Deloitte Access Economics

Melbourne Water Expenditure Review

Essential Services Commission

FINAL REPORT

25 February 2016

Deloitte.

Contents

Glossary

AER	Australian Energy Regulator
ASP	Activated Sludge Plant
BAU	Business as usual
BNI	Business Needs Identifier Business Case
CAPEX	Capital expenditure
DAE	Deloitte Access Economics
DBTS	Digital Business Transformation Strategy
EPA	Environment Protection Authority Victoria
ESC	Essential Services Commission
ETP	Eastern Treatment Plant
FIT	Feed-in Tariff
FWB	Fairer Water Bills
MCA	Multi-criteria analysis
MW	Melbourne Water
NPC	Net Present Cost
NPV	Net Present Value
OPEX	Operating expenditure
PPA	Power purchase agreement
RANE	Risk Adjusted Nominal Estimate
REC	Renewable Energy Certificate
RET	Renewable Energy Target
TN	Total Nitrogen
VDP	Victorian Desalination Plant
WAS	Waste Activated Sludge
WIRO	*Water Industry Regulatory Order 2014*
WTP	Western Treatment Plant

Executive Summary

Background

The Essential Services Commission (ESC) is currently conducting a review of Melbourne Water's proposed services and prices to be charged for the regulatory period 1 July 2016 to 30 June 2021, referred to in this document as the next or fourth regulatory period.

Melbourne Water submitted its 2016 Price Submission to the ESC for the fourth regulatory period in October 2015. The price submission includes forecasts of operating expenditure (opex), capital expenditure (capex) and demand, proposed service standards and prices. The ESC will review the price submission and intends to release a draft decision in March 2016, with a final decision in June 2016.

Deloitte Access Economics (DAE) and Arup have been engaged by the ESC to review Melbourne Water's expenditure forecasts. Arup is largely responsible for assessing Melbourne Water's forecast capex, and DAE is assessing the forecast opex for the period.

The ESC has requested that in our review of the capex forecasts we focus on the major projects that comprise a significant proportion of the total capex forecasts and provide advice on whether the expenditure meets certain criteria.

For opex, we have been asked to provide advice on whether:

- Changes in operating costs are consistent with the timing of major capital projects
- Businesses are fulfilling their obligations and meeting customer service expectations as cost efficiently as possible, and
- Forecast divergences can be readily explained.

The ESC asked that cost allocation, energy, IT and chemical costs be a focus of our review.

Process for review

We took the following approach to undertaking this review:

- We reviewed the Price Submission and supporting documentation provided by Melbourne Water to the ESC;
- We consulted with the metropolitan retailers and Southern Rural Water for their views on Melbourne Water's Price Submission;
- We submitted a request for further information and prepared a number of questions for Melbourne Water;
- We visited Melbourne Water on 26 November 2015 to discuss the Price Submission and our questions;
- We visited the Western Treatment Plant on Monday 30 November 2015 for a tour of the sites where significant capex is proposed;
- We prepared a Draft Report which was provided to the ESC and Melbourne Water on 22 December 2015;

- We held discussions with Melbourne Water regarding the Draft Report and reviewed an initial written response from Melbourne Water to the draft report; and
- We reviewed responses provided by Melbourne Water following further questions relating to opex and capex.

Approach to review

In assessing Melbourne Water's forecast operating and capex for the fourth regulatory period, we have had regard to the requirements of the *Water Industry Act* (1994) and the *Water Industry Regulatory Order* (WIRO), as well as the ESC's Guidance Paper for Melbourne Water's regulatory review, issued in April 2015.

While there are a number of factors listed in the WIRO and Guidance Paper to which we have had regard, our overarching consideration is that the forecasts must be '*expenditure which would be incurred by a prudent service provider acting efficiently to achieve the lowest cost of delivering on service outcomes over the regulatory period, taking into account a long-term planning horizon.*'[1] Our review has considered both the need and efficiency of the proposed expenditure.

Melbourne Water has made significant cost reductions over the current regulatory period and is to be commended for doing so. Business and procurement processes have been redesigned, staff numbers stabilised (after adjusting for the in-housing of waterways staff) and there has been a clear focus on cost containment.

Recommendations - operating expenditure

However, through our analysis of Melbourne Water's proposed opex we have identified the following areas of concerns with the forward forecasts and recommended the following adjustments:

- Renewable energy – Our view is that a proportion of Melbourne Water's renewable energy cost premium, which is over and above that tested in a recent customer survey, should not be recovered from customers
- Electricity network costs - Melbourne Water's forecast of energy network costs significantly overstates the price changes in the AER's latest determination and accordingly we consider its network costs do not reflect an efficient forecast
- Pollution response – Melbourne Water's proposed new obligation for pollution response is associated with activities it has already been undertaking, and is therefore reflected in base opex costs.
- Chemicals – Melbourne Water's forecast increase in chemical costs above the baseline expenditure is likely to be overstated given recent energy and oil price reductions
- Fleet – Melbourne Water's 2014-15 Annual Report indicated it expects to make significant savings in fleet costs which were not reflected in its fleet cost forecast, and therefore a reduction in proposed opex is recommended.

[1] ESC, *Melbourne Water 2016 Price Review Guidance paper*, April 2015, p. 17.

Table i summarises our overall recommended adjustments to Melbourne Water's opex, including reduced expenditure for, chemicals, fleet and energy (both renewables and network costs).

Table i: DAE recommended adjustments to Melbourne Water's proposed opex ($m, 01/01/2015)

Opex item	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Melbourne Water's proposed prescribed opex	945.26	941.29	944.03	934.80	925.31	4690.68
DAE recommended adjustments to opex						
Renewable energy (proposed new obligation)	-6.49	-6.53	-7.65	-6.30	-5.74	-32.71
Electricity network costs	-1.85	-2.78	-3.80	-4.78	-5.87	-19.07
Pollution response (proposed new obligation)	-1.12	-1.09	-1.07	-1.04	-1.02	-5.34
Fleet	-0.30	-0.20	-0.30	-0.20	-0.00	-1.00
Chemicals	-0.16	-0.24	-0.32	-0.40	-0.48	-1.58
Total recommended adjustments	**-9.91**	**-10.84**	**-13.13**	**-12.71**	**-13.10**	**-59.71**
DAE recommended prescribed opex	**935.35**	**930.45**	**930.90**	**922.08**	**912.20**	**4630.98**

Source: DAE analysis.

Our recommended opex allowance meets the ESC's efficiency hurdle for the fourth regulatory period overall.

Recommendations - Capital expenditure

Across Melbourne Water's major projects, a total reduction of approximately $162.5 million is recommended, which reflects a 26% reduction on Melbourne Water's 2016 price submission proposal for these projects. For some of the major projects, we have recommended that expenditure is deferred until the fifth regulatory period, reflecting our assessment of the need for the project. In addition, across the top 15 Melbourne Water programs, we have recommended a further $148.4 million of reductions, which reflects 14% of the total proposed capex for these programs.

We have also recommended an overall reduction of 5% across the broader capital program, excluding the projects and programs already reduced and the VDP capitalisation. This overall reduction reflects both anticipated delays in progress compared to forecast as well as the efficiencies achieved from the design and construct framework agreements and the in-house delivery of waterways projects to be reflected in reduced costs for each of the programs.

Overall, the impact of our recommendations is a 14% reduction on total capex (excluding VDP capex) over the 2016 price submission period.

We make the following high level observations about Melbourne Water's capex performance over the current regulatory period, which is based on information contained its 2016 price submission and received from Melbourne Water during our review:

1. Significant efficiencies are being realised from design and construction contracts and should continue to be achieved on future projects; and

2. Future cost estimates appear to be conservative and based on the timing of business cases and other materials provided to us, do not include efficiencies realised on previous projects. It is not clear that learnings from delivered projects are being used to refine current cost estimates (e.g. WTP Sludge Drying Beds Augmentation Project proposed).

Justification and analysis supporting the proposed reductions is provided for each project and against the service area programs.

Table iii: Total recommended adjustments – Total capex impact ($m, 01/01/2015) ($m, 01/01/2015)

	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Total proposed capex (gross, excluding VDP capitalisation)	503.7	562.6	526.0	500.7	479.0	2,572.0
Recommended reductions for projects	-22.1	-23.1	-33.7	-23.2	-60.4	-162.5
Recommended reductions for programs						-148.4
Recommended reductions across capital program (projects and programs not reviewed)	-11.0	-8.9	-8.5	-9.2	-7.4	-45.1
Total recommended change						-355.9
% adjustment overall (excluding VDP capital)						-14%

Source: Melbourne Water, 2016 Price Submission, Arup

1 Introduction

1.1 Background

The Essential Services Commission (ESC) is currently conducting a review of Melbourne Water's proposed services and prices for the regulatory period 1 July 2016 to 30 June 2021 (the fourth regulatory period).

Melbourne Water submitted its 2016 Price Submission to the ESC in October 2015. The Price Submission includes forecasts of opex, capex and demand, proposed service standards and prices. The ESC intends to release a draft decision on Melbourne Water's Price Submission in March 2016, with a final decision expected in June 2016.

1.2 Scope of work

The ESC has engaged Deloitte Access Economics (DAE) and Arup to review Melbourne Water's forecast expenditure and to provide advice on whether it is consistent with requirements of the legislative framework. Arup is largely assessing Melbourne Water's forecast capex, and DAE is assessing forecast opex.

In undertaking this review, our key responsibilities are to:

- Assess the appropriateness of the expenditure forecasts in relation to the key objectives of the review
- Provide independent advice to the ESC regarding the appropriateness of the forecasts, and
- Where our advice indicates that proposed expenditure is not appropriate, propose a revised expenditure level.

1.3 Confidentiality

While this report is largely based on public information contained in Melbourne Water's 2016 Price Submission, it also contains information which has been provided by Melbourne Water on a confidential basis. We emphasise that the un-redacted version of our report is prepared solely for the use of the ESC and must not be distributed beyond the ESC and Melbourne Water. It is not intended to and should not be used or relied upon by anyone else and we accept no duty of care to any other person or entity.

1.4 Structure of report

This report is structured as follows:

- Chapter 2 outlines our methodology for the review, the process followed and key timelines

- Chapter 3 summarises Melbourne Water's Price Submission with respect to expenditure forecasts and outlines key drivers of expenditure such as government obligations
- Chapter 4 provides our analysis, conclusions and recommendations on key issues regarding Melbourne Water's opex forecast
- Chapter 5 provides our analysis, conclusions and recommendations on key issues regarding Melbourne Water's forecast capex.

2 Overview of approach

2.1 Process for review

Our approach to undertaking the review has involved the following key steps.

2.1.1 Initial planning and workshop with the ESC

The following steps were taken in the initial planning phase of the project:

- An initial review of Melbourne Water's price submission, financial model template and associated documentation to identify key issues;
- A workshop was held with ESC staff to identify and discuss key issues for the focus of the expenditure review; and
- A detailed review of the price submission and financial template to produce a discussion guide and questions to guide consultation with Melbourne Water and the retailers.

2.1.2 Interaction with Melbourne Water

Following the planning phase, we prepared questions for Melbourne Water and arranged the following visits:

- We attended a workshop at Melbourne Water's Docklands office on 26 November 2015 to discuss the price submission;
- We conducted a site visit at Melbourne Water's Western Treatment Plant on 26 November 2015, focussing on the WTP upgrades proposed for the fourth regulatory period; and
- We consulted with the metropolitan retailers to seek their feedback on Melbourne Water's price submission, consultation process and the proposed projects.

2.1.3 Draft Report and Melbourne Water's response

We provided a draft report to Melbourne Water on 22 December 2015.

We held discussions with Melbourne Water personnel regarding the Draft Report and a formal response to the Draft Report was provided by Melbourne Water on 22 January 2016. This response accepted some elements of our Draft Report, but disagreed with other elements.

We have closely examined Melbourne Water's response and the information it provided to support its views. We subsequently asked Melbourne Water a number of additional questions to clarify certain aspects of the forecasts and its response, and a range of information was provided in response.

2.1.4 Final Report

This Final Report sets out our views of whether Melbourne Water's opex and capex forecasts meet the requirements of the ESC and the WIRO. Where we do not believe this is the case we have prepared alternative forecasts or recommended adjustments.

2.2 Approach for assessing forecasts

In assessing Melbourne Water's forecast opex and capex for the fourth regulatory period, we have followed the direction of the *Water Industry Act* (1994) and the *Water Industry Regulatory Order* (WIRO), which was last amended in October 2014. The WIRO requires, amongst other things that the ESC form an opinion as to whether the Price Submission:

- Complies with the guidance paper it issued in April 2015; and
- Has adequate regard for the following matters (listed in Clauses 8 and 11 of the WIRO and the ESC Act), including:

(ESC Act Cl. 8A)

(a) efficiency in the industry and incentives for long term investment

(b) the financial viability of the industry

(c) the degree of, and scope for, competition within the industry, including countervailing market power and information asymmetries

(d) the relevant health, safety, environmental and social legislation applying to the industry

(e) the benefits and costs of regulation (including externalities and the gains from competition and efficiency) for—

(i) consumers and users of products or services (including low income and vulnerable consumers)

(ii) regulated entities

(f) consistency in regulation between States and on a national basis

(g) any matters specified in the empowering instrument.

ESC Act cl. 33(3)

(a) the particular circumstances of the regulated industry and the prescribed goods and services for which the determination is being made

(b) the efficient costs of producing or supplying regulated goods or services and of complying with relevant legislation and relevant health, safety, environmental and social legislation applying to the regulated industry

(c) the return on assets in the regulated industry

(d) any relevant interstate and international benchmarks for prices, costs and return on assets in comparable industries

(e) any other factors that the Commission considers relevant.

WIRO Cl. 11:

> The following pricing principles, namely that the prices that a regulated entity may charge for prescribed services, or the manner in which the regulated entity's prices are to be calculated, determined or otherwise regulated, should:
>
> (i) enable customers or potential customers of the regulated entity to easily understand the prices charged by the regulated entity for prescribed services or the manner in which such prices are calculated, determined or otherwise regulated
>
> (ii) provide signals about the efficient costs of providing prescribed services to customers (either collectively or to an individual customer or class of customers) while avoiding price shocks where possible, and
>
> (iii) take into account the interests of customers of the regulated entity, including low income and vulnerable customers.

These principles have therefore guided our assessment of Melbourne Water's operating and capex forecasts.

2.2.1 Approach to assessing operating expenditure

While there is a range of criteria set out in the WIRO and ESC Act to which the ESC must have regard when assessing opex, the overarching consideration is that the forecast must be '*operating expenditure which would be incurred by a prudent service provider acting efficiently to achieve the lowest cost of delivering on service outcomes over the regulatory period, taking into account a long-term planning horizon (prudent and efficient forecast operating expenditure).*'[2]

In forming our opinion on a prudent opex forecast, we have considered:

- The proposed forecast of expenditure, firstly by category (Water/Sewerage/Waterways and Drainage/Recycled water) and then by expenditure type (Labour/IT/Energy/Chemicals);
- Melbourne Water's historical expenditure by service and category, evaluating recent increases, decreases and reallocations of costs;
- Expected step changes in forecast expenditure;
- Recent cost allocation changes and business changes;
- Efficiencies delivered through the Fairer Water Bills initiative, identifying one-off and ongoing efficiencies and how they have been incorporated into Melbourne Water's forecast; and
- The relevant requirements of the Water Industry Act (1994) and the WIRO outlined above.

[2] ESC, *Melbourne Water 2016 Price Review Guidance paper*, April 2015, p. 17.

2.2.2 Approach to assessing capex

We have assessed Melbourne Water's proposed capex program for the fourth regulatory period against the requirements in the ESC's Guidance Paper for the price review, being that the forecast must be based on '*capital expenditure that would be incurred by a prudent service provider acting efficiently to achieve the lowest cost of delivering on service outcomes, taking into account a long-term planning horizon (prudent and efficient forecast capital expenditure).*' [3]

In doing so, our review has sought to answer the following key questions in determining the efficiency of the proposed program:

1. Are the drivers and risks identified for capex projects realistic and justified?
2. Has a robust approach been taken to the identification, assessment and detailing of alternative options for delivery of the program to find the least whole of life cost solution?
3. Were capex projects subject to a rigorous challenge process to ensure the most efficient delivery of projects?

Subsequently, a review of the major capital projects for each of the service areas was undertaken to satisfy the evaluation questions listed above, and recommendations for changes to the capital program were developed (where appropriate).

[3] ESC, *Melbourne Water 2016 Price Review Guidance paper*, April 2015, p. 21.

3 Summary of Melbourne Water's forecasts

3.1 Overview

Following some significant changes to the structure of its business during the third regulatory period, including comprehensive efficiency initiatives, generally Melbourne Water is not proposing significant changes to its operating expenditure for the next regulatory period.

Melbourne Water has identified a number of new obligations in its price submission, including (see section 4.2.4 for our assessment):

- Environmental clean-up (or pollution response) following the EPA's recognition of Melbourne Water as a 'protection agency';
- Forecast waterways and drainage maintenance expenditure has been identified by Melbourne Water as new compliance obligation, driven by asset growth;
- A proportion of energy costs have been identified by Melbourne Water as a new customer driven obligation following a survey question seeking to identify customers' willingness to pay for renewable energy.

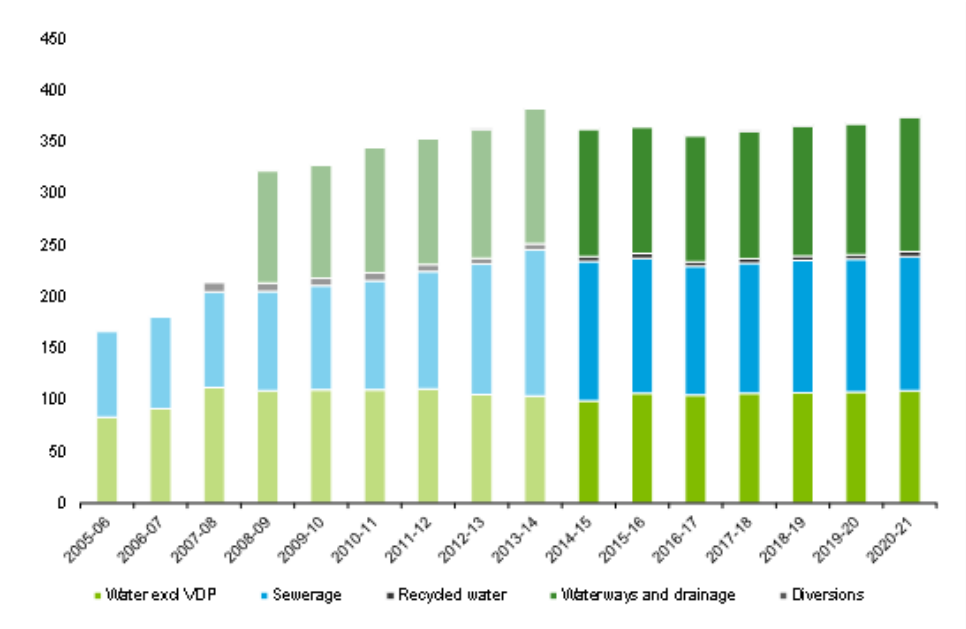
In its price submission, Melbourne Water is proposing to maintain services standards at current levels.

Melbourne Water's demand forecasts, which are essentially the aggregation of the retailers' forecasts, see wholesale water demand growing at 1% over the next regulatory period (due to some potable water substitution), and sewage growth of 1.8%.

3.2 Operating expenditure

Melbourne Water has forecast relatively flat business as usual (BAU) opex (excluding the Victorian Desalination Plant (VDP), new obligations and licence fees) for the fourth regulatory period. Total opex of $1.83 billion is forecast for the fourth regulatory period (2016-17 to 2020-21), equal to spending in the preceding five years; that is 2011-12 to 2015-16 (forecast).

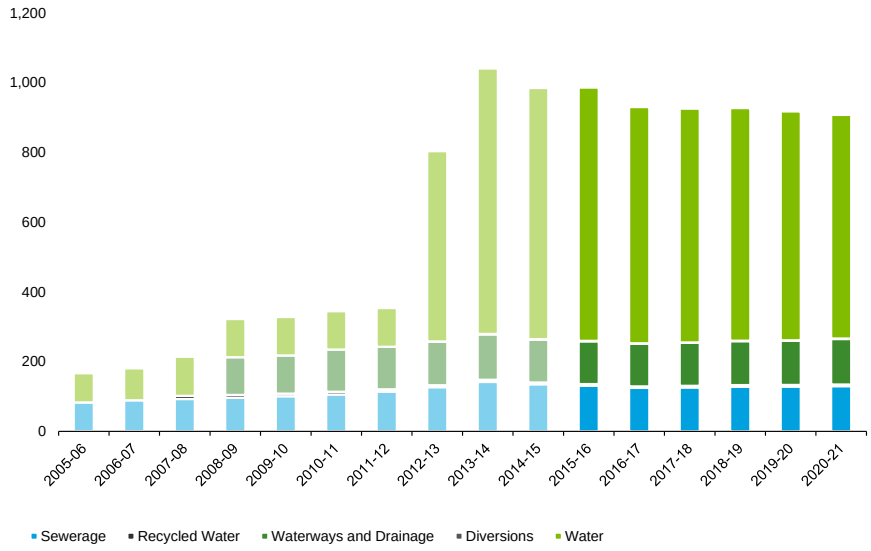
Figure 3.1: Forecast opex excluding VDP, new obligations and licence fees ($m, 01/01/2015)



Source: Melbourne Water price submission

Figure 3.2 provides the same information, including the VDP, highlighting that VDP costs are forecast to decline over the fourth regulatory period.

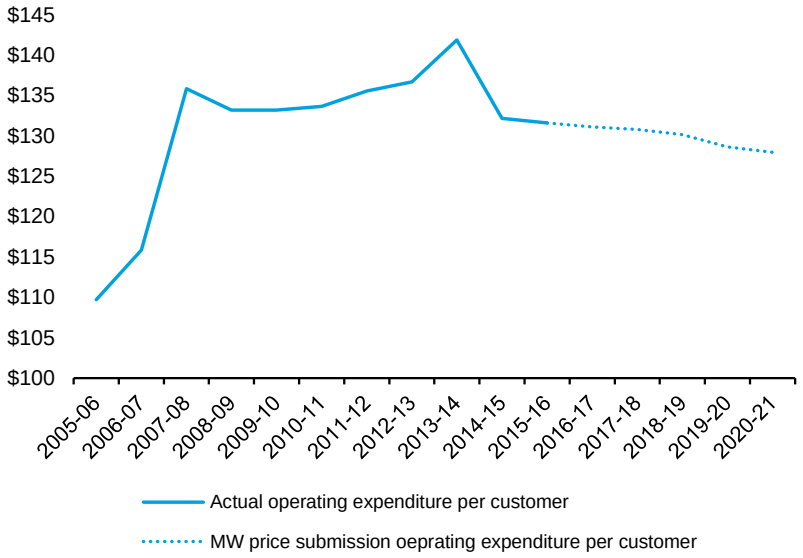
Figure 3.2: Forecast total opex including VDP, excluding new obligations and licence fees ($m, 01/01/2015)



Source: Melbourne Water 2016 price submission

We note that when normalised for customer numbers, Melbourne Water's forecast opex for water and sewerage services (excluding VDP) dropped notably in 2014-15, and is forecast to continue declining over the fourth regulatory period.

