computers (except for operations control)	3	We consider that the useful life adopted is reasonable.
COMPUTER	Computers - servers (except for operations control)	4	We consider that the useful life adopted is reasonable.
COMPUTER	Computers - other (except for operations control)	5	We consider that the useful life adopted is reasonable.
CW1	Civil works - pump stations including any buildings, treatment plant	50	We consider that the useful life adopted is reasonable.
CW2	Chemical dosing facility - minor	10	We consider that a lower useful life in the range of 3-7 years may be more reasonable depending on Water Corporation's design standards and the operating environment.
D1	Dams and associated civil works (including excavated earth dams)	120	We are used to greater componentisation for dams and distinction based on the construction method and materials used. Greater definition is warranted by the relatively higher value of these assets. There are examples of dams in Australia that are more than 200 years old. A higher useful life may be reasonable for some types or components of dams.
D2	Excavated service reservoir and roof	70	Assuming that this refers to concrete reservoirs in-ground, we consider that the useful life adopted is reasonable.

Asset Class	Description	Useful Life (years)	Recommendation
D3	Tanks - reinforced concrete	70	We consider that the useful life adopted is reasonable.
D4	Tanks - steel and fibreglass	50	We consider that the useful life adopted is reasonable.
D5	Production and investigation wells and bores - steel	20	The useful life appears low in our experience. Steel bores typically have a useful life in the range of 70 – 100 years provided that the water or surrounding ground is not aggressive.
D6	Production and investigation wells and bores - PVC and GRP	30	The useful life appears low in our experience. We would expect a well constructed PVC bore to have a useful life similar to that for a PVC pipe of 80 – 100 years.
DR1	Tunnels - drainage and irrigation	100	We consider that the useful life adopted is reasonable
DR2	Drains and channels - earth (including compensation basin) earth excavation	150	We consider that the useful life adopted is reasonable
DR3	Drains and channels - earth (including compensation basin) preservation work	20	We consider that the useful life adopted is reasonable
DR4	Drains and channels - earth (including compensation basin) concrete lining	30	We consider that the useful life adopted is reasonable
E1	Mechanical and electrical installation	25	We consider that the useful life adopted is reasonable
E2	Telemetry equipment and instruments	10	We consider that the useful life adopted is reasonable.
E3	Revenue meters	10	We consider that the useful life adopted is reasonable.
E4	Office equipment and furniture	7	We consider that the useful life adopted is reasonable.
E5	Laboratory equipment	7	We consider that the useful life adopted is reasonable.
E6	Computers for operation control	3	We consider that the useful life adopted is reasonable.
E7	Fixed radio equipment	10	We consider that the useful life adopted is reasonable.
E8	Fire Hydrants	50	We consider that the useful life adopted is reasonable.
E9	Reticulation Valves	55	We consider that the useful life adopted is reasonable.
LAND	Land		Land is non-depreciable.
MOBPLANT	Mobile plant	Various	N/a
MOBRADIO	Mobile radios	10	We consider that the useful life adopted is reasonable.
OF1	Tunnels - sewerage ocean outfall	100	We consider that the useful life adopted is reasonable
OF2	Pipes - sewerage ocean outfall	40	Given the corrosive marine environment, we consider that the useful life adopted is reasonable.
P1	Water pipes < 300mm - galvanised steel	30	We consider that the useful life adopted is reasonable.
P2	Water pipes < 300mm – PVC/MDPE	80	We consider that the useful life adopted is reasonable.