Figure 3.3: Opex (excluding VDP) per customer - sewerage and water ($m, 01/01/2015)



Source: ESC. Note: Excludes Waterways and Drainage expenditure.

Key drivers of Melbourne's Water's flat forecast opex are the efficiencies realised for the 2014 Fairer Water Bills (FWB) efficiency review which have been built into Melbourne Water's baseline as well as additional efficiencies the business has identified going forward.

Key drivers of operating costs in the fourth regulatory period have been identified by Melbourne Water as new obligations (specifically a new obligation for environmental clean-up), and growth (notably driving waterways and drainage opex). These are discussed further in section 3.4.

3.3 Capital expenditure

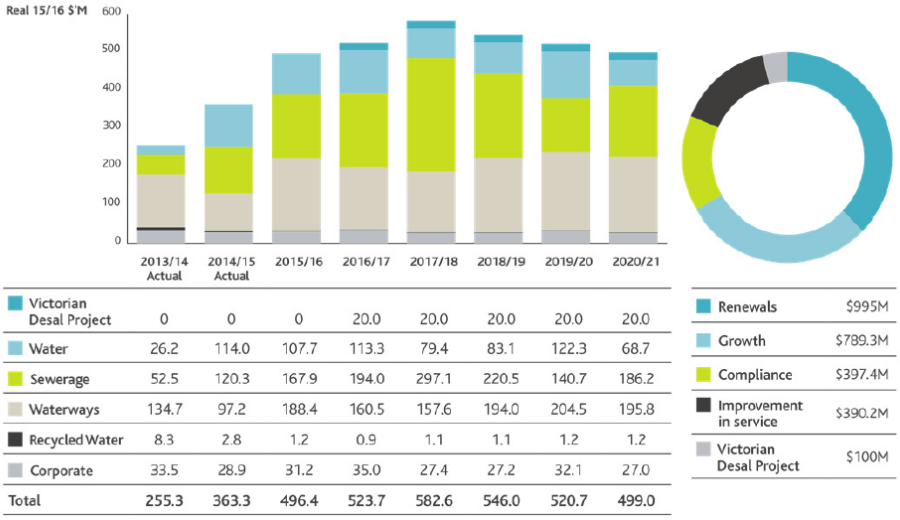
Melbourne Water's capex forecast is $2,672m over the next regulatory period. Capex is expected to peak in 2017-18, particularly due to the proposed WTP Treatment Capacity Increase project which will reach peak construction in that year.

Figure 3.4 below presents forecast capex according to its driver. It can be seen that sewerage projects comprise a significant proportion of spend in the second and third years of the period. Conversely, waterways and drainage expenditure is forecast to increase in the final three years and represents between 33-39% of total capital forecast for those years.

Renewals and growth comprise the most significant proportion of capex, mostly in water and sewerage services.

Figure 3.4: Forecast capex per driver for the fourth regulatory period ($m, 01/01/2015)

Figure 6: Total actual and forecast capital expenditure and 5-year total by driver (2015/16 Real Dollars)



	2013/14 Actual	2014/15 Actual	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Victorian Desal Project	0	0	0	20.0	20.0	20.0	20.0	20.0
Water	26.2	114.0	107.7	113.3	79.4	83.1	122.3	68.7
Sewerage	52.5	120.3	167.9	194.0	297.1	220.5	140.7	186.2
Waterways	134.7	97.2	188.4	160.5	157.6	194.0	204.5	195.8
Recycled Water	8.3	2.8	1.2	0.9	1.1	1.1	1.2	1.2
Corporate	33.5	28.9	31.2	35.0	27.4	27.2	32.1	27.0
Total	255.3	363.3	496.4	523.7	582.6	546.0	520.7	499.0

Source: Melbourne Water Price Submission, 2015

Over the long term, Melbourne Water's forecast capex is in line with average spending over the past 10 years. However it is noted that this comparison includes two large augmentation projects, the North-South Pipeline and the Eastern Treatment Plant Tertiary Upgrade which comprised the majority of spending in years 2008 to 2011. The WTP Treatment Capacity Increase project, with forecast expenditure of over $180m, is the largest project scheduled for completion over the next regulatory period.

The major program areas contributing to the rise in Waterways and Drainage expenditure are Drainage and Flood Protection and Stormwater Quality and Quantity Management. The top five waterways and drainage projects make up approximately 10% of the overall Waterways and Drainage capital spend of $879.6m over the five-year period.

Melbourne Water is forecasting minor capital spending on recycled water.

3.4 Key drivers and obligations

Below is a brief summary of items that Melbourne Water has submitted as new obligations. See section 4.2.4 for our assessment of both forecast expenditure and whether each item satisfies the definition of either new obligation or a customer driven expense.

3.4.1 New obligation – pollution response

In its price submission Melbourne Water indicated that environmental regulatory obligations have been clarified by the EPA for the fourth regulatory period to include pollution response for larger pollution events. Moreover, EPA's guidance for the Melbourne Water 2016 price submission identifies Melbourne Water as a 'protection agency' under the *Environment Protection Act 1970* (EP Act) with responsibilities for pollutants or environmental hazards on designated waterways.

3.4.2 Customer driven expense - renewable energy

Melbourne Water has categorised a proportion of its total energy costs as a new customer driven obligation, on the basis of one survey question which sought to identify customers' willingness to pay for renewable energy. Melbourne Water's 20 year energy contract, which commenced in 2010, incorporates a rising proportion of renewable energy, reaching 100% of energy consumption in 2018.

Melbourne Water estimated the cost premium associated with renewable energy to be $55.8 million, which it translated to $5.10 per customer per annum. In an online survey, Melbourne Water asked whether customers would be willing to pay this premium. Melbourne Water interpreted the average survey result of 7.6 out of 10 as indicating strong support for renewable energy, and therefore categorised this as a new obligation. Melbourne Water subsequently updated its estimate of the renewable energy cost premium to $76.2 million (37% increase); however, the increase in the estimated premium was included in BAU opex. This is discussed further in section 4.4.3.

3.4.3 Growth – waterways and drainage maintenance

Melbourne Water identified the component of waterways and drainage opex above the growth allowance, as a new obligation. Melbourne Water noted that the ESC's approach to assessing waterways and drainage opex in the 2013 Draft Decision was different to that used for other opex. Waterways and drainage charges are better correlated to growth in assets rather than growth in customer numbers.[4]

Melbourne Water has forecast $9.7 million in waterways and drainage maintenance expenditure above the 'growth' allowance in the next regulatory period. This is discussed further in section 4.4.3.

3.5 Consultation

In developing its 2016 price submission, Melbourne Water undertook a lengthy consultation process with different stakeholders, including technical regulators, customers (the retailers), the retailers' customers (households and businesses), customer representative and community groups, local councils and developers. Melbourne Water used a number of different methods for consultation for different purposes, including:

- A customer willingness to pay survey by La Trobe University featuring trade-off options;
- Engagement with retailers, including joint workshops and meetings to progress key issues and potential options for reforms in November and December of 2014, and February, March and July of 2015. Melbourne Water's capital plan and prioritisation information was provided to retailers for comment;
- Existing committees and groups were also utilised for consultation on specific issues including the Sewage Quality Steering Group (regarding upgrades at ETP and WTP), Principal Representatives of the Bulk Supply Agreements (regarding feedback on levels of service);

[4] ESC 2013, Price Review 2013: Greater Metropolitan Water Businesses — Draft Decision, Volume I, April, p. 89

- The Project Advisory Group (PAG), which includes representatives of the retailers (regarding the development of Melbourne Water's Waterways and Drainage Investment Plan);
- A deliberative style forum with end use customers (to which the retailers were invited) involving 122 residential and non-residential customers; and the online survey with responses from 801 and 180 residential and non-residential customers respectively;
- Waterways and drainage survey (1,000 respondents);
- Three community and business forums with 122 participants; and
- Provision of a public Consultation Paper, facts sheets and a dedicated website which received 3,324 visitors.

Melbourne Water stated that it "aimed to have a transparent consultation process with early engagement with the retailers. Melbourne Water asked to be led by the retailers as to topics for discussion and focus, and such topics included levels of service, risk profiles and capital processes and projects, proposed asset transfers, approaches to operating expenditure such as fire prevention and research."

Melbourne Water provided examples of where it adjusted its capex program based on consultation with the retailers, including:

- Included Yan Yean to Bald Hill Pipeline ($3.4 million – design only) and Yan Yean Pumping Station ($2 million – design only) projects to meet growth demand in Melbourne's north-west. Both projects are planned for construction in the fifth regulatory period;
- Continued to include Holden Zone Tank and Inlet Main ($23.8 million), Pakenham Security Supply Upgrade ($10.9 million) and Cranbourne Second Tank ($9.2 million) in response to growth in Melbourne's west and south-east;
- Committed to projects to return the Yan Yean Treatment Plant to service ($2.8 million) during the 2016 regulatory period, to support low cost supply and customer;
- Re-phased $104.8 million of expenditure at ETP by re-phasing the $57.2 million Aeration Tanks Works Augmentation and the $47.6 million Primary Tank Augmentation (leaving only design costs during the 2016 regulatory period);
- Reviewed optimisation initiatives to find approximately $12 million in efficiencies by integrating the Waste Activated Sludge Pre-Treatment project within the current budgets of other related projects; and
- Reviewed risk assessments for a range of sewerage projects resulting in the rephrasing of Gardiner's Creek Sewer Main Upgrade ($6.2 million) and the Kew Sewer Pump Station Upgrade ($4.1 million).

3.5.1 Our consultation with retailers

We consulted with the metropolitan retailers to seek their feedback on Melbourne Water's price submission, consultation process and the proposed projects.

Retailers commented that Melbourne Water made genuine effort to consult with them in the lead up to its 2016 Price Submission, and engaged them earlier in the process. However, a general view was that there is still room for improvement in the consultation

process before reaching a point where Melbourne Water's price submission represents a 'negotiated outcome' between Melbourne Water and its customers.

The retailers suggested that the consultation process for the next regulatory period would benefit from Melbourne Water providing more analysis of the possible capex program earlier, rather than just information. That said, the retailers noted that there was significant improvement in information sharing by Melbourne Water compared to the previous price review.

Finally, retailers suggested they were surprised by the size of Melbourne Water's capex program following the large program in the previous regulatory period.

3.6 Service standards

3.6.1 Water quality and sewage treatment

Melbourne Water has Bulk Water Supply Agreements with each of its customers, including the metropolitan retailers, Western Water, Gippsland Water, Barwon Water, South Gippsland Water and Westernport Water. The agreements set out the responsibilities of Melbourne Water and the retailers for bulk water, including requirements of Melbourne Water's water quality monitoring program, and minimum standards for:

- Effective disinfection
- Fluoride
- Turbidity
- Apparent colour
- pH
- Iron, magnesium, aluminium
- Coliforms
- Algae

Melbourne Water has agreements with the retailers for bulk sewage transfer, treatment and disposal. Under the agreement, Melbourne Water must receive, transfer, treat and dispose of Biochemical Oxygen Demand, Suspended Solids and Total Kjeldahl Nitrogen loads contained in sewage delivered by the retailers.

Melbourne Water is required to comply with EPA discharge licence requirements for both the WTP and ETP, as well as other obligations set out under the Statement of Obligations (SoO) issued by the Department of Environment, Land, Water and Planning.

3.6.2 Proposed service standards

Melbourne Water proposed to maintain service standards for the next regulatory period, and as such service standards have not been identified as a cost driver.[5]

3.7 Demand forecasts

Melbourne Water's demand forecasts for water and sewerage services are an aggregation of the bulk water and sewage forecasts for each of the metropolitan retail businesses.

[5] Melbourne Water price submission, p. 37.

Water

Demand for wholesale water is forecast to grow by around 16GL over the next regulatory period, from 401.6GL forecast in 2015-16 to 417.6GL by 2020-21. This represents an annual increase of around 1% each year. Melbourne Water noted that while annual demand is subject to climate variation, 2014-15 demand growth was about 1%.

From discussions with Melbourne Water we understand that growth is driving peak demands, with less uncertainty compared to the third regulatory period. Reductions in water demand owing to changes in behaviour (for example the effect of Permanent Water Saving Rules, and customers switching to low water using appliances) have already occurred, so there appears to be an element of 'demand hardening'.

Sewerage services

Demand in sewage volume is forecast to continue to grow at a rate of 1.8% over the next regulatory period and Melbourne Water noted that load demand is dependent on expected economic conditions.

Melbourne Water's price submission states that "sewage volume demand is growing at a faster rate than water due to potable substitution and other contributing factors." During our workshop, Melbourne Water explained that under a return to dry scenario water recycling is in greater demand (i.e. potable substitution), but sewerage load remains unchanged and driven by population growth.

4 Assessment of operating expenditure

This chapter sets out our assessment of opex including:

- An assessment of the 2014-15 baseline expenditure, which forms the basis of the growth-adjusted business-as-usual BAU for the fourth regulatory period
- Assessment of individual expenditure items, including labour, electricity and chemicals
- Assessment of business specific expenditure items that are increasing and are above BAU (i.e. new initiatives or large increases in BAU items).

4.1 Historical and forecast operating expenditure

This section provides an overview of:

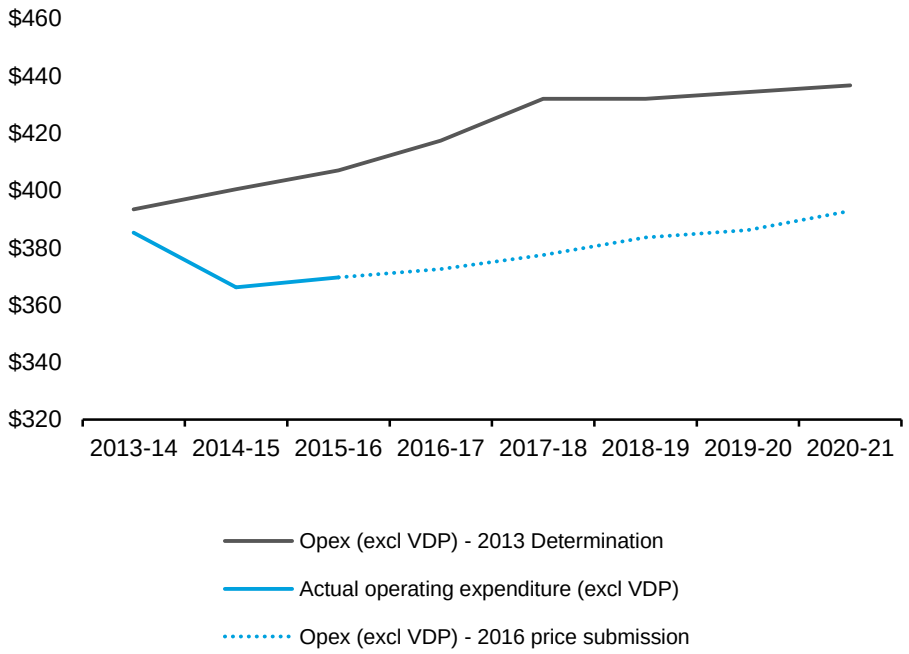
- Expenditure forecasts set out in the ESC's 2013 Determination
- Melbourne Water's actual expenditure in the current regulatory period, and
- An explanation for the variation.

At the outset, we note that Melbourne Water has achieved significant reductions in opex since the ESC's 2013 Determination. This is commendable, and has occurred through a range of initiatives, including redesigning its processes and business by utilising new technology (such as drones for asset monitoring), redesigning procurement and professional services contracts (such as in-housing some maintenance functions) reviewing service standards (such as re-scoping waterways maintenance work for greenfield developments), and reviewing cost allocation to improve transparency in reporting.

Melbourne Water's forecasts indicate that it will spend $79.8 million less opex than that allowed under the ESC's 2013 determination, excluding the VDP (Figure 4.1).

- In the first two years of the regulatory period for which actual data is available (2013-14 and 2014-15), Melbourne Water spent $42 million less than allowable opex in the ESC's 2013 determination, excluding the VDP.
- Once VDP is included, the difference for the whole period increases to $174.5 million.

Figure 4.1: Opex (excluding VDP, including new obligations) - 2013 final decision compared to actuals and 2016 price submission ($m, 01/01/2015)



Source: Melbourne Water price submission, ESC template 2013

The bulk of the opex savings were driven by Melbourne Water's 2014 FWB efficiency review, under which Melbourne Water undertook an enterprise-wide review of business operations and processes and established a new business and operating model to drive efficiency.[6]

In 2014, Melbourne Water committed to $114.2 million in opex efficiencies between 2014-15 and 2017-18, including $29.4 million in 2014-15. Table 4.1 provides a breakdown of savings by service.

Table 4.1: Service areas savings from the 2014 efficiency review (per cent)

Service Allocation	Service Allocation
Water	43.0
Sewerage	11.1
Waterways and Drainage	38.7
Recycled Water	7.2

Source: Melbourne Water 2016 price submission, p. 12.

We understand from Melbourne Water that some savings achieved during the third regulatory period were short term. Melbourne Water explained that this gave it capacity to meet the targets in the short term, while allowing other parts of the business time to adjust and find ongoing savings. For example, some short term savings included reduced financing costs and delaying waterways and drainage maintenance works during the period.

[6] Melbourne Water 2016 price submission, p. 11.

In its price submission, Melbourne Water has indicated that it has built in $5.8 million of further efficiencies bringing forecast opex for 2014-15 to $366.2 million, or $34 million below the ESC's 2013 Determination.

More detail on the efficiency savings planned for the fourth regulatory period are discussed in section 4.2.5.

4.2 BAU operating expenditure

Our approach to assessing baseline BAU expenditure was to:

- Define efficient expenditure in the base year, which comprises controllable costs from the last full year for which there is actual data (2014-15)
- Remove material once-off items that were incurred that year, as well as adding back any material items that are normally incurred but were not.
- Adjust the baseline for efficiency commitments made by Melbourne Water following its efficiency review in 2014.[7]

The ESC's guidance paper stipulates that in calculating the required revenue for the fourth regulatory period, an "efficiency hurdle" of 2% each year applies to controllable forecast opex.[8]

Table 4.2 sets out Melbourne Water's proposed baseline opex target for the fourth regulatory period.

Table 4.2: Melbourne Water's forecast base opex ($m, 01/01/2015)

$M	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Actual opex	984.9						
Less uncontrollable costs							
VDP contract payments	621.1						
Land tax	20.7						
Total baseline opex	**343.0**						
Adjusted BAU			**345.1**	**344.4**	**343.7**	**343.0**	**342.3**
Baseline escalated for customer growth allowance (1.8%) minus efficiency hurdle (2%)							

Source: ESC, Melbourne Water 2016 price review guidance paper, Melbourne Water price submission, p. 24.

Melbourne Water's proposed usual (BAU) opex for the next regulatory period is shown in Table 4.3. Melbourne Water has made no adjustment for once-off expenditures in 2014-15.

[7] ESC Melbourne Water 2016 Price Review Guidance Paper, p. 18

[8] ESC Melbourne Water 2016 Price Review Guidance Paper, p. 1.

Table 4.3: Melbourne Water's forecast BAU opex ($m, 01/01/2015)

$M	2016-17	2017-18	2018-19	2019-20	2020-21
Forecast BAU opex	930.0	925.4	927.3	917.7	907.8
Less uncontrollable costs:					
VDP contract payments	572.7	563.8	560.5	548.7	532.4
Land Tax	21.7	22.2	21.8	22.3	22.7
Forecast BAU	**335.7**	**339.4**	**345.0**	**346.8**	**352.7**
Opex hurdle target	345.1	344.4	343.7	343.0	342.3
Difference	-9.4	-5.0	1.3	3.7	10.4

Source: ESC, Melbourne Water 2016 price review guidance paper, Melbourne Water price submission, p. 24.

While Melbourne Water's opex proposal passes the efficiency hurdle overall, it is fails the hurdle in the final two years of the period. See section 4.5 for our assessment of Melbourne Water's performance against the efficiency hurdle and the change following our recommended adjustments to expenditure.

In its price submission and during our workshop, Melbourne Water indicated it considers the opex in 2014-15 "to be a low base due to unusual, stable weather events with no major flooding or bushfires which impact operating expenses (over a regulatory period, on average, one event occurs)" (Price Submission, p. 24).

The following sections set out our assessment of once-off expenses, new obligations and individual expenditure items and services.

4.2.2 Once-off expenses

We requested further information from Melbourne Water on two potential once-off items identified in Melbourne Water's Corporate Plan and 2014-15 Annual Report:

- Employer contributions to defined benefits superannuation schemes; and
- Redundancies.

Defined superannuation scheme

Melbourne Water's 2014-15 Annual Report indicated that employer contributions to defined benefits superannuation schemes was $0 in 2014-15, compared to $1.3 million in 2013-14. We asked whether Melbourne Water expected no cost going forward, or whether an adjustment to the baseline would be warranted for expected future costs. Melbourne Water advised that it does not expect any defined benefits costs going forward, consistent with its most recent actuarial advice, and as such no adjustment was required.

Redundancy payments

Melbourne Water concluded a significant redundancy program in 2013-14 and 2014-15, costing $1.3 million and $1.6 million respectively.

In our Draft Report we noted that we considered 2014-15 to be an abnormally high year for redundancies given historical costs (for example $410,000 in 2012-13), and costs forecast

($800,000 in 2016-17); our recommendation was therefore that it was appropriate to remove $1 million from the 2014-15 baseline expenditure.

Table 4.4: Melbourne Water FTE reconciliation

	2012-13	2013-14	2014-15	2015-16*
Redundancies ($million, 2015-16)	0.4	1.3	1.62	0.8
Redundancies (number)		27		17
Opening FTE			812	899
Less redundancies			-27	-17
Plus waterways delivery			149	2
Less roles out of business			-77	
Plus roles replaced			42	
Closing FTE		812	899	901

Source: Melbourne Water * as at November 2015

In response to our draft report, Melbourne Water advised that we incorrectly interpreted the 2015-16 figure as a forecast, and that $0.8 million was the year-to-date actual expenditure on redundancies (i.e. as at November 2015). Melbourne Water forecasts redundancy expenses for 2015-16 to be in line with 2014-15.

We requested further information from Melbourne Water regarding historic redundancy costs. These are shown in Table 4.5. Aside from 2009-10, redundancy costs in 2014-15 and 2015-16 (forecast) are historically high.

Table 4.5: Historical redundancy expenses, ($m, 01/01/2015)

2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16*
0.42	0.35	4.24	0.26	0.04	0.44	1.30	1.62	1.62

Source: Melbourne Water. * MW forecasts redundancy expenses in 2015-16 to be in line with 2014-15

Bearing in mind historic redundancy expenditure and the fact that Melbourne Water has recently undergone a corporate restructure and redundancy program, we remain of the view that expenditure in the baseline year 2014-15 is abnormally high. The 5 year average (2009-10 to 2014-15) is $0.73 million.

On this basis we consider an appropriate benchmark for redundancy expenditure in the baseline year is $0.75 million, a reduction of $0.87 million compared to actual expenditure.

Land Tax

Melbourne Water's 2014-15 annual report specified that 274 lots at the Meridian residential development (at the site of the decommissioned Dandenong Treatment Plant) were sold over the financial year, and that the final stage of the Logis industrial development has now been sold "with development works to construct the roads and services due for completion late 2015". Furthermore, the Annual Report indicated that the sale and resulting development of the land "is delivering returns to Melbourne Water in excess of $100 million" (Melbourne Water 2014-15 Annual Report p. 57).

We asked Melbourne Water a series of questions to better understand the timing of sales (regardless of when sale proceeds are realised) and any possible implications for land tax in for baseline opex. In response, Melbourne Water confirmed that the $100 million reflects gross sales proceeds over the period 2008-2015, and that around $25 million sales proceeds related to 2014-15.

Melbourne Water has confirmed that $18.2 million of land (subject to land tax) was sold in 2014-15 (after 31 December 2014),[9] but that this had already been incorporated into the business's forecasts for land tax. Moreover, Melbourne Water advised that both projected acquisitions and divestments are accounted for in its forecasts for land tax. Melbourne Water further advised that it has included valuation increases of 4.5% nominal per year over the next regulatory period in line with historical averages; this appears reasonable in our assessment. Melbourne Water's forecasts for valuations are higher than its forecast growth for total land tax over the next regulatory period (an average of 4.0% per year), supporting Melbourne Water's argument that it considers both projected acquisitions and divestments in forecasting it's tax liability. We do not recommend any changes to land tax expense.

4.2.3 Realised efficiencies

We also requested further information on the efficiencies achieved by Melbourne Water during the current regulatory period, to ensure that these had been incorporated into its baseline forecast, including:

- Savings from joint procurement
- Asset management system
- Fleet savings
- Reintroduction of Lake Borrie.

Joint procurement savings

Melbourne Water advised that $1.1 million was saved on its insurance bill through joint procurement with the metropolitan retailers. Melbourne Water confirmed that the contract took effect from 1 November 2015, and that this saving has been incorporated into its price submission in 2015-16.

We also requested information about other possible joint procurement initiatives (such as energy and chemicals). Melbourne Water noted that it is in the early stages of a joint procurement process for chemicals, but that it is not expected to deliver any savings to Melbourne Water in the fourth regulatory period. Melbourne Water confirmed that it will not pursue joint procurement for energy in the next regulatory given its existing contract.

Asset management system

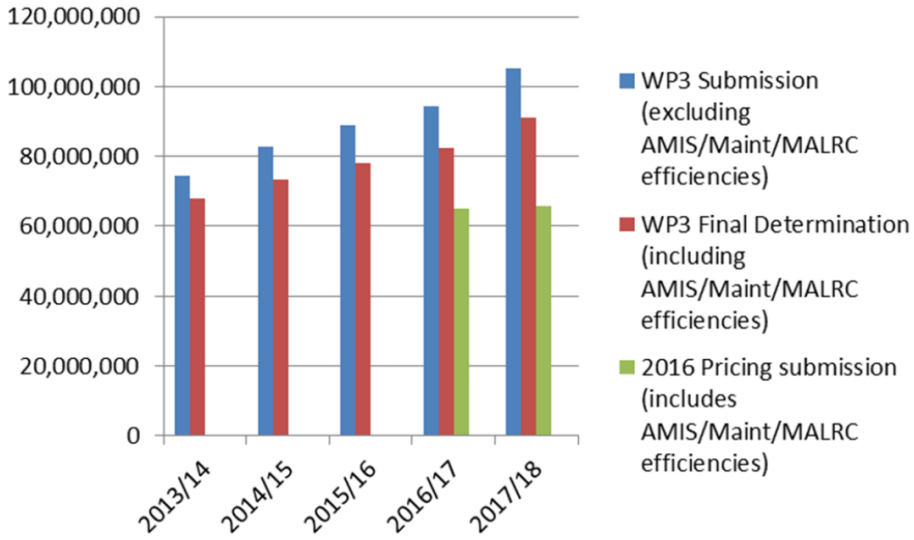
Melbourne Water stated that it had implemented a new Asset Management System (AMIS) and expected to "realise $70 million of operational and maintenance efficiencies and defer

[9] Land tax liability is based on total taxable land holdings as at midnight on 31 December, and tax liability is based on the aggregated land holding of a business, person or entity. Every second year in Victoria the Valuer General values land.

$44 million of capital works over the next 15 years."[10] We requested further information to understand the quantum and timing of savings and how they had been treated with respect to Melbourne Water's baseline.

Melbourne Water confirmed that AMIS operational and maintenance efficiencies are included in its 2014-15 baseline, and that efficiencies arising from the system's implementation in December 2014, have been reflected in forecasts for 2014-15 and 2015-16 (consistent with the ESC's 2013 Price Determination). Moreover, Melbourne Water advised that the efficiencies are included in forecasts as sustained savings and are thus embedded in the 2014-15 baseline. Melbourne Water provided Figure 4.2, which compares the maintenance costs from its 2013 price submission, ESC's 2013 Price Determination and Melbourne Water's 2016 price submission.

Figure 4.2: Differences in opex due to implementation of AMIS and maintenance efficiencies ($, 01/01/2015)



Source: Melbourne Water

We accept Melbourne Water's explanation as the efficiencies are apparent in the business's results and consistent with our observations of the business's efficiency program more broadly.

Fleet savings

In its 2016 Price Submission, Melbourne Water identified fleet vehicles savings of $400,000 in 2014-15 from changes to the procurement model which saw vehicles removed and not replaced from the business's fleet. Melbourne Water confirmed that this saving is reflected in the 2014-15 baseline.

Melbourne Water's 2014-15 Annual Report further indicated that it expects to eventually save up to $2 million each year. Melbourne Water provided further information advising

[10] Melbourne Water 2014-15 Annual Report p. 5

that this represents a cumulative saving via a reduction in the size of the fleet (so is inclusive of the initial $400,000) and that this figure had recently been revised to $1.5 million as a "stretch target".[11]

This forecast saving (above the $400,000 already realised) has not been factored into Melbourne Water's opex forecasts. Melbourne Water advised this is because:

- It represents an aspirational target
- Details of the initiative are still being finalised
- Since the publication of the Annual Report, revised estimates indicate future potential stretch savings as $1.5 million each year
- Demographic changes in Melbourne Water's workforce are unknown (for example retirements, resignations etc.) meaning that the business is unable to be specific about where these savings will come from
- These savings are unlikely to be realised during this regulatory period for some of the reasons provided above.

In our draft report we suggested it was reasonable to expect that given this 'aspirational target' was set out in the business's Annual Report, then some progress toward the goal should be expected over the fourth regulatory period.

We recommended that opex could be reduced by $0.6 million over the period in anticipation of achieving $1 million of annual savings (which is lower than the current $1.5 million target).

Melbourne Water's response to our draft report was that the savings quoted are to be realised on a cumulative basis, but accepted that this was not clearly worded in the Annual Report. Moreover, Melbourne Water suggested that:

- The proposed reduction in fleet opex of $1 million per annum from 2016-17 (i.e. $0.4 million realised plus additional $0.6 million proposed reduction) is not achievable because current savings are $0.4 million per annum and there are currently no additional initiatives in place (i.e. in addition to those already proposed), that would generate the required additional savings of $0.6 million.
- But that further savings will be realised as fleet reductions are gradually implemented.

Melbourne Water stated that:

> On reviewing overall fleet costs for the regulatory period and taking into consideration expected efficiencies, Melbourne Water would propose a reduction in the forecast of $1 million rather than the $3 million recommended by DAE.

While we accept Melbourne Water's explanation, Melbourne Water's statement in its annual report is not clear. This is also the case with respect of the Lake Borrie savings (discussed below). We recommend a reduction in the forecast opex of $1 million over the forth regulatory period.

Reintroduction of Lake Borrie

[11] Melbourne Water 2014-15 Annual Report, p. 55.

In its 2014-15 Annual Report, Melbourne Water stated that the reintroduction of Lake Borrie in May 2015 is expected to save several million dollars in annual operating costs.[12]

On request, Melbourne Water provided further information, explaining that this saving was an avoided cost, in the sense that the business was saving money by not opting for a more expensive option. The option chosen allowed Melbourne Water to implement the current augmentation plan, while the more expensive option required a new activated sludge plant to be built, which carried with it additional costs. The savings are not a reduction from baseline levels.

4.2.4 Melbourne Water's proposed new obligations

This section provides an assessment of whether the new obligations identified by Melbourne Water are indeed new obligations. It also provides an assessment of Melbourne Water's corresponding forecast expenditure.

4.2.4.1 Pollution response

Melbourne Water has proposed opex of $5.3 million over the fourth regulatory period to undertake its "pollution or environmental hazard response in line with its new responsibilities as a protection agency" (Melbourne Water).

EPA's guidance for the Melbourne Water 2016 price submission identifies Melbourne Water as a 'protection agency' under the *Environment Protection Act 1970* (EP Act) with responsibilities for pollutants or environmental hazards on designated waterways:

> EPA's position is that Melbourne Water, pursuant to section 4 of the EP Act, is a 'protection agency' in respect of designated waterways and designated land in the Port Phillip and Westernport regions. In accordance with section 66 of the EP Act, if any designated water or designated land in these regions is polluted or an environmental hazard occurs, Melbourne Water, as a protection agency, may, and if 'directed' by the EPA, must, conduct a clean up to protect public health and the environment.[13]

In response to our questions about whether this is indeed a new obligation, Melbourne Water explained that "for larger pollution events, Melbourne Water has traditionally operated under EPA direction for clean-up". As such, Melbourne Water had not sought additional funding for these activities in previous price reviews, and that it has "to date been an unfunded activity, sourced from maintenance budgets at the expense of other priority activities."

A comparison of EPA's guidance to Melbourne Water for the 2016 price review with equivalent guidance for the 2013 price review suggests that this obligation has been strengthened (by way of EPA recognising Melbourne Water as a 'protection agency'). It therefore appears to be a new obligation, regardless of customer support for this activity.

[12] Melbourne Water, 2014-15 Annual Report, p. 35.

[13] EPA Guidance - Melbourne Water 2016 Price Submission Attachment 1, p. 10.

Despite this, we recommend that no additional expenditure for this activity be provided, as Melbourne Water has largely been undertaking this function in the past within its reported expenditure levels (including the 2014-15 base). This will result in a reduction in Melbourne Water's opex of $5.3 million over the period. Should Melbourne Water be exposed to large outlays associated with a particular event, we note that expenditure can be recovered through the pass through mechanism for unforeseen events.

4.2.4.2 Waterways and drainage

Melbourne Water has forecast $9.7 million in waterways and drainage maintenance above the 'growth' allowance, and has included it as a new obligation. To be clear, this additional opex is growth driven, not a new obligation. Having said that, we note that the ESC's 2013 Determination treated it in effectively the same way in terms of the efficiency hurdle – as such we have moved this item out of 'new obligations' and into its own category in the baseline, consistent with the methodology used in the 2013 expenditure review.

Melbourne Water also noted that this is consistent with the ESC's approach in the 2013 Draft Decision:

> The approach used to assess this expenditure is different to that used for other opex, because waterways and drainage charges are better correlated to growth in assets rather than growth in customer numbers. The analysis is based on the proposed increase in assets and maintenance timing as well as any changes to obligations requiring an increase in expenditure.[14]

We accept the argument that waterways and drainage expenditure is better correlated with asset growth, although it is not clear that the growth component of this expense should be excluded from the efficiency hurdle. The ESC may consider applying the efficiency hurdle to the growth component of waterways and drainage opex in future.

Section 4.3.3 sets out our assessment of forecast expenditure for waterways and drainage services more broadly.

4.2.4.3 Renewable energy

As discussed above, Melbourne Water has categorised a proportion of its total energy costs as a new customer driven obligation, on the basis of a survey question which sought to identify customers' willingness to pay for renewable energy.

Our assessment of this expenditure is provided in section 4.4.3.

4.2.4.4 Fire Services Levy

We recommend that the Fire Services Levy, like land tax, should be treated as uncontrollable opex. We accept the quantum forecast by Melbourne Water, and understand that 2014-15 expenditure was low due to including a refund from the Victorian State Revenue Office. Although a small amount (around $0.5 million per annum), we have included it in the uncontrollable expenditure category for completeness.

[14] ESC 2013, Price Review 2013: Greater Metropolitan Water Businesses — Draft Decision, Volume I, April, p. 89

4.2.5 Fairer Water Bills savings and future efficiencies

The ESC specified that Melbourne Water's price submission must:

- Provide a brief description of Melbourne Water's current and expected efficiency programs (separately identifying the efficiency programs arising from the 2014 efficiency review, including shared services initiatives), and
- For each current and expected efficiency program, identify the forecast efficiency saving and which major service category that saving relates to (that is, water, sewerage, waterways and drainage services).[15]

Melbourne Water provided further information about the breakdown of efficiencies achieved through the FWB efficiency review, see Table 4.6.

Table 4.6: Melbourne Water's operating cost savings due to the 2014 (FWB) efficiency review ($m, 01/01/2015)

	2013-14	2014-15	2015-16	2016-17	2017-18
2013 Determination	393.4	401.4	402.4	410.8	423.1
Less changed obligations (carbon tax repeal)	1.0	4.7	3.3	3.5	3.6
Less Net Efficiencies					
External Services	11.8	33.9	30.1	36.9	44.5
Fees and Charges	1.6	-5.3	1.8	2.0	2.9
Other	2.9	13.9	2.7	12.8	12.7
Labour	-9.2	-11.9	-4.8	-16.9	-18.2
Total Net Efficiencies	**7.1**	**30.5**	**29.8**	**34.7**	**42.0**
Actual/Forecast opex including BAU and new obligations	385.3	366.2	369.3	372.6	377.5

Source: Melbourne Water

[15] ESC 2016, Melbourne Water 20116 Price Review Guidance Paper, p. 20.

4.2.6 Changes to cost allocation

Melbourne Water changed its cost allocation approach in 2014. In particular, changes were made to the allocation of corporate costs across the four main services (Water, Sewerage, Waterways and Recycled Water). A line by line reassessment of cost centres was undertaken, with programs' contribution to each service reconsidered and updated, through consultation with staff and management. The changes were significant, as is apparent in the summary of historical expenditure by service discussed in section 4.3.

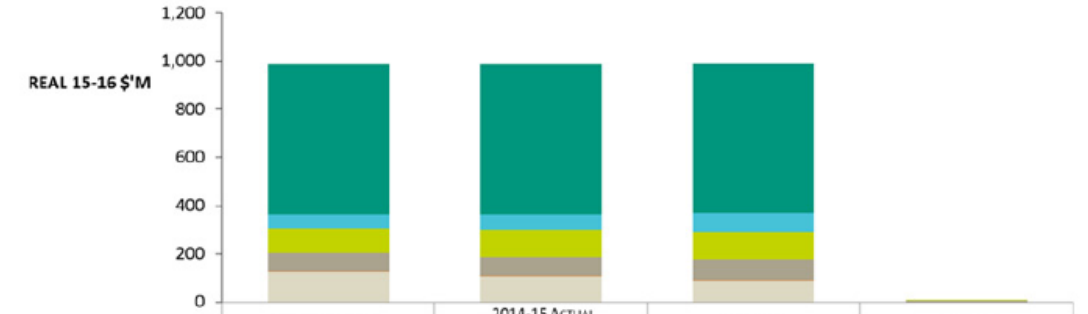
Melbourne Water allocates costs on the basis of FTEs. That is, each employee is allocated to one or more of the four services, or directly to corporate. In reviewing these allocations in 2014, Melbourne Water did not make any changes to account for its insourcing of certain water maintenance labour (discussed in section 4.4.1), as it considered that this change would not materially affect the costs of providing corporate services for water.

Overall, an additional $22.5 million of costs that would have previously been identified as corporate costs were allocated out to the services.

No changes were made to Melbourne Water's capitalisation policy as part of this restructure.

The impact of the changes to cost allocation is shown below. The $22.5 million of corporate costs were reallocated to services relatively equally among Sewerage ($7.2 million), Water ($8.3 million) and Waterways ($7.2 million).

Figure 4.3: Impact of Melbourne Water's 2014 Cost Allocation Changes ($m, 01/01/2015)



	2014-15 Actual	2014-15 Actual Revised	2015-16	Variance
Victorian Desalination Project	621.1	621.1	620.0	(1.1)
Water	60.9	69.2	80.8	11.6
Sewerage	102.1	109.3	110.3	1.0
Waterways	72.5	79.8	86.3	6.5
Recycled Water	3.5	3.1	3.3	.2
Corporate	127.2	104.7	88.6	(16.1)
Total	987.3	987.3	989.3	2.1

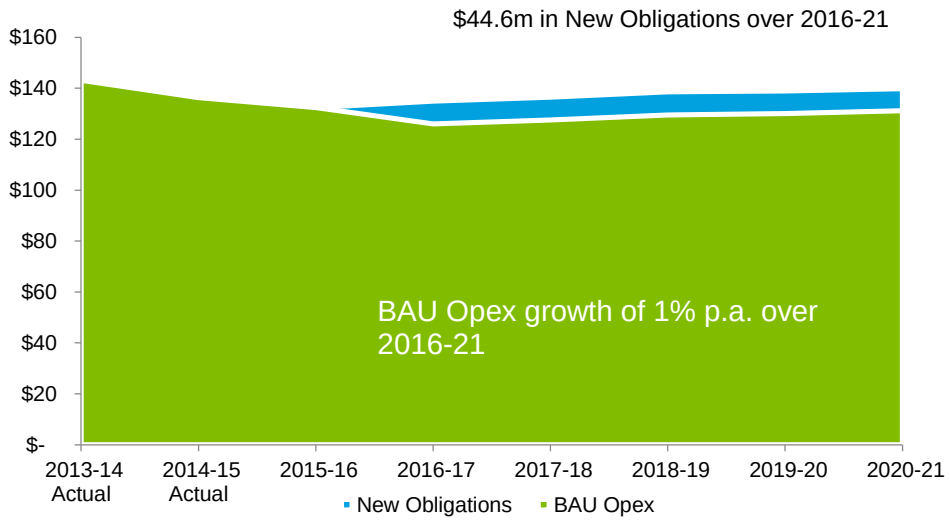
Source: Melbourne Water, Presentation to DAE and Arup, 26 November 2015.

4.3 Assessment by Service

4.3.1 Water

Melbourne Water supplies, treats and transfers drinking water to the retailers and regional water businesses. Excluding VDP, labour (including contracted labour or External Services) is by far the largest cost component, accounting for over 60% of water opex over the 2016-21 period, followed by land tax and energy which make up 9% and 8% of water opex respectively.[16]

Figure 4.4: Water BAU Opex and new obligations ($m, 01/01/2015)

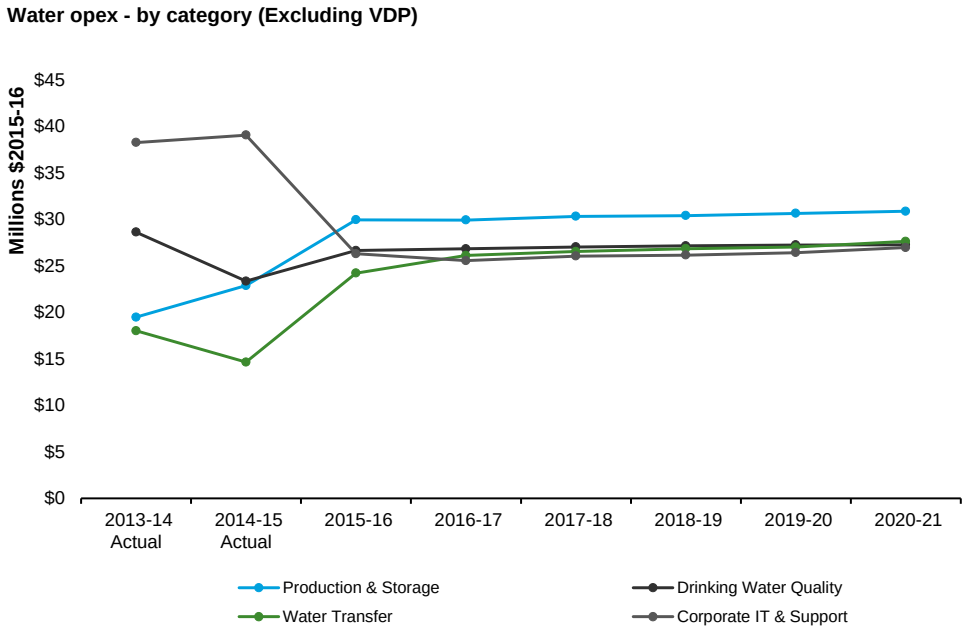


Source: Melbourne Water, 2016 Price Submission, p. 40 and underlying excel files provided by Melbourne Water; 2016 price submission template

For the next regulatory period, excluding desalination costs and diversions, water expenditure is highest for the production and storage category and evenly split across the remaining categories of drinking water quality, transfer and corporate IT and support. Figure 4.5 shows a significant increase in expenditure for production and storage expenditure in 2014-15 and 2015-16, before it stabilises over the next regulatory period. Melbourne Water also forecast a significant increase in the cost of water transfer in 2015-16.

[16] Melbourne Water, 2016 Price Submission, p. 40.

Figure 4.5: Water opex by category ($m, 01/01/2015)



Melbourne Water provided further information about the main drivers of cost increases in both Water Production and Storage and Water Transfer:

- **Reallocation of corporate costs accounts for $7.3 million increase** in Water Production and Storage, and Water Transfer costs. This cost has been offset by an equivalent decrease in corporate costs for other parts of the business.