Asset Class	Description	Useful Life (years)	Recommendation
P3	Water pipes < 300mm - cast iron	90	The useful life adopted appears high. We recommend that cast iron pipes are separated into unlined and lined pipes to reflect the associated differing methods of degradation. Secondly, we recommend that the useful life for CI (unlined) pipes is reduced to around 60 years, and the useful life for CICL (cement-lined) pipes is reduced to around 70 years.
P4	Water pipes < 300mm - other ferrous (DI, MSCL)	80	We consider that the useful life adopted is reasonable.
P5	Water pipes < 300mm - reinforced concrete	80	We consider that the useful life adopted is reasonable.
P6	Water pipes < 300mm - asbestos cement	80	We consider that the useful life adopted is reasonable.
P7	Water pipes < 300mm - copper	80	The useful life adopted appears high. We recommend that the useful life for copper pipes is reduced to around 40 years.
P8	Water pipes 300-600mm - ferrous	80	Assuming that this refers to DICL, we consider that the useful life adopted is reasonable.
P9	Water pipes 300-600mm - concrete	80	We consider that the useful life adopted is reasonable.
P10	Water pipes > 600mm - ferrous	110	We consider that the useful life adopted is reasonable for large diameter pipelines
P11	Water pipes > 600mm - concrete	110	We consider that the useful life adopted is reasonable.
P12	Water pipes - interconnecting pipework and fittings	80	Assuming standard, modern pipe materials, we consider that the useful life adopted is reasonable.
P13	Wastewater gravity pipes < 300mm - PVC	75	We consider that the useful life adopted is reasonable.
P14	Wastewater gravity pipes < 300mm - vit clay (mm)	90	We consider that the useful life adopted is reasonable.
P15	Wastewater gravity pipes < 300mm - vit clay (rr)	90	We consider that the useful life adopted is reasonable.
P16	Wastewater gravity pipes < 300mm - other	90	Assuming standard, modern pipe materials, we consider that the useful life adopted is reasonable.
P17	Wastewater gravity pipes main sewer 300-600mm - unlined reinforced concrete	75	We consider that the useful life adopted is reasonable.
P18	Wastewater gravity pipes main sewer 300-600mm - plastic reinforced concrete	110	The adopted useful life is at the upper end of the range we consider reasonable. Water Corporation may have performance information to support this value.
P19	Wastewater gravity pipes main sewer 300-600mm - other	110	The adopted useful life is at the upper end of the range we consider reasonable. Water Corporation may have performance information to support this value.
P20	Wastewater gravity pipes main sewer >600mm - unlined reinforced concrete	75	We consider that the useful life adopted is reasonable.

Asset Class	Description	Useful Life (years)	Recommendation
P21	Wastewater gravity pipes main sewer >600mm - plastic reinforced concrete	110	The adopted useful life is at the upper end of the range we consider reasonable. Water Corporation may have performance information to support this value.
P22	Wastewater gravity pipes main sewer >600mm - other	110	The adopted useful life is at the upper end of the range we consider reasonable. Water Corporation may have performance information to support this value.
P23	Tunnels - water	150	Assuming that this refers to very large concrete pipes, we consider that the useful life adopted is reasonable.
P24	Water pipes > 300-600mm - PVC	80	We consider that the useful life adopted is reasonable.
P25	Water pipes > 600mm - PVC	80	We consider that the useful life adopted is reasonable.
S1	Bridges - timber	40	We consider that the useful life adopted is reasonable.
S2	Bridges - concrete	80	We consider that the useful life adopted is reasonable.
S3	Concrete and masonry structures (including weirs, drops, etc.)	50	Given the potential variability in masonry materials, we consider that the useful life adopted is reasonable. However, we recommend that consideration be given to separating masonry structures that may have different useful lives (e.g., concrete versus brick).
S4	Cattle stops	7	The useful life appear low. We recommend that the useful life for cattle grids is increased to 40 years.
S5	Hydrometric stations	40	Assuming that this includes civil structures, we consider that the useful life adopted is reasonable.
S6	Timber checks, floodgates	30	We consider that the useful life adopted is reasonable.
S7	Bridges - RCP and box culverts	60	We consider that the useful life adopted is reasonable.
S8	Bridges - steel	50	We recommend that the useful life for steel road bridges is increased to meet current design standards, typically 80 – 100 years.
TREE	Tree plantation	0	N/a
V1	Vehicles - small, medium, large	3	We consider that the useful life adopted is reasonable.
V2	Light commercial	3	We consider that the useful life adopted is reasonable.
V3	Trucks > 3.5 tonne	7	We consider that the useful life adopted is reasonable.