Table 4.7: Corporate cost reallocation 2014-15, ($m, 01/01/2015)

Sub-category	Actual based on old allocation rates	Actual based on revised allocation rates	Variance
Production & Storage	22.9	26.3	3.4
Water Transfer	14.6	18.5	3.9
Total			**7.3**

Source: Melbourne Water

- **Energy cost increases accounts for $5.3 million** of the increase in Water Production and Storage, and Water Transfer costs. Melbourne Water advised that for water this is largely driven by significant import volume increases at Yering Gorge due to increased water pumping at Winneke/Yering Gorge. Melbourne Water further advised that Winneke is the business's third highest electricity consuming site and that actual electricity consumption for the period July to October 2015 (i.e. first four months in the 2015-16 year) has surpassed electricity consumption for the 2014-15 year at that site.
- **Reallocation of Land Tax costs accounts for $4.4 million** of the increase in Water Production and Storage, and Water Transfer costs (see Table 4.8). As per the corporate cost reallocation, this cost has been offset by decreased land tax costs for other parts of the business.

Table 4.8: Land tax cost reallocation 2014-15, ($m, 01/01/2015)

Sub-category	2014-15	2015-16	Change
Production & Storage	3.6	6.4	2.8
Water Transfer	2.1	3.7	1.6
Total	**5.7**	**10.1**	**4.4**

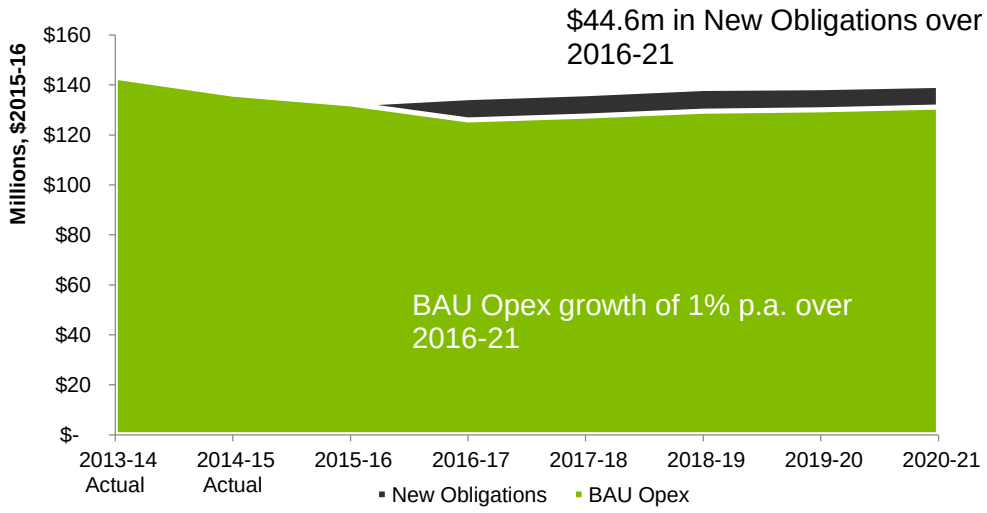
Source: Melbourne Water

Overall, Melbourne Water is forecasting a real growth rate of 1% per annum in water opex over the 2016-21 period, which is driven by increases in energy (some of which are New Obligations), and reallocations of land tax and corporate. Aside from our concerns relating to rising energy costs discussed in section 4.4.3, the forecasts appear reasonable.

4.3.2 Sewerage

Melbourne Water's sewerage opex includes operations and maintenance activities at the WTP and ETP, which treat over 90% of Melbourne's sewerage. The biggest cost components are labour (including contracted labour or External Services) making up 53% of sewerage opex over the 2016-21 period, and energy which makes up 26%.[17]

Figure 4.6: Sewerage BAU Opex and new obligations ($m, 01/01/2015)

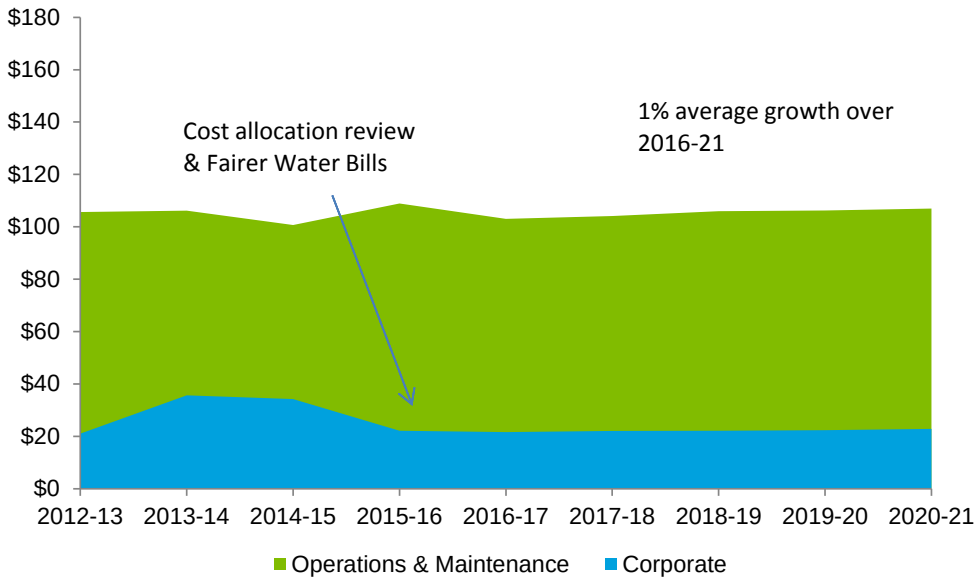


Source: Melbourne Water, 2016 Price Submission, p. 58 and underlying excel files provided by Melbourne Water; 2016 price submission template

Melbourne Water has identified the purchase of a proportion of its renewable energy as a new obligation, based on the results of a customer survey. This contributes $44.6 million to sewerage costs over the fourth regulatory period, as Melbourne Water's energy costs are largely incurred in its sewerage operations. Energy costs are discussed in more detail in section 4.4.3.

Excluding the new obligations associated with renewable energy, Melbourne Water's total opex for sewerage is forecast to grow at 1% per annum. This growth is also affected by renewable and black energy costs, of which a large proportion is included in baseline expenditure. Expected efficiencies and the reallocation of corporate costs are also impacting the trend in sewerage opex in recent years, as shown in Figure 4.7.

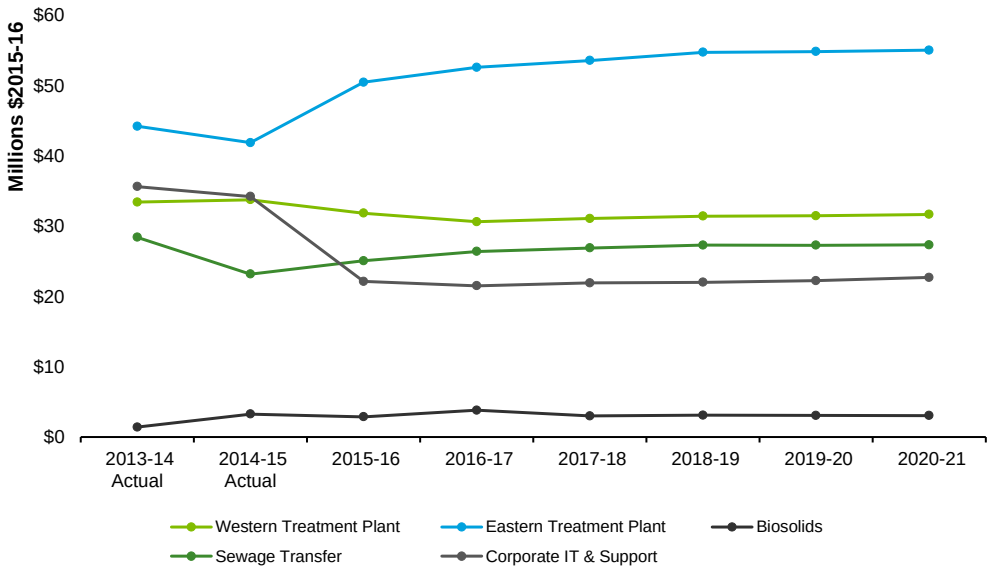
Figure 4.7: Sewerage Opex - excluding New Obligations ($m, 01/01/2015)



Source: Melbourne Water, 2016 Price Submission, 2016 price submission template

In reviewing its cost allocations, Melbourne Water increased the proportion of cost directly attributable to the ETP from 2015-16, as shown in the figure below. In addition there was also an underlying increase in ETP opex of $3 million (7%) between 2014-15 and 2015-16.

Figure 4.8: Sewerage opex by category ($m, 01/01/2015)



Source: Melbourne Water, 2016 Price Submission, p. 58 and underlying excel files provided by Melbourne Water.

Melbourne Water provided the following explanation for the increase in ETP opex.

Table 4.9: Drivers of ETP opex growth over 2014-15

Drivers of cost increase - ETP	
$0.5 million – Tertiary Treatment Plant maintenance	The ETP Tertiary Treatment Plant is entering the third year of its operation and is now beginning to see an increase in the expected repair costs of its large plant and equipment. These units have now reached a stage where Melbourne Water is refurbishing major components rather than just monitoring through condition based assessments.
$0.7 million - Power Station maintenance and solids management	Power Station Maintenance: Due to the ageing assets and condition of the engines in the Power Station, the frequency of major services needs to be increased to maintain levels of service. The increased major service frequency is expected to increase the repair costs for the engines over the final five years of their asset life. The risk of failing to appropriately maintain these engines into the future is an increase in the import electricity costs for the plant's operation. Onsite generated electricity is about two thirds the cost of imported electricity. Solids Management: The limited solids handling capacity of the facility requires an increase the in cleaning of plant and equipment and the annual desludging of the supernatant holding basins. The

	reason for this increase in frequency is that the supernatant holding basins are being used to relieve the impact on overloaded treatment processes. This increased desludging regime is expected to continue until the planned digester augmentation, giving greater solids handling capacity (as per the ETP Sludge Digestion Augmentation Project, discussed in section 5.3.1).
$0.25 million - Digester cleaning	The annual maintenance requirement is for two digesters to be cleaned per year. In 2014-15 only one digester was cleaned due to operation constraints (North Yarra Main Renewal project diverted sewage to ETP for construction works). The ongoing forecast is based on returning to the scheduled maintenance program.
$0.35 million – Sludge Handling	Sludge handling costs vary each year based on climatic conditions. In wet years we can spend in excess of $2M in harvesting costs. In dryer years as low as $1.2M. 2014-15 was a dry year. The forecast is based on an averaged the cost for the past 5 years.
$0.4 million – Chemicals	As discussed in section 4.4.4, the chemicals used in ETP can vary significantly from year to year depending on the quantity and quality of sewage entering the plant as well as equipment availability. The budget allocation is based on first principles for baseline chemical consumption with allowances for a nominal average operational upset event frequency. These nominal average operational upset events necessitate further chemical consumption to ensure treatment objectives are met. The frequency of upset events is estimated based on historic experience. This is based on a nominal average frequency of a particular upset event rather than the highest frequency for any given period. Examples of upset events include high flow associated with wet weather, asset breakdowns, power interruptions and planned capital works. 2014/15 was a year with relatively few operational upset events and therefore optimised chemical consumption, but such favourable conditions are not expected to continue throughout the period.
$0.8 million - Other	PCS7 Control System Support ($200K): Ongoing maintenance of the control system at ETP through the Synertec contract, covering call outs, break downs and ongoing improvements to the control system. The budget is based on averaged forecast as these items vary year-to-year depending on the number of call outs, and breakdowns in the system. Investigations ($300K): Detailed investigations as part of the asset condition based program, to enable better optimization of the options and timing of the renewals program. Asbestos program (200K): Increasing amount of auditing and removal of asbestos to ensure Melbourne Water can meet risk management requirements and obligations.

	HAZID procedure implementation ($100K): Following recent revisions to the procedures, costs have increased to meet requirements regarding the review of the regulatory hazards sites.

Source: Melbourne Water Responses to Questions – Q131, 14 December 2015.

As the figure above demonstrates, after a $5 million reduction in 2014-15, Melbourne Water forecasts sewage transfer opex to increase to almost its 2013-14 levels by 2020-21. Melbourne Water provided the following reasons for the increase in sewage transfer opex:

- Energy cost increases ($1.8 million) – discussed in section 4.4.3
- Land tax returning to historical levels after rebates ($0.5 million)
- External services labour contract costs ($0.9 million) – including increased civil maintenance costs, investigations into the asset condition based program, routine head space testing.

Overall, Melbourne Water forecasts a real growth of 1% per annum in sewerage opex over the 2016-21 period, driven by increases in energy (some of which are New Obligations), labour and contract or External Services costs. Bearing in mind growth in customer numbers and treatment volumes and putting aside our concerns relating to rising energy costs discussed in section 4.4.3, the forecasts appear reasonable.

4.3.3 Waterways and drainage

Melbourne Water forecasts $632 million in total waterways and drainage opex (including diversions) over the next regulatory period, and $15 million in new obligations including pollution response, waterways maintenance and diversions.

Melbourne Water's total opex for waterways and drainage is forecast to grow at 1.6% per annum over the period excluding the new obligations, and 2.1% per annum including new obligations. Growth in the final year of the period picks up to 3.0% due to growth in maintenance costs (excluding new obligations or 3.4% including new obligation), driven largely by the need for services to greenfields developments.

Figure 4.9: Waterways and drainage and new obligations ($m, 01/01/2015)

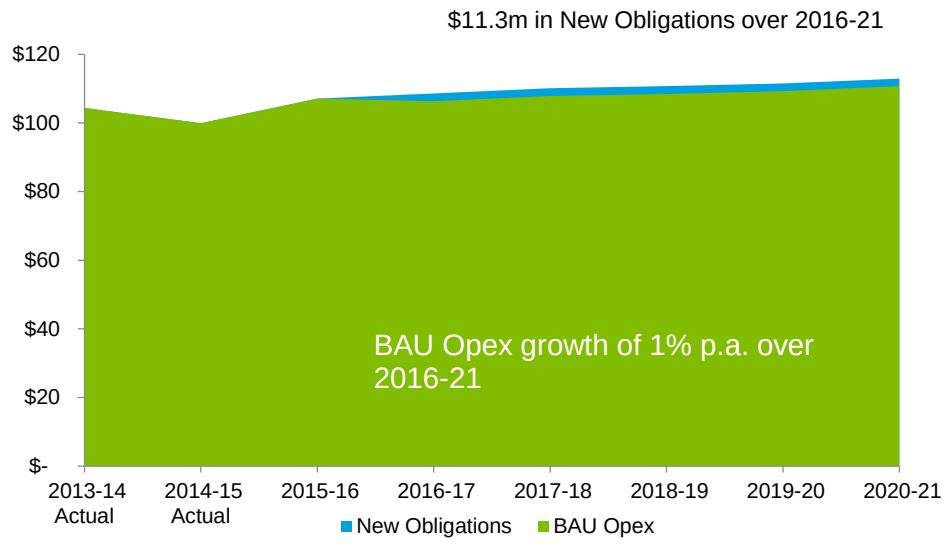
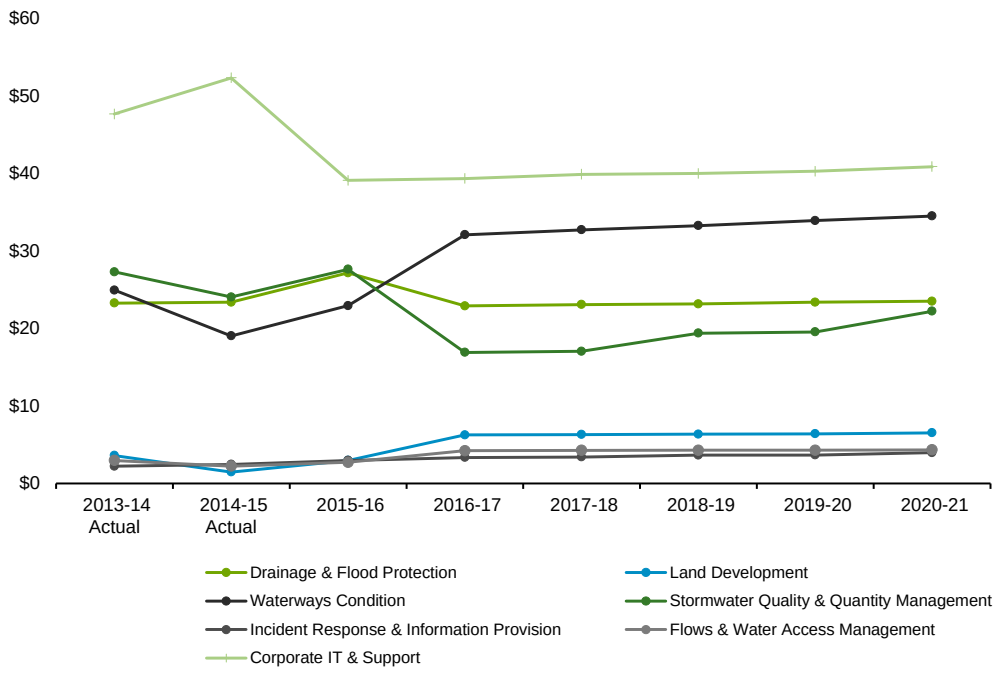


Figure 4.10 provides a breakdown of waterways and drainage opex by activity type. Following a decline in waterways condition expenditure in 2014-15, 2015-16 and 2016-17 are forecast to see notable expenditure increases, partially offset by forecast declines in drainage and flood protection and stormwater quality and quantity management in 2016-17.

Figure 4.10: Waterways and drainage opex by category ($m, 01/01/2015)



Source: Melbourne Water, 2016 price submission template

Waterways and drainage expenditure was low relative to past levels in 2014-15 but is forecast to increase gradually to $135.8 million (an increase of $11 million) by the end of the regulatory period. Melbourne Water explained that expenditure was low in 2014-15 due to:

- $7.8 million related to slowing spend to achieve the FWB efficiency target, including an underspend in maintenance ($4.7 million) and in-housing some maintenance staff; and
- $6 million related to the cost allocation review, which resulted in direct costs being attributed to cost centres on the basis of FTEs, and which sees more costs attributed to waterways and drainage rather than corporate cost centre in 2015-16.

Melbourne Water stated that waterway condition management, stormwater quality and quantity management and flood risk management services are obligations (including the direction of the SEPP WoV and the Victorian Waterway Management Strategy) and that service standards are determined by customer preferences and willingness to pay.[18]

In the lead up to the 2016 Price Submission, Melbourne Water consulted with customers about waterways and drainage services, which included a willingness-to-pay study conducted by The La Trobe University.[19] It indicated to Melbourne Water that 65% of respondents are willing to pay the existing Waterways and Drainage Charge of $95. Moreover, the survey indicated a willingness to pay for ecological and amenity improvements although greater value is placed on ecological improvements. For waterways condition, Melbourne Water has proposed increased investment to directly improve up to 30ha of green space for shade and cooling and naturalise concrete drainage channels for improved ecology and amenity. We also note that in Melbourne Water's 2014 Community Perceptions of Waterways study, the business received a community satisfaction rating of 86% for waterways in greater Melbourne.

The forecast $15 million in new obligations over the fourth regulatory period includes pollution clean-up, waterways and drainage maintenance above the growth allowance and diversions. See section 4.2.4 for our assessment of these items.

Although forecast to grow around 1.3% above the 'growth allowance' across the regulatory period (including new obligations), Melbourne Water's forecast increase in waterways and drainage opex is slower than cumulative growth in assets over the period (5.5% each year). We understand that increased maintenance of new waterways and drainage assets is a key cost driver for the next regulatory (driven by development), but that Melbourne Water has made some cost savings by in-housing and re-scoping some maintenance activities for the period.

Notwithstanding our earlier recommendation for pollution response expenditure, we accept Melbourne water's explanation for waterways and drainage forecast expenditure without adjustment.

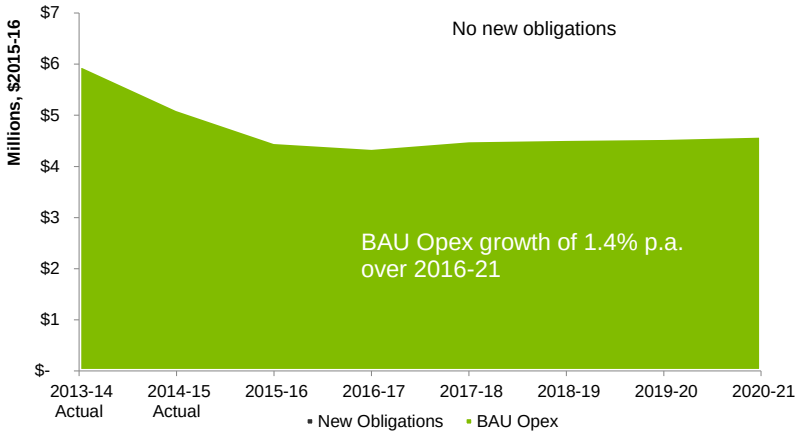
4.3.4 Recycled water

[18] Melbourne Water, Waterways and Drainage Investment Plan, p. 12.

[19] Price Submission, pp 68-69.

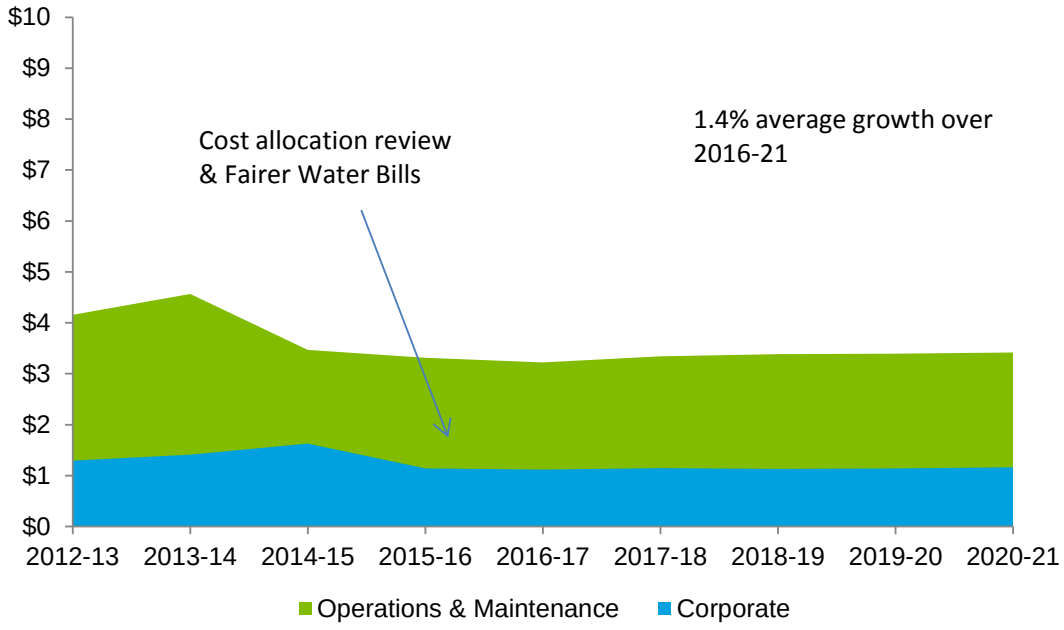
Melbourne Water supplies recycled water from the WTP and ETP to a range of customers, including retailers and agricultural operators. The biggest cost components are labour (71% of opex) and energy (11% of opex).[20]

Figure 4.11: Recycled Water opex ($m, 01/01/2015)



Similar to the other services, the revisions to Melbourne Water's cost allocation approach in 2014-15 resulted in a reduction in corporate costs allocated to recycled water, as shown in the following graph. This change also coincided with efficiencies sought under the FWB initiative.

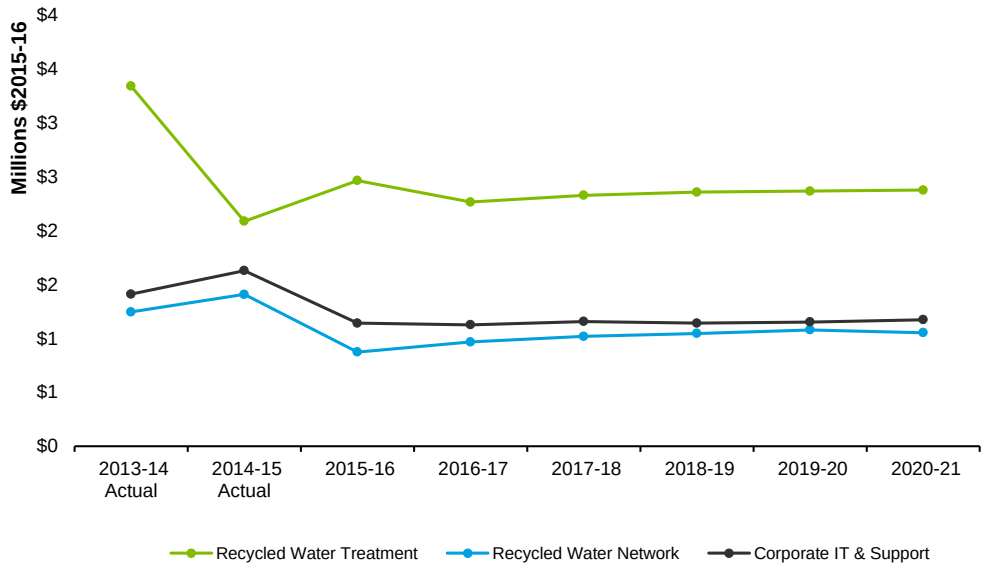
Figure 4.12: Recycled Water Opex ($m, 01/01/2015)



[20] Melbourne Water, 2016 Price Submission, p. 83.

Over the fourth regulatory period, Melbourne Water's forecast increase in recycled water costs is driven by increases in treatment costs, due to energy and labour cost increases. Melbourne Water has not identified any new obligations or cost escalation for recycled water (the new obligation associated with renewable energy has been allocated between Water and Sewerage services).

Figure 4.13: Recycled Water opex by category ($m, 01/01/2015)



Overall, Melbourne Water has forecast 1.4% of real growth in recycled water costs over the fourth regulatory period. This does not appear unreasonable, putting aside our concerns relating to rising energy costs discussed in section 4.4.3.

4.4 Assessment by expenditure type

4.4.1 Labour

Over the year to March 2015, Victorian utilities' wages grew 3.3%, higher than the national utilities Wage Price Index (WPI).[21] We note that growth in Victorian utilities' WPI lagged the national equivalent for much of the past decade and the last few years have been a period of catch-up.

Table 4.10 reflects Melbourne Water's forecasts for wages growth of 3.3% (in nominal terms) each year over the next regulatory period, or an average 0.7% per annum in real terms,[22] although total labour costs are projected to grow by 0.6% per annum in real terms. Melbourne Water advised that this is consistent with its enterprise agreement, and that

[21] Deloitte Access Economics, 2015, *Forecast growth in labour costs in NEM regions of Australia*, p. 50.

[22] Melbourne Water Price Submission, p. 19.

offsetting savings also formed part of the enterprise agreement, including a nine-day fortnight.[23]

Table 4.10: Melbourne Water's forecast FTEs and labour costs for the fourth regulatory period, ($m, 01/01/2015)

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
FTEs (number)	812	899	901	901	901	901	901	901
Labour costs ($m)	104.9	107.4	113	112.2	113.3	114.2	115.2	116.3
Change (per cent)		2.4	5.2	-0.7	1.0	0.8	0.9	1.0

Source: Melbourne Water price submission

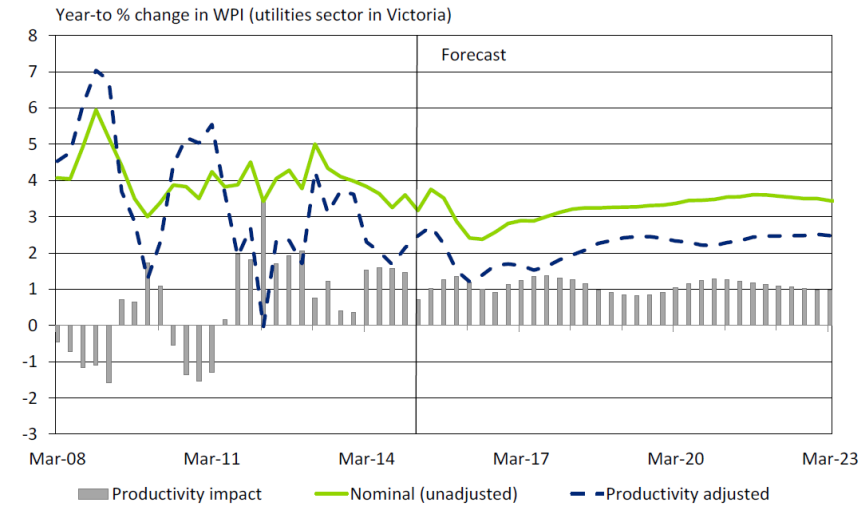
Melbourne Water confirmed that its EBA expires on 30 June 2016, and that work has not yet begun on the new agreement. It further confirmed that:

- The growth in FTE from 2013-14 is due to the in-housing of previously outsourced maintenance activity during mid-2015, and wages for those new employees are expensed;
- The current EBA allows for a 2.5% increase with an additional 0.5% possible if KPIs contained in the agreement are achieved;
- The accepted increase in the Victorian Public Service is 2.5%, but up to 3% is being negotiated where a Service Delivery Partnership Plan is agreed between the department and the unions;
- Melbourne Water expects the forthcoming EBA will be in line with the current EBA.

In assessing Melbourne Water's forecasts for wage escalation, we note that the forecasts are consistent with DAE's forecasts for the Australian Energy Regulator (AER) for the Victorian utilities sector, as shown in Chart 4.1.

[23] Melbourne Water Price Submission, p. 20.

Chart 4.1: Victoria utilities WPI forecasts

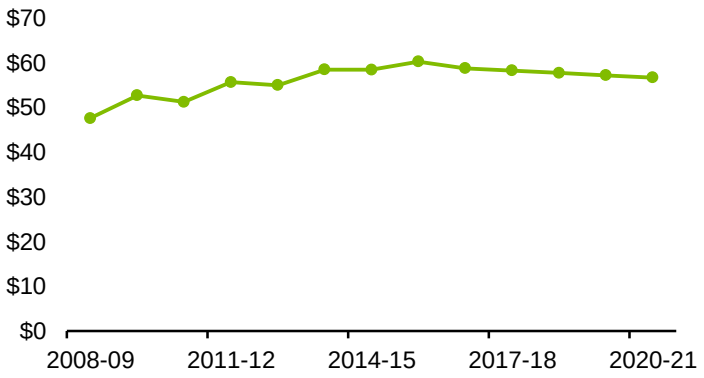


Source: ABS, Deloitte Access Economics estimates, Deloitte Access Economics' labour cost model

Melbourne Water undertook an activity review across its business units in 2014, leading to a number of redundancies in 2014-15 and 2015-16. It forecasts the number of Full Time Equivalent (FTE) employees to remain relatively flat over the next regulatory period, at 901 FTEs on average.

We note that having increased gradually over the third regulatory period, labour costs per customer are projected to decline slightly over the next regulatory period because FTEs are projected to remain flat.

Chart 4.2: Melbourne Water Labour costs per customer



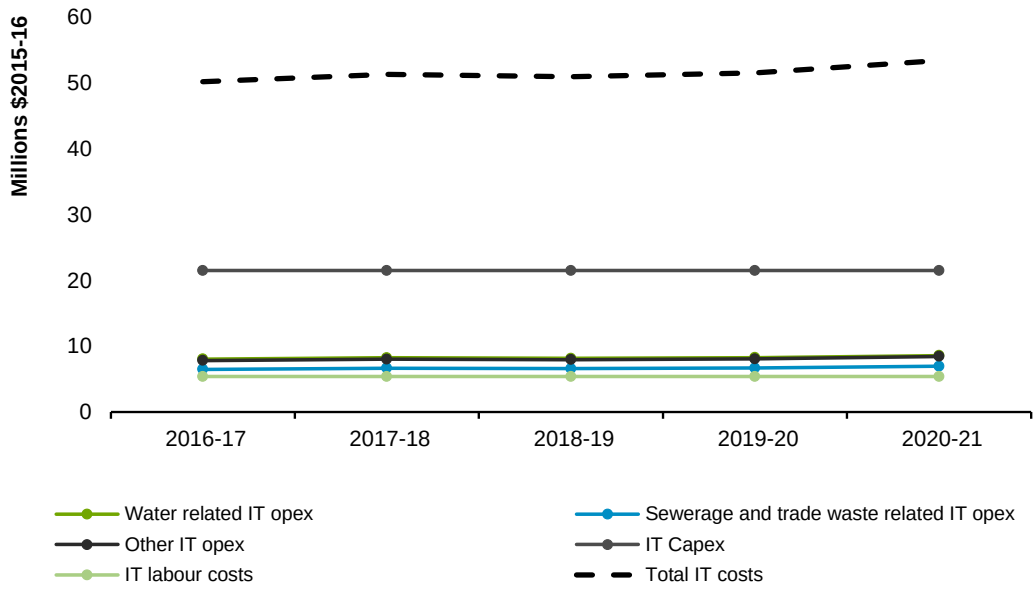
Source: Melbourne Water price submission, ESC. Note: Customer numbers are water customers.

We proposed an adjustment to redundancy expenditure for the baseline year (see section 4.2.2), but this aside, Melbourne Water's forecasts for labour appear reasonable, and propose no further adjustments.

4.4.2 IT costs

Melbourne Water has forecast an average increase in IT opex of 1.8% per annum over 2016-21. It indicated that this was associated with a shift to cloud computing, and would be offset by a reduction in capex, although we note IT capex is forecast to remain constant at $21.5 million per annum over the fourth regulatory period.[24] Total IT costs, broken down into IT opex by service, IT capex and IT labour are presented in the following graph.

Figure 4.14: IT Expenditure – Opex, Capex and Labour ($m, 01/01/2015)



Source: Melbourne Water Price Submission p 22, 2016 price submission template, IT labour costs provided in response to Q78 on 1 December.

Growth in Melbourne Water's IT opex from 2014-15 to 2015-16 was $2 million, and associated with a range of costs, including:

- Upgrades to the Asset Management System
- Cloud backup costs
- Support for Customer Resource Management and Development Services Systems.

These costs are associated with Melbourne Water's Digital Business Transformation Strategy (DBTS) which was developed in 2014 and is currently being refreshed. While the DBTS proposes a comprehensive change to the way in which Melbourne Water designs and develops its IT and customer interface systems, the overarching strategy appears to involve implementing the transformation within its existing budgets and to seek minimal increases where benefits can be demonstrated.[25]

[24] Melbourne Water, 2016 Price Submission, p. 22.

[25] *Melbourne Water Digital Business Transformation Strategy* – Final, December 2014, p. 14-15.

In the fourth regulatory period, the biggest increase in opex is associated with the re-tendering of external labour services in 2019-20 (forecast at $900,000).

For IT capex, Melbourne Water has forecast $11.2 million for renewals and $10.3 million for improved service.[26] In relation to substitution opportunities between IT opex and capex, Melbourne Water indicated that further substitution may occur during the fourth regulatory period with its further adoption of cloud technology.[27]

IT cost benchmarking

Melbourne Water provided a report it commissioned from KPMG which benchmarked its IT opex and capex against 13 electricity, 9 gas and 1 water distribution utility (SA Water).[28]

- Melbourne Water's total IT expenditure (capex and opex – totex) as a proportion of all expenditure is forecast to remain around 5%, which is below the forecast benchmark average of 10%.
- Melbourne Water's IT totex per customer (property or household) is forecast around $26, which is below the benchmark average of $60-65. IT capex and opex per customer are also substantially below the benchmark average, which likely reflects the larger scale of Melbourne Water's bulk supply business when compared to utilities supplying a smaller network area.
- Melbourne Water's IT capex as a proportion of total capex is approximately 3.5%, which is below the industry mean of approximately 6-7%.
- IT opex makes up a growing proportion of total Melbourne Water opex, and is forecast to exceed the industry average by 2021. However, this is likely to be affected by overall declining opex (including VDP).
- On a per employee basis, Melbourne Water's total IT expenditure is significantly higher than the industry average, at $24,000 to $30,000 per employee over the regulatory period, compared to an industry average of $15,000. IT costs per end user of IT services are also forecast to be slightly higher than the industry average of $13,000.

We reviewed the benchmarks against our internal confidential database and confirmed that the average costs reported by KPMG are reasonably reflective of electricity utility averages. However, we note that:

- The benchmark sample was heavily influenced by electricity distributors and included only one other water utility;
- As a bulk service provider, Melbourne Water has relatively fewer employees than SA Water and the electricity distribution businesses which make up the majority of the benchmark sample; and
- Melbourne Water does not require substantial billing or customer resource management systems for its water and sewerage customers.

In our view, the differences between Melbourne Water and the benchmark utilities are substantial, and mean that the comparisons drawn in the report are of limited value.

[26] Melbourne Water 2016 Price Submission, ESC Financial Template

[27] Melbourne Water, response to Q4, 1 December 2015.

[28] KPMG, *IT Expenditure Benchmarking for Melbourne Water*, 17 November 2015.

Conclusion

In assessing Melbourne Water's IT opex for the fourth regulatory period, we have reviewed a range of documents, including:

- Digital Business Transformation Strategy (DBTS) and the DBTS Implementation Plan, developed in 2014
- Cloud Adoption Strategy – explaining the rationale for shifting to the cloud, which began in 2014
- Digital Steering Committee Charter – setting out the decision making process for investments in IT
- KPMG's IT Expenditure Benchmarking for Melbourne Water, prepared in November 2015
- Responses to our written questions on IT costs, including a detailed breakdown of forecast IT opex.

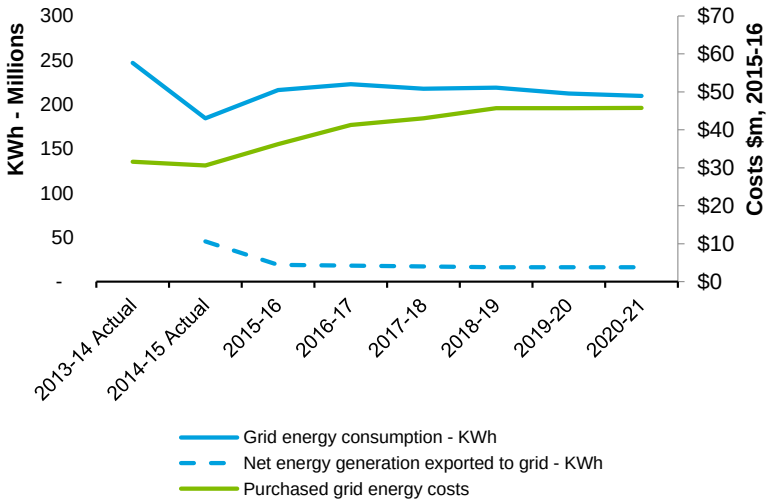
Our view is that Melbourne Water's forecast of IT costs appears reasonable, considering the digital transformation strategy it is implementing and the potential gains in productivity that it can bring.

4.4.3 Electricity costs and green energy

Melbourne Water's energy costs are a key driver for its opex growth over the fourth regulatory period, with total costs forecast to increase by 11% or $4.4 million per annum by 2020-21. This increase is not associated with growing energy consumption (which is declining), but instead is caused by rising costs per unit of electricity consumed (MWh). Electricity generation from Melbourne Water's properties is forecast to remain stable.

Figure 4.15 presents Melbourne Water's actual and forecast electricity consumption imported from the grid, as well as the net electricity which is generated onsite and exported to the grid. Melbourne Water also generates electricity which is consumed at its treatment plants and some smaller sites. For the purposes of our opex assessment, we have focused on Melbourne Water's energy contract which covers the cost of energy imported from the grid and the net energy exported to the grid.

Figure 4.15: Electricity costs – Grid consumption (KWh) and costs ($m, 01/01/2015)

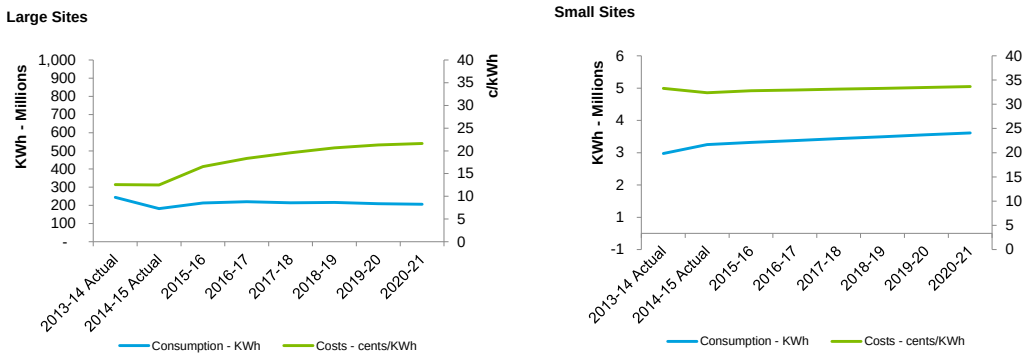


The increase in energy costs and grid energy consumption from 2015-16 is associated with both a reduction in onsite generation at WTP due to a damaged lagoon cover, increased consumption at Yering Gorge, and a 7.9% increase in its energy contract rates.[29] We note that 2014-15 was an unusually low grid energy consumption year, coinciding with higher energy exports.

Melbourne Water indicated that the fall in net energy generation exported to the grid from 2016-17 is associated with lower hydroelectricity generation due to lower actual and expected flows, pressures and availability of water during the fourth regulatory period.

Most of the increase in energy costs is being incurred at Melbourne Water's large sites, as shown in the following graphs.

Figure 4.16: Electricity costs – Small and Large Sites– Grid energy consumption (KWh) and costs ($m, 01/01/2015)



[29] Melbourne Water, Response to Question 3; Melbourne Water, Presentation to DAE and Arup, 26 November 2015, Slide 37

It is difficult to compare Melbourne Water's energy contract with other similar PPAs, because such information is typically commercially sensitive and highly confidential, and also because Melbourne Water's contract is complex, incorporating a range of features which contribute to the overall price. However, it is clear that contractual prices being paid by Melbourne Water are substantially higher than current market rates. For example, it is instructive to consider public information relating to a recent PPA between the Ararat Wind Farm and the ACT Government, which was agreed on the basis of a fixed price of $87/MWh (bundled energy and RECs) for 20 years, with no escalation for inflation.[30] The following graph presents this comparison, along with the relationship between renewable energy proportion and contract price.

We acknowledge that the circumstances under which Melbourne Water entered into its energy contract in 2009 were significantly different from those on which the Ararat Wind Farm contract was signed in June 2015, and that Melbourne Water's energy needs are likely to be different from those of the ACT Government. Despite this, in our view, the 65% (rising to 100%) price premium in the Melbourne Water energy contract is concerning.

4.4.3.2 Contract establishment

Before entering into the PPA, Melbourne Water undertook a competitive Expression of Interest and then Request for Tender process, in which six energy suppliers provided a final quote. Melbourne Water sought professional advice throughout the assessment process from a panel of experts. It selected the AGL contract on the basis of 33 evaluation criteria, including:

- Is the Proponent able to meet MWC's future variable electricity requirements?
- Is the Proponent able to meet MWC's future variable REC requirements?
- Is there flexibility to adapt to uncertainty in future consumptions, sites, major projects and policy scenarios?
- Is the product carbon inclusive? Have all legislative risks been removed from MWC?[31]

The contract length options were specified in the Request for Tender as 15, 20 or 25 years. Melbourne Water has indicated that these contract lengths were chosen following information received during the Expression of Interest phase, and reflected the fact that it was seeking to bundle RECs and energy supply to meet its overall requirements for both energy and to address its carbon emissions liability, and that such bundling provided the cheapest, lowest price volatility option. We note that the contract is significantly longer than the three year energy supply contracts typically entered into by the Victorian water businesses.

Overall, the process that Melbourne Water undertook to establish the energy contract appears reasonable, particularly given the expert advice it sought in assessing the proposals. However, our experience suggests that even at that time it was quite unusual for such contracts to encompass carbon price insulation, and that the contract price appears to incorporate a substantial premium for this feature. Further the contract is much longer than other typical contracts. We note that the other Victorian water businesses typically enter into contracts of three years duration.

[30] See: http://reneweconomy.com.au/2015/plunging-cost-of-renewables-act-wind-auction-goes-at-81-50mwh-98344

[31] Melbourne Water, Response to Question 88 – Tender Analysis Criteria.

Melbourne Water's energy costs associated with this contract have previously been reviewed by the ESC. The ESC's 2013 determination did not approve Melbourne Water's forecast energy costs, and instead approved a benchmark 'black' (i.e. non-renewable) electricity cost.[32] In response, Melbourne Water decided to sell RECs to give customers price relief, effectively reducing its renewable energy proportion.[33]

Melbourne Water's 2016 Price Submission indicates that it has now recommitted to its contract of 100% renewable energy and ceased its policy of selling RECs. We note that recent volatility in REC prices may have reduced the attractiveness of the strategy of selling RECs acquired under its energy contract, although REC prices are currently high.

4.4.3.3 Customer willingness to pay

In 2008, before entering its current energy contract, Melbourne Water commissioned a study which tested customer willingness to pay '$2 per property per year' for renewable energy during the second regulatory period, and '$4 per customer per year' during the third regulatory period.[34] The study found a strong willingness to pay to reduce Melbourne Water's greenhouse gas reductions, and was submitted to the ESC to support Melbourne Water's 2013 Price Submission.

For its 2016 Price Submission, Melbourne Water incorporated one question relating to renewable energy in a quantitative online customer survey of 801 residential customers of the three Melbourne urban retailers, which was conducted in late August/early September 2015. The relevant question is presented in Figure 4.18.

[32] ESC, Price Review 2013: Greater Metropolitan Water Businesses - Final Decision, June 2013, p. 69.

[33] PwC, Review of Metropolitan Melbourne's water companies' proposed expenditure, Final Findings, April 2013, Appendix A.

[34] The Klein Partnership (TKP), *Melbourne Water Community Research Customer Willingness to Pay Greenhouse Gas Emissions Reduction*, 21 November 2008.

Figure 4.17: Melbourne Water Online Customer Survey – Renewable Energy Question

30. Melbourne Water generates renewable electricity at its sites (eg hydro-electric generation at dams) and purchases additional electricity for use in operations. To reduce its impact on climate change and help make its service more environmentally responsible, Melbourne Water has entered into an agreement to purchase renewable electricity, to reduce the greenhouse gases emitted through delivering its services. In 2016-17, Melbourne Water plans to purchase 75% of its additional electricity needs through renewable sources, then 85% in 2017-18, and 100% from 2018-19.

The cost per customer per year (for the next five-year period) is shown in the table below, with examples for different types of customers.

Customer	Water Use	Cost per year (2016/17 – 2020/21)
Average (all)	**450 litres per day**	**$5.10**
Home owner	Low (300 litres / day)	$4.02
	Average (450 litres / day)	$5.10
	High (600 litres / day)	$6.25
Tenant	Low (300 litres / day)	$1.62
	Average (450 litres / day)	$2.69
	High (600 litres / day)	$3.84

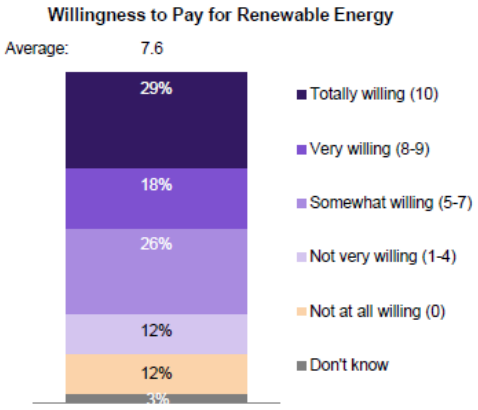
Please indicate how willing you are to pay this amount on the scale below.

Not at all willing										Totally willing	Don't know
0	1	2	3	4	5	6	7	8	9	10	11

Source: Newgate Research, Melbourne Water – 2016 Price Review – Deliberative Consultation Research Report, 27 October 2015.

The results of the survey, presented in the Figure 4.19, were interpreted by Melbourne Water as 'overall willingness to pay was quite high with an average customer rating of 7.6 out of 10.'[35]

Figure 4.18: Melbourne Water Online Customer Survey – Renewable Energy Question – Survey Results



Source: Newgate Research, Melbourne Water – 2016 Price Review – Deliberative Consultation Research Report, 27 October 2015.

[35] Melbourne Water, Price Submission, p. 25.

We note that while the average result was 7.6, only 48% of customers surveyed were more than 'somewhat willing' to pay the premium outlined. We also note that preferences stated in willingness to pay studies often tend to be overstated, and that actual willingness to pay is often assumed to be lower than stated preference.

Further, there is some ambiguity in the customer survey about what premium customers were responding to (given that a number of premia were given in the question).

Subsequent to the September 2015 survey, which tested an average price premium of $5.10 per residential customer per year based on $55.8 million premium over the fourth regulatory period, Melbourne Water revised its forecast of the price premium for renewable energy, increasing it to $76.2 million.[36]

Melbourne Water's $55.8 million price premium translates to $5.10 for approximately 2.2 million customers. However, the metropolitan water retailers together have approximately 1.7 million residential sewerage customers, whose prices reflect the majority of Melbourne Water's energy costs. Dividing Melbourne Water's $55.8 million price premium by 1.7 million retail residential sewerage customers suggests an average per customer premium of $6.56 per annum over the fourth regulatory period.

Melbourne Water's post-survey revised forecast of the price premium for renewable energy of $76.2 million translates to $8.94 per retail sewerage customer per annum over the fourth regulatory period, which is 75% higher than the $5.10 per customer tested with residential customers.

Melbourne Water has included the total forecast cost of its energy contract in its opex forecast for 2016-17 to 2020-21, and separated the proportion of the 'renewable energy premium' tested in the survey ($55.8 million over the regulatory period) from the rest of the energy costs by labelling it as a New Obligation, driven by customer preference.

The price premium for renewable energy was calculated by Melbourne Water based on an equivalent non-renewable energy market rate. It is not clear how Melbourne Water estimated this equivalent rate, given the complexity of its contract which also allows for renewable energy to be exported to the grid at an equivalent rate. Overall, Melbourne Water estimated that the increasing proportion of renewable energy is resulting in a 110% price premium in 2016-17, reducing to 102% in 2020-21.

4.4.3.4 Conclusions - renewable energy

We acknowledge that it is extremely difficult to evaluate the prudency and efficiency of contracts which were entered into in market and policy circumstances which have since evolved so substantially. We also acknowledge the competitive tender process Melbourne Water undertook in 2009 and the expert advice it sought in evaluating the contract.

We note that Melbourne Water has confirmed that exiting the contract would result in it paying an early termination fee. Overall, Melbourne Water considers it is prudent to remain in the existing contract as the early termination fee would result in costs that exceed the current contract costs.

[36] Melbourne Water, Price Submission, p. 26.

While this may be correct, we remain concerned that:

- The contract price is substantially higher than market rates
- Customers are being asked to pay an amount that is 50% higher than that canvased in the customer survey.

Overall, it is our view that the price premium which Melbourne Water must pay for its energy contract should not be entirely paid by customers. In particular, we are concerned that the amount Melbourne Water tested with customers through its survey question is significantly less than the actual costs being incurred by Melbourne Water over and above equivalent market rates.

Noting that the prudency of Melbourne Water's decision to purchase renewable energy is affected by a range of factors, including the various changing Victorian and Australian Government policies, customer willingness to pay, and relevant market and contract prices for renewable and non-renewable energy, there are several options to consider when determining an efficient allowance for Melbourne Water's wholesale energy costs. These include:

- Appropriate proportion of renewable energy (if any), given current Government policies, relative costs and customer willingness to pay
- Efficient costs of renewable and non-renewable energy generation, given recent market activity and forecasts of wholesale prices and feed in tariff rates for renewable energy. For example, the ESC's 2016 determination on the Minimum Electricity Feed-in Tariff to apply in 2016, which is based on an assumed wholesale energy cost of $40.19/MWh, and determined a minimum feed in tariff of $50/MWh.[37] By comparison, the Ararat Wind Farm PPA discussed above is based on an agreed rate of $87/MWh
- Appropriate assumptions on credits for forecast on-site generation, noting that Melbourne Water's current contract rate is higher than the ESC's solar feed in tariff rate for 2016.
- The fact that Melbourne Water entered into the contract some time ago.

Table 4.11 provides some context around the impact of these factors on an efficient cost forecast, with reference to Melbourne Water's proposed wholesale energy cost.

[37] ESC, *Minimum Electricity Feed-In Tariff to Apply from 1 January 2016 to 31 December 2016*, August 2016, p. 16.

Table 4.11 Options for determining an efficient wholesale energy cost allowance ($m, 01/01/2015)

		2016-17	2017-18	2018-19	2019-20	2020-21	Total	Reduction on proposed costs
	Melbourne Water's proposed wholesale energy cost	28.3	28.7	30.7	29.7	29.3	**146.7**	-
1	Melbourne Water's customers' willingness to pay more for renewable energy ($5.10 per residential sewerage customer), plus MW's estimated equivalent wholesale energy costs	21.8	22.2	23.1	23.4	23.6	**14.0**	**-32.7**
2	Melbourne Water's contract renewable energy proportions priced at Ararat Wind Farm PPA ($87/MWh) plus 10% to allow for other contract benefits, wholesale energy priced at $40.19/MWh, minus credit of ESC Determined Solar FiT price for MW onsite generated energy ($50.00/MWh)	15.6	16.4	18.3	17.7	17.4	**85.3**	**-61.4**
3	20% renewable energy priced at Melbourne Water's contract rates, remainder wholesale energy purchased at ESC Determined Solar FiT price $50.00/MWh, minus credit of ESC Determined Solar FiT price for MW onsite generated energy ($50.00/MWh)	13.0	13.1	13.8	13.5	13.4	**66.6**	**- 80.1**
4	All grid energy at equivalent black energy rate, as identified by MW in its 2016 Price Submission, plus ESC Determined Solar FiT price for MW onsite generated energy	12.6	12.8	13.5	13.7	13.7	**66.3**	**- 80.4**
5	20% renewable energy priced at Melbourne Water's contract rates, remainder wholesale energy purchased at $40.19/MWh, minus credit of ESC Determined Solar FiT price for MW onsite generated energy ($50.00/MWh)	11.4	11.5	12.2	11.9	11.9	**58.9**	**- 87.8**
6	20% renewable energy priced at Ararat Wind Farm PPA (+ 10% to allow for uncertainty), wholesale energy priced at $40.19/MWh, minus credit of ESC Determined Solar FiT price for MW onsite generated energy	9.4	9.3	9.4	9.1	8.9	**46.1**	**-100.6**
7	All grid energy at $40.19, minus credit of ESC Determined Solar FiT price for MW onsite generated energy	7.2	7.1	7.2	6.9	6.8	**35.2**	**-111.5**

Source: DAE analysis.

As a lower bound, a strictly efficient allowance would reflect the benchmarked equivalent non-renewable energy rate, such as that presented in Option 7, although other options presented in Table 4.11 also reflect relevant benchmarks. However, ultimately the appropriate proportion of renewable energy that Melbourne Water's customers should be required to pay for, and any premium they should pay above market rates given the long term contract that Melbourne Water entered, are regulatory policy decisions.

Our recommendation is that the energy cost premium over and above that tested in the customer survey should not be recovered from customers. This would result in an allowance equivalent to Option 1 in the table above.

The following table outlines the impact of this recommendation on Melbourne Water's opex.

Table 4.12 Recommendation on energy costs – Reduction in opex ($m, 01/01/2015)

	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Customer willingness to pay for renewable energy ($5.10 per residential sewerage customer per annum)	$8.3	$8.5	$8.8	$8.9	$9.1	$43.5
Melbourne Water's estimated Renewable Energy total cost premium	$14.8	$15.0	$16.4	$15.2	$14.8	$76.2
Difference - recommended opex reduction	**$6.5**	**$6.5**	**$7.6**	**$6.3**	**$5.7**	**$32.7**

Source: Melbourne Water 2016 Price Submission, p. 26; DAE analysis.

4.4.3.5 Network costs

Melbourne Water's energy cost forecast incorporates significant increases in electricity network costs for the majority of its 59 network connections, which together have 56 network tariffs across the five electricity distributors in Victoria. Overall, Melbourne Water forecast a compound average annual growth rate in network costs of 7.6%. This increase is calculated on the basis of observed network tariff changes over 2009-15.[38]

[38] Note that Melbourne Water has used a seven year average for some tariffs and a five year average growth rate for other tariffs.

Table 4.13: Electricity Network Costs – Melbourne Water forecasts ($, 01/01/2015)

	2015-16 (estimate)	2016-17	2017-18	2018-19	2019-20	2020-21
Network costs	$11,268,295	$11,972,950	$13,256,210	$14,755,619	$15,295,858	$16,025,293
% growth in network costs		*6.3%*	*10.7%*	*11.3%*	*3.7%*	*4.8%*
Small Sites & Other		$1,127,050	$1,043,790	$144,381	$704,142	$474,707
Total Network Charges, Small Sites & Other		**$13,100,000**	**$14,300,000**	**$14,900,000**	**$16,000,000**	**$16,500,000**

Source: Melbourne Water, 'Q84 – Electricity Cost Data WP4.xls' and 2016 Price Submission, p. 21.

Melbourne Water has not taken into account any other information about future network costs in developing its forecast electricity network charges.

Victorian electricity network tariffs are determined by the Australian Energy Regulator (AER) in five yearly determinations. Distribution Network tariffs for 2016-20 are currently being considered by the AER, and a preliminary determination was made on 29th of October 2015. Overall, the AER's draft position is that distribution tariffs will decline over the forecast period, largely reflecting reductions in the cost of debt but also various efficiencies. The average annual change in network tariffs across the five Victorian distributors is -3%. The AER's final determination is expected at the end of April 2016, before the ESC's final determination for Melbourne Water.

Victorian transmission network tariffs are also currently being considered by the AER, and while it is yet to release a draft position, the transmission network has also forecast an average annual tariff decline of 3% over 2017-20. AER and transmission network forecast changes in tariffs are set out in Table 4.14.

Table 4.14: Electricity Network Costs – AER Preliminary Determination – Price changes (%)

	2016-17	2017-18	2018-19	2019-20	2020-21	Average change
AusNet Services	-8.12%	-8.12%	0.00%	0.00%	0.00%	-3.25%
Jemena	-9.18%	-8.48%	-1.34%	0.64%	0.64%	-3.54%
Powercor	-7.96%	-6.75%	0.75%	0.75%	0.75%	-2.49%
CitiPower	-6.75%	-6.75%	0.45%	0.45%	0.45%	-2.43%
United Energy	-8.72%	-8.72%	0.00%	0.00%	0.00%	-3.49%
Victorian DNSPs - average annual price change						**-3.04%**
AusNet Services Transmission proposed price changes 2017-21		-10.17%	-0.62%	-0.62%	-0.62%	**-3.01%**

Source: AER PTRMS.

We reviewed Melbourne Water's network tariff pricing model and identified the specific distribution tariffs which apply to its highest energy consuming sites. We then compared Melbourne Water's forecast increase in network tariffs (based on historical movements in

prices) to the forecasts contained in the AER's Preliminary Determination, as set out in Table 4.15.

Table 4.15: Electricity Network Costs – Melbourne Water forecasts comparison with AER preliminary determination forecasts for major energy consuming sites

Melbourne Water Site	Electricity Network and Tariff	Melbourne Water forecast average annual increase (Network – Fixed component)	AER Preliminary Determination – Average annual change
Eastern Treatment Plant	United Energy - HVkVAToU	7.2%	-1.9%
Western Treatment Plant	Powercor – DH.C	12%	-1.8%
East Drop Structure	CitiPower – CG3	23%	-0.8%
Water PumpStations WP255- Yea	AusNet Services - NSP95	3%	-1.1%
Brooklyn SPS	Jemena - A400	10%	-3.1%

Source: Melbourne Water, 'Q84 – Electricity Cost Data WP4.xls' and AER Preliminary Determinations – Distributor Post Tax Revenue Models – October 2015.

In conclusion, Melbourne Water's forecast of energy network costs significantly overstates the price changes in the AER's latest determination and AusNet Services' proposal, and accordingly we consider its network costs do not reflect an efficient forecast.

We propose that a more reasonable forecast of energy network costs would be to take the average of the latest AER price forecasts for the five Victorian electricity distributors and the transmission network (-3.02%) and apply this to Melbourne Water's actual 2015-16 network costs over the 2016-17 to 2020-21 regulatory period. This results in a 27% reduction in Melbourne Water's network cost forecasts, with an impact of $19.1 million ($2015-16) over the regulatory period.

Table 4.16: DAE Recommendation – Network costs ($, 01/01/2015)

	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Melbourne Water Proposed network costs	$11,972,950	$13,256,210	$14,755,619	$15,295,858	$16,025,293	**$71,305,929**
Deloitte Recommendation	$10,126,704	$10,480,878	$10,955,887	$10,516,202	$10,157,304	**$52,236,975**
Difference	-$1,846,246	-$2,775,332	-$3,799,731	-$4,779,656	-$5,867,989	**-$19,068,954**

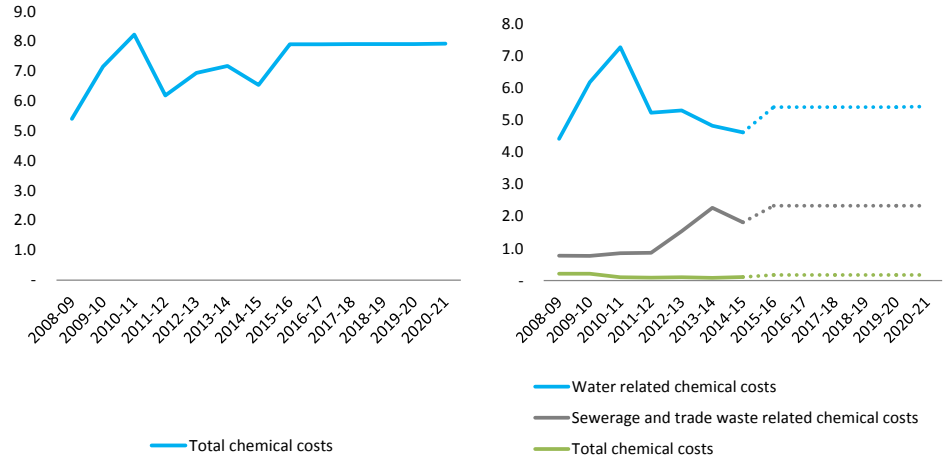
Source: DAE analysis.

We note that the Victorian distribution networks have recently responded to the AER's draft decision, proposing price increases rather than decreases. Given the AER's final determination on these revised pricing proposals will be made before the ESC's final determination for Melbourne Water's expenditure, we recommend that the ESC's final opex allowance should incorporate network costs in line with the AER's final determination rather than the distributors' revised proposals.

4.4.4 Chemicals

Figure 4.20 shows Melbourne Water's forecast for chemical costs. Total chemical costs are forecast to increase from $6.5 million in 2014-15 to $7.9 million in 2015-16 and then remain constant in real terms.

Figure 4.19: Historical and forecast cost of chemicals – total and breakdown, $ million, 2015-16



Source: Melbourne Water financial template

Melbourne Water provided additional information to explain the increase in chemical costs between 2014-15 and 2015-16. Melbourne Water has explained that it is mostly attributable to around $400,000 for the Eastern Treatment Plant and $900,000 for Water Supply. In both cases, Melbourne Water advised that 2014-15 was an unusually low chemical usage year and does not reflect chemical costs required ongoing, where forecasts are based on more average expected conditions. Melbourne Water offered further explanation:

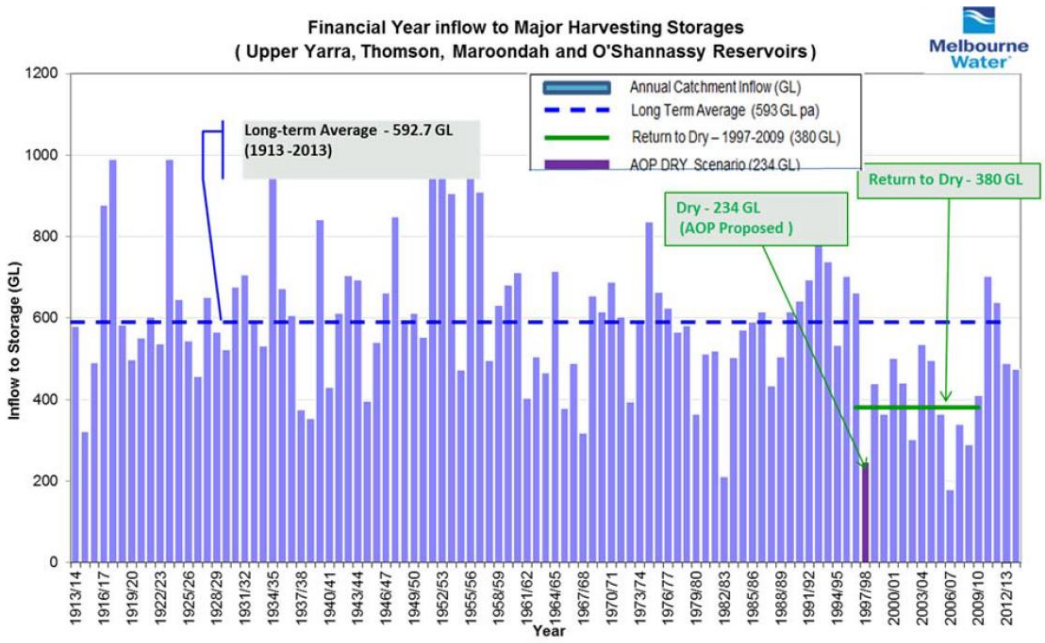
Eastern Treatment Plant

- Chemicals used in ETP can vary significantly over time depending on the quantity and quality of sewage entering the plant as well as equipment availability, and as such forecasts are based on average usage, which takes into account variability between individual years.
- Melbourne Water's forecast is based on baseline chemical consumption with allowances for an average operational upset event frequency – these events require additional chemical consumption to ensure treatment objectives are met.
- The frequency of upset events was estimated based on historic experience – Melbourne Water bases this on a nominal average frequency of a particular upset event rather than the highest frequency for any given period.
    - Examples of upset events include high flow due to wet weather, asset breakdowns, power interruptions and planned capital works.
- 2014-15 was a year with relatively few operational upset events but such favourable conditions are not expected to continue throughout the period.

Winneke Treatment Plant

- In 2014-15 water production at Winneke was reduced to 80GL to lower costs (including chemicals) as conditions allowed water to be supplied from elsewhere in the system due to high storage levels
- Melbourne Water's planning for the next regulatory period was based on current streamflow forecasts and outlooks, which assumes return to dry conditions.
- In the next regulatory period, Winneke will produce an average 100GL annually, representing full utilisation of harvest resources from the Maroondah Aqueduct and the Yarra River.
- The "return to dry" conditions scenario is based on 1997-2009 streamflows, representing a reduction from long term average inflows to Melbourne Water's catchments. It includes some drier years and El Nino events as well as some wetter years. It is shown graphically below.

Chart 4.3: Melbourne Water – water supply system inflow, GL



Source: Melbourne Water financial template. Note AOP is Annual Operating Plan.

In response to queries about whether chemical prices had fallen due to decreasing oil or commodity prices, or might be expected to fall in line with future declining electricity prices, Melbourne Water provided information on recent chemicals price changes. Although price change information for all chemicals was not yet available, data suggested that price increases in 2015-16 are likely to be below inflation, following above CPI increases in 2014-15.

Given future electricity price changes are likely to be modest at best, and that electricity prices are a key influence on the price of Melbourne Water's most costly chemical, chlorine gas, there is some likelihood that future price changes will be below inflation. At the same time, it is very difficult to precisely forecast future chemical costs.

For the purposes of this report, we have adjusted Melbourne Water's chemical costs downward by 1% in real terms each year.

Table 4.17: DAE Draft Recommendation – Chemical costs ($m, 01/01/2015)

	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Melbourne Water proposed chemical costs	7.91	7.92	7.92	7.92	7.93	39.59
DAE Final Recommendation	7.75	7.68	7.60	7.52	7.46	38.01
Difference	0.16	0.24	0.32	0.40	0.48	1.58

Source: DAE analysis.

4.4.5 Grants/incentives program

Melbourne Water's grants/incentive program allows it to form partnerships with key stakeholders such as councils, landholders and community groups to protect waterways and water quality. Melbourne Water states that this is:

> an efficient and effective as the condition of waterways is strongly influenced by catchment-level drivers that are managed at a local level by multiple agencies. For this reason, we will invest to build the capacity of responsible agencies and community organisations to deliver better outcomes for waterways condition, water quality and flood protection. Operational expenditure will increase slightly over the 2016 regulatory period."[39]

In 2013-14, expenditure for grants/incentive stepped up from around $5.2 million per annum to around $10.7 million per annum and Melbourne Water proposes expenditure of around $11.2 million each year of the next regulatory period, ($57 million for the period, including $1.2 million in labour costs for administering and evaluating the programs).

Table 4.18: Melbourne Water's grants/incentive program expenditure ($m, 01/01/2015)

Year	Expenditure
2009-10	2.41
2010-11	3.47
2011-12	4.21
2012-13	5.18
2013-14	10.75
2014-15	9.92
2015-16 forecast	10.17
Total third regulatory period	**30.84**
2016-17 forecast	11.16
2017-18 forecast	11.16
2018-19 forecast	11.16
2019-20 forecast	11.16

[39] Melbourne Water, 2016 Price Submission, p. 72.

Year	Expenditure
2020-21 forecast	11.16
Total fourth regulatory period	**55.80**

Source: Melbourne Water

Melbourne Water advised that the increase in expenditure in 2013-14 is attributed to the implementation of the Living River grants program and the ramping up of the River Health Incentive Program (particularly in the West and South East regions). These programs form the largest component of the broader grant/incentive program:

- The Living Rivers Program supports Local Councils to improve water quality through catchment solutions in support of the Stormwater Strategy objectives; and
- The River Health Incentive Program (RHIP) supports private landowners along waterways to deliver river health improvement works in support of the Healthy Waterways Strategy outcomes.

Table 4.19: Melbourne Water grants/incentive program breakdown - third regulatory period ($m, 01/01/2015)

Grants Program	2013-14	2014-15	2015-16	Total
Living Rivers	3.69	3.66	4.30	**11.65**
River Health Incentives Program	5.63	5.48	4.85	**15.96**
WaterWatch	0.13	0.09	0.14	**0.36**
Clearwater	0.67	0.39	0.21	**1.26**
Other	0.63	0.31	0.67	**1.61**
Total	**10.75**	**9.92**	**10.17**	**30.85**

Source: Melbourne Water

Table 4.20: Melbourne Water grants/incentive program breakdown - fourth regulatory ($m, 01/01/2015)

Grants Program	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Living Rivers	4.35	4.35	4.35	4.35	4.35	**21.75**
River Health Incentives Program	6.00	6.00	6.00	6.00	6.00	**29.98**
WaterWatch	0.18	0.18	0.18	0.18	0.18	**0.89**
Clearwater	0.25	0.26	0.26	0.26	0.26	**1.28**
Other	0.38	0.38	0.38	0.38	0.38	**1.91**
Total	**11.16**	**11.16**	**11.16**	**11.16**	**11.16**	**55.82**

Source: Melbourne Water

In response to our questions about the broader program, including the two largest programs (Living Rivers and the River Health Incentive Program), Melbourne Water provided further information on the activities of the programs. However, we understand from Melbourne Water that there is no business case for the broader grants/incentive program or for the individual programs under its umbrella and that the case for programs has been built up by Melbourne Water over time:

> The rationale for the grants/incentive programs is underpinned by the development of our strategies (Healthy Waterways Strategy and Stormwater Strategy) and for this pricing submission period the Waterways and Drainage Investment Plan[40]

Furthermore, Melbourne Water noted that its Stormwater Strategy states "working with local government is essential to achieving street-scale and large-scale outcomes for stormwater management" (section 6.1), and that the concept of "working together" is at the heart of the strategic approach to managing stormwater (Section 5.1).

Melbourne Water further advised that evaluations of previous programs are also used to inform the scope, focus and administration of its current programs, and that the evaluations confirm that grants/incentives are a cost effective approach to delivering the services. Evaluations for the programs that make up the bulk of proposed expenditure are discussed below.

Living Rivers evaluation (2015)

The latest evaluation of the Living Rivers program was conducted in December 2015 by GHD. The evaluation noted that:

> In practice, direct comparison of investment outcomes is complicated by the fact that strategic investments generally do not result in immediate on-the-ground beneficial outcomes for stormwater, waterways and the Bays. Rather, these investments are enabling activities that support the realisation of these outcomes through future investment.[41]

In testing the cost effectiveness of Living River investments involving Total Nitrogen (TN), reductions were benchmarked (representing 20 of the 49 Living River projects). GHD compared the weighted average cost of TN reductions achieved by Council through Living River investments to the Melbourne Water's avoided cost (i.e. the weighted average cost that would be incurred through the five wetlands that make up Melbourne Water's offset rate review, $3,936 per kg TN). The evaluation found the investments that were benchmarked (i.e. the investments involving TN reductions), have achieved the 776 TN kg per annum reduction at an estimated cost of $3,290 TN per kg, which is lower than the avoided cost ($3,936 per kg TN).

In addition, the evaluation concluded that:

- Total co-contribution from Councils has been around $23.7 million (including $21 million in on-ground structural works) for Melbourne Water's investment of $8.8 million for 105 projects – for every dollar invested by Melbourne Water the program, Councils have invested around $3.7 in contributions (cash and in kind), surpassing the Living River's dollar for dollar contribution requirement;
- Melbourne Water uses Benefit Cost Ratio (BCR) analysis to prioritise projects and maximise benefits from investment and a Multi-Criteria Analysis (MCA) tool to ensure decisions are transparent, auditable and analytically rigorous; and

[40] Melbourne Water response to query, 5 February 2016.

[41] GHD, 2015, *Living Rivers Program Review*, December, p. 42.

- GHD's evaluation shows that combined, the 20 Living River projects are more cost effective in achieving total nitrogen reductions than the Melbourne Water offset benchmark.

River Health Incentive Program (RHIP)

Melbourne Water has stated that this program is cost effective and has broader community benefits. This program, together with Melbourne Water's Maintenance and Capital Delivery programs delivers the business's waterway condition outcomes.

The incentive-based program also has broader and long term benefits due to it high level of interaction with land managers. According to Melbourne Water, it forms an important interface between the business and the community, contributing to enhanced community awareness and capacity as well as Melbourne Water's reputation.

In responding to our questions about the program, Melbourne Water responded:

> …benchmarking of costs to achieve waterway condition outcomes highlights that RHIP is the most cost-effective Melbourne Water delivery mechanism for traditional waterway condition investments such as revegetation, fencing and weed control. In large part this is due to the preparation, installation of works being cost-shared between Melbourne Water and the land manager and all ongoing maintenance costs of the works being borne by the land manager. As an example, work undertaken by Melbourne Water (2012) indicates that the average unit rate for revegetation/km is $78,000 per km in the capital delivery program compared to $21,000 per km through RHIP.

The latest independent evaluation of the River Health Incentive Program found the program to be cost effective, although we note that the evaluation was conducted in 2011, prior to the significant step up in program expenditure so it unclear whether these results are still relevant. On the cost-effectiveness of the program, the report found:[42]

- Operating costs are comparable to Landcare delivered programs and relatively low compared to agency delivered NRM programs. The high degree of one-on-one contact with land managers by the Assessors and RHOs improves the awareness and knowledge of land managers, encourages continued engagement and contribute to the reputation of Melbourne Water";
- The program is contributing to improved streamside zone and water quality, which are two components of river health. Co-dependencies on other aspects of Melbourne Water operation such as Capital Delivery (minor and major) and Maintenance Services should be recognised as contributing to hydrology/flows, physical form and aquatic life. These works were being delivered in a cost effective manner; and
- That skills and knowledge of land managers appear to have improved through informal education and training and that activities that work collaboratively with landholders and on a one-to-one basis are more likely to be effective).

We have not made any adjustments to Melbourne Water's forecast in this area, noting that forecast expenditure is largely consistent with base year spend. However, we strongly

[42] RMCG, 2011, *River Health Incentives Program Evaluation & Future Directions Paper*, September, Page v.

suggest that the RHIP program be subject to a program evaluation, and that this evaluation clearly set out the costs and benefits (including reductions in Melbourne Water's own costs) brought about by the program.

4.5 Summary of recommended changes to operating expenditure

4.5.1 Recommended operating expenditure

Table 4.21 summarises our recommended adjustments to Melbourne Water's proposed prescribed opex, including reduced expenditure for pollution response, and energy (both renewables and network costs), chemicals, and fleet.

Table 4.21: DAE recommended adjustments to Melbourne Water's proposed opex ($m, 01/01/2015)

Opex item	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Melbourne Water's proposed prescribed opex	945.26	941.29	944.03	934.80	925.31	4690.68
DAE recommended adjustments to opex						
Renewable energy (proposed new obligation)	-6.49	-6.53	-7.65	-6.30	-5.74	-32.71
Electricity network costs	-1.85	-2.78	-3.80	-4.78	-5.87	-19.07
Pollution response (proposed new obligation)	-1.12	-1.09	-1.07	-1.04	-1.02	-5.34
Fleet	-0.30	-0.20	-0.30	-0.20	-0.00	-1.00
Chemicals	-0.16	-0.24	-0.32	-0.40	-0.48	-1.58
Total recommended adjustments	**-9.91**	**-10.84**	**-13.13**	**-12.71**	**-13.10**	**-59.71**
DAE recommended prescribed opex	**935.35**	**930.45**	**930.90**	**922.08**	**912.20**	**4630.98**

Source: Melbourne Water template

Table 4.22 sets out our revised view of Baseline opex adjusted for the ESC's efficiency hurdle and customer number growth. At the request of the ESC we have removed total energy costs from both the Baseline and BAU opex, which means that energy is treated as an uncontrollable cost and that increases in energy costs are not accounted for in the efficiency hurdle. Table 4.22 demonstrates that using our revised forecasts, the opex allowance meets the ESC's efficiency hurdle for the fourth regulatory period overall, although the final two years do not meet the target. We note that this outcome is largely due to the fact that desalination contract payments (which are subtracted from BAU to test the hurdle) are forecast to decline progressively over the regulatory period, with the biggest decline in 2020-21, such that the difference between baseline opex (which has been reduced by 2014-15 desalination payments) and our adjusted forecast BAU opex (which has been reduced by forecast desalination payments) increases.

Table 4.22: DAE recommended Baseline and BAU opex ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
BAU opex	984.92						
Less uncontrollable costs							
VDP contract payments	621.14						
Land Tax	20.75						
Fire Services Levy	0.53						
Less adjustments							
Redundancies	-0.87						
Total energy costs - remove from Baseline	30.64						
Total Baseline opex	**311.00**						
		313.49					
Adjusted BAU (for customer growth and productivity hurdle)			**312.86**	**312.23**	**311.61**	**310.99**	**310.36**
Forecast BAU operating expenditure			930.05	925.39	927.30	917.69	907.83
Less uncontrollable costs:							
VDP contract payments			572.68	563.84	560.47	548.67	532.41
Land Tax			21.65	22.20	21.84	22.27	22.70
Fire Services Levy			0.53	0.53	0.53	0.53	0.53
Total energy costs - remove from forecast BAU			30.10	31.82	34.26	34.54	34.89
Less adjustments for individual expenses not included as new obligations							
Fleet			-0.30	-0.20	-0.30	-0.20	-0.00
Chemicals			-0.16	-0.24	-0.32	-0.40	-0.48
Forecast adjusted BAU opex			**304.62**	**306.56**	**309.59**	**311.10**	**316.82**
Difference between forecast BAU and hurdle			-8.27	-5.70	-2.06	0.08	6.42
Pass/fail productivity hurdle			**PASS**	**PASS**	**PASS**	**FAIL**	**FAIL**

Source: Melbourne Water template Note: BAU opex excludes land tax, Fire Services Levy, new obligations and regulatory fees. Note that total energy costs do not include new obligations (renewable energy opex) for the purpose of this table, since all new obligations are already excluded from BAU opex.

Table 4.23 sets out our recommended adjustments to opex for new obligations.

Table 4.23: DAE recommended reductions to new obligations opex ($m, 01/01/2015)

	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Renewable energy	6.49	6.53	7.65	6.30	5.74	**32.71**
Pollution response	1.12	1.09	1.07	1.04	1.02	**5.34**
Total adjustments recommended	**7.61**	**7.63**	**8.72**	**7.34**	**6.76**	**38.05**

Table 4.24 sets out our revised view of prescribed opex; starting with the forecast adjusted BAU opex (see Table 4.22), adding back uncontrollable opex, growth in waterways and drainage opex and new obligations. No allowance is recommended for pollution response.

Table 4.24: DAE recommended total prescribed opex ($m, 01/01/2015)

Opex item	2016-17	2017-18	2018-19	2019-20	2020-21
Forecast adjusted BAU opex	304.62	306.56	309.59	311.10	316.82
Add back expenditure allowed					
Desalination contract costs	572.68	563.84	560.47	548.67	532.41
Regulatory costs	2.31	2.31	2.31	2.31	2.31
Land Tax	21.65	22.20	21.84	22.27	22.70
Fire Services Levy	0.53	0.53	0.53	0.53	0.53
Growth in waterways and drainage opex	0.57	1.26	1.94	2.62	3.30
Energy (including recommended allowance for renewable energy and network costs)	32.98	33.75	34.22	34.59	34.13
Recommended total prescribed opex	**935.35**	**930.45**	**930.90**	**922.08**	**912.20**

Source: Melbourne Water template Note: Controllable opex excludes desalination payments, land tax, licence fees and new obligations.

5 Capital expenditure

5.1 Historical and forecast capital expenditure

In its 2013 determination, the ESC approved $1549.6 million of capex for Melbourne Water over the three year period from 2013-14 to 2015-16. The final approved capex reflected changes to the timing of delivery of certain projects and the removal of some projects.[43]

A comparison of the forecast and actual capex is summarised in Table 5.1, and graph below. In the current regulatory period Melbourne Water significantly underspent against the 2013 regulatory forecasts in 2013-14 and 2014-15, but forecasts being in line with the forecast in 2015-16. This contrasts with previous regulatory periods where Melbourne Water's actual spending has been broadly in line with the approved regulatory forecasts.

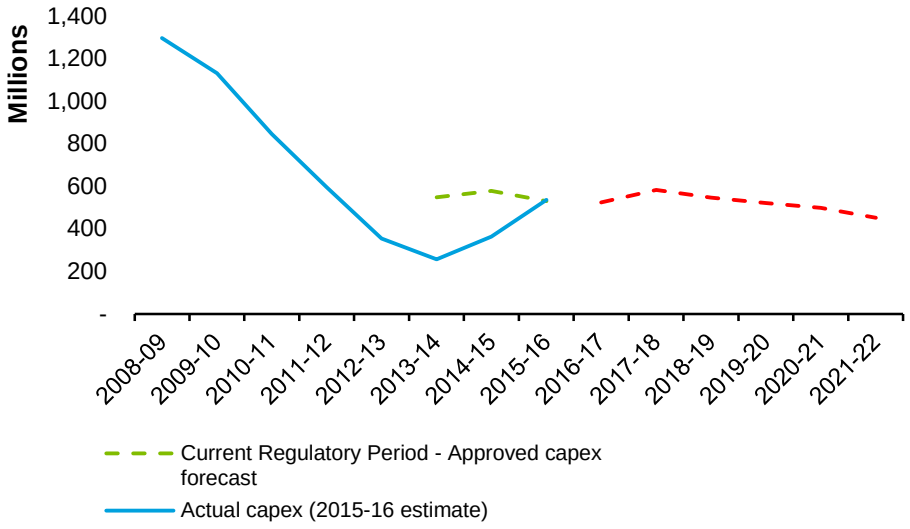
Table 5.1 Comparison of historical and forecast capex from 2013-14 to 2020-21 ($m, 01/01/2015)

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total
2013-14 to 2017-18 Final Decision	548.1	578.4	530.2	513.2^	405.8^				2 575.6
2016-17 to 2020-21 Submission	255.3*	363.3*	535.8#	523.7	582.6	546.0	520.7	499.0	2 672.0

^ Indicative based on five year assessment. * Denotes actual expenditure # Denotes estimate for current year

[43] Essential Services Commission 2013, *Price Review 2013: Greater Metropolitan Water Businesses — final decision,* June.

Figure 5.1 Comparison of historical and forecast capex ($m, 01/01/2015)



Melbourne Water has reported on its performance in the delivery of capital projects in the current regulatory period. Table 5.2 below summarises the outcomes of these major projects and programs.

Table 5.2 Summary of performance against major projects and programs in WP3

Project Name	Product	Driver	Project Status	WP3 Real 15/16 Cumulative 3 Year Plan vs Actual ($,000)	Expenditure to date against plan
WTP Treatment Capacity Augmentation Stage 2	Sewerage	Growth	Incomplete	Plan: 109,775 Actual: 11,035	10%
Allocation – Flood Mitigation	Waterways	Compliance	Ongoing	Plan: 64,580 Actual: 44,536	69%
St Albans – Werribee Pipeline Stage 2	Water	Growth	Complete (predicted for Nov 2015)	Plan: 99,403 Actual: 44,722	45%
Allocation – ETP Mechanical and Electrical renewals	Sewerage	Growth	Ongoing	Plan: 50,309 Actual: 40,558	81%
M040/041 (Preston) Water Mains Renewal	Water	Renewals	Incomplete	Plan: 37,985 Actual: 18	<1%
M102 (North Essendon-Footscray) Water Main Renewal	Water	Renewals	Incomplete (to be completed in late 2015-16)	Plan: 55,077 Actual: 41,229	75%
Allocation – Retarding Basin Spillway Upgrades	Waterways	Compliance	Ongoing	Plan: 35,732 Actual: 17,892	50%

Project Name	Product	Driver	Project Status	WP3 Real 15/16 Cumulative 3 Year Plan vs Actual ($,000)	Expenditure to date against plan
WTP Sludge Drying Augmentation	Sewerage	Compliance	Complete	Plan: 57,852 Actual: 30,193	52%
Allocation – Sewerage Transfer Corrosion and Odour Management	Sewerage	Compliance	Ongoing	Plan: 30,615 Actual: 0	0%
North Yarra Sewer Main Rehabilitation	Sewerage	Renewals	Complete	Plan: 24,310 Actual: 31,170	128%

The table shows that Melbourne Water has generally underspent on capital projects over the three-year regulatory period. Of the completed projects, the majority (both in number and overall cost) have been delivered at significantly lower cost than planned, including the St Albans-Werribee Pipeline and the WTP Sludge Drying Augmentation. For the major programs, Melbourne Water has similarly underspent against forecast, generally spending around 70% of the allocated budget.

We make the following high level observations about Melbourne Water's capex performance over the current regulatory period and implications for the next regulatory period, based on our analysis and information contained its 2016 price submission and received from Melbourne Water during our review:

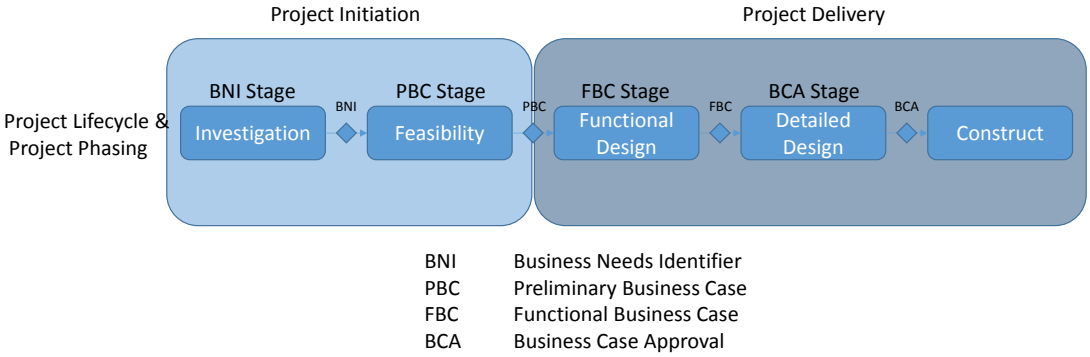
1. Significant efficiencies are being realised from design and construction contracts and should continue to be achieved on future projects; and
2. Future cost estimates appear to be conservative and based on the timing of business cases and other materials provided to us, do not include efficiencies realised on previous projects. It is not clear that learnings from delivered projects are being used to refine current cost estimates (e.g. WTP Sludge Drying Beds Augmentation Project proposed).

5.2 Generic issues

5.2.1 Capital expenditure planning

Melbourne Water's capital plan outlined in its Price Submission has generally been supported by business case documents, engineering studies and risk assessments. This information has, for the most part, demonstrated an efficient approach to project identification. It is noted, however, that a number of the business cases are at the Business Needs Identifier (BNI) stage (the first stage in Melbourne Water's capital process) and progress on the project has stalled since the first business case preparation.

Figure 5.2Melbourne Water's Capital Approval Gates



Source: Melbourne Water, Presentation to DAE and Arup, 26 November 2015.

Examples of this include Regan St Retarding Basin and Hobsons Bay Sewer where in both cases the project was identified many years ago, but little progress has been made to develop detailed options analysis or cost estimates. Considering the timeframe for delivery of these projects, we were concerned that more could have been achieved over the period to plan for capex.

In response to our questions, Melbourne Water provided some explanation for the underspend associated with individual projects. It outlined a number of actions which have been undertaken over the period, including:

- The need for and timing of projects has been challenged
- Alternative options have been identified which allowed certain projects to be deferred, and
- Additional investigations have been conducted to confirm or review initial findings.

Nevertheless, considering both the timeframe for delivery of these projects and the initial urgency of required works (based on condition assessments), we would have expected more to have been achieved since projects were initially identified, in order to ensure:

- A greater level of accuracy relating to cost estimates
- A more thorough options analysis
- More efficient delivery of construction for projects with the ability to forecast timing and program, and
- Greater ability to program and forecast work ahead to coincide with planned outages, shutdowns or maintenance periods.

5.2.2 Cost estimation and escalation

As discussed previously, the business cases developed for the major projects listed in Melbourne Water's 2016 price submission have been developed to the initial gate of the BNI. For the BNI, the cost estimates developed are based on limited information or design and include a significant number of assumptions. Furthermore, a Risk Adjusted Nominal Estimate (RANE) is not required for the BNI phase. As such, the cost estimates for those projects at the BNI phase, and which form the basis of the capital plan and proposed expenditure, are expected to be inaccurate. In addition, our review of the projects delivered in the current regulatory period suggests that the cost estimates (those based on limited design) are conservative.

It has also been noted that a number of the projects have been previously submitted for approval as part of Melbourne Water's 2013 Price Submission. In some instances, the business cases appear to have been updated to 2015 costs; however projects including Hobsons Bay Sewer Main Renewal and Alexandra Main Drain Redecking, were based on cost estimates which were completed several years ago. Efficiencies achieved from the existing design and construction contracts and the more competitive rates now available for design and construction services should be reflected in the updated cost estimates.

5.2.3 Deliverability of the capital expenditure program

In undertaking the comparison of Melbourne Water's historical and forecast capex, we observe that Melbourne Water has generally not delivered allocated programs to the regulatory forecast in the current period. The retailers also raised concerns over the ability of Melbourne Water to deliver against its capital plans with a perceived history of underspending on capital programs.

We acknowledge Melbourne Water's argument that its delivery of capital programs during the current regulatory period was affected by the transition and negotiation of multiple new agreements with service providers. However, from a pricing and service delivery perspective we do have concerns that over the current regulatory period customers have been paying for a capital works program that has only 70% been delivered.

5.3 Major sewer projects

The major sewer projects proposed for the fourth regulatory period comprises 54% of the forecast capital spend for the delivery of sewerage services.

The largest of these projects is the WTP Treatment Capacity Augmentation; with an overall project spend of $182m over the fourth regulatory period. Three of the five largest sewerage projects are planned for construction at the WTP.

Finally, two of the projects, ETP Sludge Digestion and 55E ASP Renewal, are expected to require some capex in the fifth regulatory period, starting in 2021-22.

5.3.1 ETP Sludge Digestion Augmentation

5.3.1.1 Project description and key drivers

The ETP is Melbourne Water's second largest sewage treatment plant, located in Bangholme in Melbourne's South East. The activated sludge plant produces three sludge streams:

- Primary Sludge from the Primary Treatment Area
- Waste Activated Sludge (WAS) from the Secondary Treatment Area, and
- Tertiary Sludge from the Tertiary Treatment Area.

Melbourne Water has identified that its current sludge management and treatment system capacity may be exceeded in the short to medium term and an augmentation may be required. The proposed project includes the construction of two new anaerobic sludge digesters to provide the additional processing capacity to cater for growth in the sludge volumes currently being experienced and forecast to increase over the fourth regulatory

period. ETP currently utilises anaerobic digestion to process sludge and produces biogas for onsite electricity generation.

Table 5.3 below provides the proposed annual capex over the fourth regulatory period. This equates to approximately 99% of the P50 estimate (real dollars) in the associated business case, with some minor additional expenditure expected to occur in the next pricing period (years 2021-22 and 2022-23).

The sole driver for this project has been identified as growth.

The operating costs implications of this project have not been identified in the business case provided.

Table 5.3: Proposed capex for ETP Sludge Digestion Augmentation ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			0.42	1.12	1.31	19.36	18.89	41.10

Source: Melbourne Water, 2016 Price Submission

5.3.1.2 Options analysis

A strategic options analysis has not been undertaken by Melbourne Water to date. The Business Case developed for the BNI in December 2014 is based on the delivery of two new anaerobic sludge digesters in line with the existing technology currently installed at ETP. Melbourne Water has advised that process variations of anaerobic digestion will be considered in the feasibility study phase in early to mid-2016.

A broader review of options to address growth aside from anaerobic digestion does not appear to have been undertaken (and does not appear to be planned). Melbourne Water's preferred option might be cost effective, but we have not observed a strategic options analysis demonstrating this.

5.3.1.3 Discussion and analysis

The business case and supporting information generally demonstrates the need for the project and the timeline for delivery in meeting the growth forecasted. Furthermore, the proposed capacity increase appears reasonable to meet medium-term requirements, considering the planning horizon beyond the current fourth regulatory period.

The business case is based on a specific technology and as discussed, a strategic analysis of options has not been undertaken. As such, the capital cost estimates may be accurate for the preferred technology but may not be suitable should alternative solutions become available. This is further compounded given the project is in the early phases of development and design.

It is important to note that Melbourne Water is also seeking to generate efficiencies in its pre-treatment of sludge prior to digestion to delay the construction of the new sludge digesters.

As discussed above, the current business case is based on the use of anaerobic digestion technology. One of the key drivers for the selection of this technology is the production of biogas to generate additional onsite electricity.

If the energy contract and tariff applicable to sale of electricity to the grid was to change, the business case for anaerobic digestion may be impacted significantly. Forecasts for energy prices and tariffs for onsite generation should be carefully considered when projecting opex costs and savings long term for this project, taking into consideration the current downward trend for tariffs for onsite generators.

5.3.1.4 Recommended adjustments

While we have some concerns about the lack of documentation on broader strategic options, the case for the project appears sound. Therefore we have made no adjustments to the forecast expenditure. It is noted that no additional opex has been requested in the business case, but that given the timeframe for delivery; additional operating costs may not be incurred in the fourth regulatory period but could be expected to begin in 2021-22.

Table 5.4: Proposed capex for ETP Sludge Digestion Augmentation and recommended adjustments ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			0.42	1.12	1.31	19.36	18.89	41.10
Recommended adjustments			0	0	0	0	0	0
Recommended capex			0.42	1.12	1.31	19.36	18.89	41.10

Source: Melbourne Water, 2016 Price Submission, Arup

5.3.2 Upper Hobsons Bay Sewer Renewal

5.3.2.1 Project description and key drivers

The Upper Hobsons Bay Sewer Renewal project involves the proposed rehabilitation of an existing sewer constructed between 1907 and 1909 in Melbourne's inner south east. The sewer main was inspected in 2010 and again in 2012 and 2015. From the inspections, Melbourne Water has identified a 3.5km section in particular (between HBM067A and HBM099P) which requires rehabilitation due to significant deterioration.

Table 5.5 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 99% of the P50 estimate (real dollars) in the business case. The preliminary business case was developed for the initial BNI gate in 2011.

The sole driver for this project has been identified as renewal.

The operating costs incurred as a result of delivering this project have not been identified in the business case provided; however we assume they will be minimal.

Table 5.5: Proposed capex for Upper Hobsons Bay Sewer Renewal ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			1.95	20.47	19.97			42.39

Source: Melbourne Water, 2016 Price Submission

5.3.2.2 Options analysis

A simplified options analysis was included in the business case; however, a broader strategic options analysis was not immediately provided for the project. Melbourne Water subsequently indicated that the options available for this project were limited due to the nature of the pipeline and its crucial role in service delivery.

The simple options assessment included as part of the business cases provided considers relining of the main, replacement by pipe bursting or the preferred option of laying new diversion sewers and relining the existing main. The options analysis presented does not appear robust and appears to be unevenly weighted towards the preferred option (no cons are reported against the preferred option which is highly unlikely). Additional supporting information provided by Melbourne Water also identified only a minor difference in the assessment scores for the "Do Nothing" option (Base score of 0) and the current preferred option which scored +0.05.

The cons listed for the non-preferred options include the following wording, "unlikely to be feasible…", and "uncertain availability of pipe bursting equipment at this scale". This would indicate that a detailed analysis has not been undertaken to adequately assess the options and determine the most efficient approach for delivery. These options have been somewhat discounted due to lack of information where further analysis may have demonstrated a more prudent approach than the preferred option.

Melbourne Water has advised that further options analysis will be carried out by mid-2016 prior to submitting the project for preliminary business case approval.

5.3.2.3 Discussion and analysis

Upper Hobsons Bay Sewer Renewal project was identified in 2010 from an inspection of the sewer main. At the time of inspection the condition assessment identified over 30% of the 3.5km section of interest to have a remaining asset life of 1 to 5 years. Additional inspections were subsequently undertaken in 2012 and 2015 with some minor deterioration noted by Melbourne Water in that period. Further, the business case, having been prepared in 2010, proposes the construction of the preferred option by 2015-16. Since the preparation of the BNI, no further work has been undertaken on the project to develop the strategic options or design, and no works have been delivered on the main. Given the original condition assessment and expected life of one-third of the sewer main, the requirement for delivery of this project in the fourth regulatory period is uncertain.

The early stage of this project, and the subsequent lack of detailed information, make it difficult to determine the efficiency of this project. Melbourne Water considers that this is a high risk project due to the consequences of failure and the main is already beyond the critical renewal period previously recommended in 2010.

5.3.2.4 Recommended adjustments

In our draft report, we made the following comments in relation to the recommended adjustments for this project:

- Options had not been fully evaluated
- We were concerned that given its history the project may be deferred again, and

- The costs appeared high and did not appear to include efficiencies gained from Melbourne Water's framework agreements.

Melbourne Water subsequently provided additional information in response to our comments. This included:

- A summary of the options which had been investigated, confirming the requirement for the sewer and the need for additional capacity in addition to renewal of the asset;
- An assessment of the CCTV monitoring program indicating that sections of the sewer would reach a critical condition, Category 5, by 2018 based on the past three CCTV condition assessments. As such, replacement in the next regulatory period would be required; and
- Cost estimates for options developed since the original business case provided by Melbourne Water indicated a higher cost than that previously allowed (i.e. $50-54m compared to $42.4m).

Given the history of the project and the amount of time which has passed since the original inspection recommended works to be undertaken, we remain concerned as to the deliverability of the project in the next regulatory period. The CCTV condition assessments have generally indicated that the sewer is stable and has not deteriorated materially over the past three years. However, it is noted that a failure of this asset could result in severe impacts to the environment and to the public.

Given the history of the project and Melbourne Water's concern about the state of the asset, we would have expected design to be further progressed. We recommend that the allowance for design is maintained, and note that, based on updated condition assessments, Melbourne Water may choose to complete the project in the fourth regulatory period. However, at this time we do not have sufficient confidence that the project will be required to warrant inclusion in the forward forecasts.

Our final recommendation for the adjustment to the capital project is summarised in Table 5.6.

Table 5.6: Proposed capex for Upper Hobsons Bay Sewer Renewal and recommended adjustments ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			1.95	20.47	19.97			42.39
Recommended adjustments			1.95	20.47	19.97			-40.44
Recommended capex			1.95	0	0			1.95

Source: Melbourne Water, 2016 Price Submission, Arup

5.3.3 WTP Treatment Capacity Increase

5.3.3.1 Project description and key drivers

The WTP in Werribee, which treats over half of Melbourne's sewage, was Melbourne's first, constructed in the late 1890s. The WTP occupies approximately 10,500 ha of land which includes significant area for sewage treatment, as well as farming and ecological conservation. WTP has undergone a number of upgrades over the past 100 years of operation, and now includes more energy intensive processes to achieve the stricter

environmental discharge requirements (when compared with the lagoon based system originally constructed).

WTP discharges to Port Philip Bay are regulated by the EPA, and the discharge license includes ammonia limits. Melbourne Water has advised that WTP discharges have been exceeding its ammonia license conditions with more than 26 exceedances in 2014-15. Growth in inflows has been identified as the primary cause of these exceedances. This project therefore includes the augmentation of WTP to increase capacity and allow continued achievement of the regulatory limits of the discharge licenses.

This project has previously been submitted for approval to ESC in the current regulatory period, and was, in our understanding, also submitted for approval in Water Plan 2.

Table 5.7 provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 94% of the P50 estimate (real dollars) in the business case. A Preliminary Business Case has been developed for this project. The cost estimates for this project are understood to have been developed in 2011-12 which may not truly reflect current estimates based on the delivery approach.

The sole driver for this project has been identified as growth.

The operating costs incurred as a result of delivering this project have been calculated to be approximately $1.1 million per annum.

Table 5.7: Proposed capex for WTP Treatment Capacity Project ($m, 2015-16)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			31.02	110.41	37.61	2.17	1.02	182.23

Source: Melbourne Water, 2016 Price Submission

5.3.3.2 Options analysis

A detailed options analysis has been developed for this project which includes the delivery of the additional capacity through a range of approaches. Further, this options assessment considers delivery of future projects beyond the current planning horizon, including the WTP 55E Renewal project discussed in Section 5.3.4.

5.3.3.3 Discussion and analysis

This project was submitted and included in the regulatory benchmarks for the current regulatory period, however there has been a delay in its delivery. The driver for the project appears reasonable, and given Melbourne Water's current work in the development of pilot plants, we consider it should be capable of being delivered in the fourth regulatory period.

5.3.3.4 Recommended adjustments

The driver for this project is reasonably well established and with growth rates predicted to increase, the likelihood of exceeding compliance targets increases. Accordingly, we do not recommend any adjustments to the capital forecast.

Table 5.8: Proposed capex for WTP Treatment Capacity Project and recommended adjustments ($m, 2015-16)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			31.02	110.41	37.61	2.17	1.02	182.23
Recommended adjustments			0	0	0	0	0	0
Recommended capex			31.02	110.41	37.61	2.17	1.02	182.23

Source: Melbourne Water, 2016 Price Submission, Arup

5.3.4 WTP 55E Renewal

5.3.4.1 Project description and key drivers

The WTP 55E Renewal project's key drivers are renewal of the existing 55E Activated Sludge Plant (ASP), and compliance with safety requirements. The existing 55E ASP has been identified by Melbourne Water as being unsafe to maintain and operate and also as reaching the end of its useful life having been installed in 2001.

Specifically, this project includes the upgrade of the existing 55E ASP following the completion of the WTP Treatment Capacity Increase project. The WTP Treatment Capacity Increase project will provide additional capacity to WTP to allow the 55E ASP to be taken offline for upgrade.

Melbourne Water intends to utilise innovative biological treatment technology, known as anaerobic ammonium oxidation (anammox).

Table 5.9 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 70% of the P50 estimate (real dollars) in the business case, with additional expenditure occurring in the following fourth regulatory period, majority in 2021-22. A Preliminary Business Case has been developed for this project and approved in 2015.

The drivers for this project have been identified as 50% compliance (safety) and 50% renewals.

The operating costs incurred as a result of delivering this project have been calculated to be approximately $1.5m per annum but are expected to be fully offset from the current inefficient 55E ASP.

Table 5.9: Proposed capex for 55E ASP Renewal project ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			0.34	0.42	2.04	5.04	66.87	74.71

Source: Melbourne Water, 2016 Price Submission

5.3.4.2 Options analysis

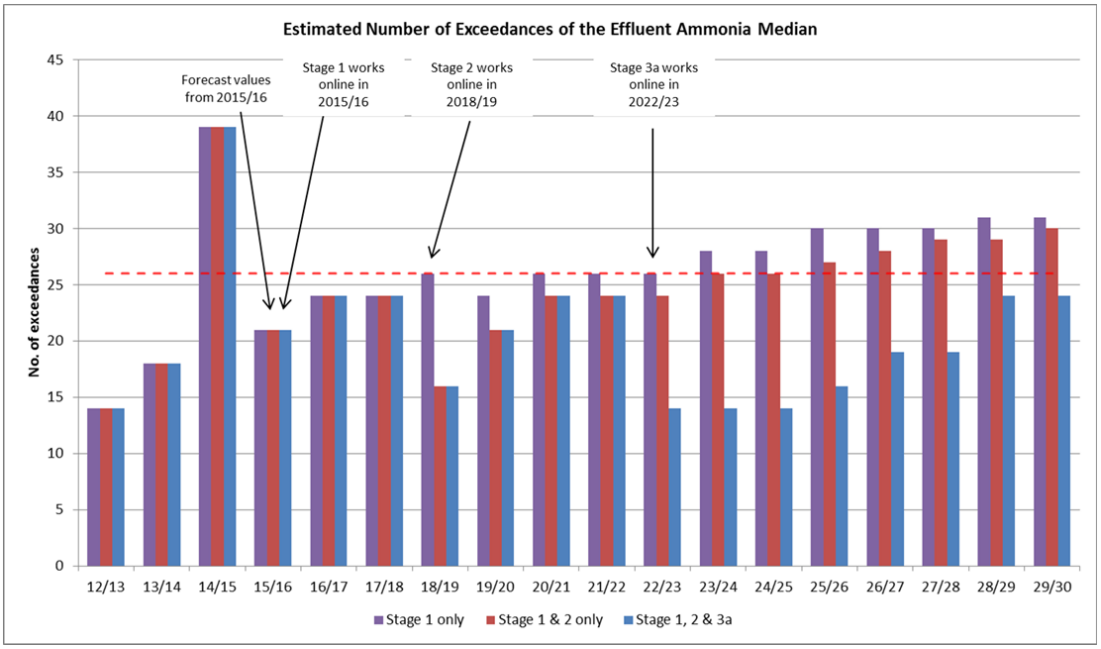
A detailed options analysis has been developed for this project which formed part of an overall strategic plan for WTP. This project in particular considers the requirements outside the current planning horizon.

Additionally, Melbourne Water is currently investigating the potential options for delivery of the 55E ASP upgrade, including the use of innovative biological processes to achieve efficiency in energy usage and sludge production.

5.3.4.3 Discussion and analysis

The primary drivers for this project are compliance for safety of personnel and renewals. It is noted that the WTP Treatment Capacity project provides sufficient additional capacity to allow the existing 55E ASP to be taken offline for the upgrade works. While not stated specifically in the business case, it is expected that the upgrade to the 55E ASP is required at some time to provide capacity for nitrogen removal, however this does not appear to be required until 2023-24 or later (see Figure 5.3 below). Therefore, once the WTP Treatment Capacity Project has been commissioned, the 55E ASP can be decommissioned and does not need to be brought online until two years into the following fourth regulatory period (i.e. 2021-22 or 2022-23). During the fourth regulatory period, and following completion of the WTP Treatment Capacity Project, the 55E ASP can be decommissioned. This will remove the risk to safety of personnel carrying out maintenance, as maintenance is not required, and the renewal of the plant can be delayed until required, and construction works for the 55E Renewal delayed until the following pricing period.

Figure 5.3 Estimated number of exceedences of ammonia discharge limit based on the implementation of capital projects at WTP.



5.3.4.4 Recommended adjustments

In our draft report, our assessment was that the 55E ASP Renewal project was not required to be constructed in the fourth regulatory period and construction could be delayed until the next period. As such, we recommended that design be completed within the 2016 period, ready for construction to commence, if required in 2021-22.

Melbourne Water subsequently provided additional information addressing our concerns relating to the timing of the project. In particular, it was noted that the forecasts for

ammonia discharge exceedences were difficult to predict and subject to a number of influences with recent breaches of the licence in 2014-15. As such the postponement of the upgrade would risk a breach of Melbourne Water's licence conditions.

There are a significant number of capital projects being undertaken at WTP which will impact on the ammonia discharge concentration. Without knowing the selected treatment process for the Stage 2 Upgrade and the reduction in ammonia achieved with this process or the viability of dry stacking in the sludge drying pans, we expect there to be changes in the ammonia concentration forecast over the next three to five years.

We maintain our position that it would be prudent to undertake the design components and necessary decommissioning works in the fourth regulatory period, and construction should be delayed to the fifth regulatory period given the variability in ammonia forecast and with the current forecast showing Melbourne Water to be compliant albeit nearing the licence condition limit. Our final recommendation is outlined in Table 5.10 below.

Table 5.10: Proposed capex for WTP 55E ASP Renewal and recommended adjustments ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			0.34	0.42	2.04	5.04	66.87	74.71
Recommended adjustments			0	0	0	0	-66.87	66.87
Recommended capex			0.34	0.42	2.04	5.04	0	7.84

Source: Melbourne Water, 2016 Price Submission, Arup

5.3.5 WTP Sludge Drying Capacity

5.3.5.1 Project description and key drivers

Melbourne Water has identified additional sludge production and volumes within its lagoon system at WTP which are in excess of forecast volumes. Furthermore, the solids and sludge loading at WTP is forecast to increase over the medium term. Melbourne Water believes it needs to increase the capacity of its existing sludge dying beds to cater for the existing sludge volumes stored in the lagoons as well as the increase in solids forecast into the future.

The sludge drying pans are intended to be designed based on the innovative drying stacking technique. In late 2015 sludge drying pans, 205W SDP, were constructed and commissioned utilising dry stacking.

Table 5.11 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to 100% of the P50 estimate (real dollars) in the business case. A BNI Business Case was developed for this project in 2014.

The sole driver for this project has been identified as growth.

The operating costs incurred as a result of delivering this project are approximately $0.32 million per annum.

Table 5.11: Proposed capex for WTP Sludge Drying Capacity project ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex				0.24	37.61	0.72	-	38.57

Source: Melbourne Water, 2016 Price Submission

5.3.5.2 Options analysis

An overarching options assessment was undertaken in 2011 as part of the WTP Sludge Processing Strategy. This Strategy considered options including mechanical thickening and drying and typical sludge drying beds. The preferred option of constructing modified sludge drying beds was implemented for a previous project, the 205W SDP project completed in 2015.

5.3.5.3 Discussion and analysis

The proposed project is highly dependent on the trialling and success of the 205W SDP project which was recently completed. Melbourne Water has advised that full results from the 205W SDP project will not be known for another three years. As the dry stacking technology is new to Melbourne Water, understanding the efficiencies gained from the 205W SDP project should be included in this new project or where dry stacking does not achieve the required results, allowing for additional drying area to be constructed.

5.3.5.4 Recommended adjustments

Based in the information provided by Melbourne Water, we are satisfied with the proposed capex and timing for this project. No specific adjustments are recommended.

Table 5.12 Proposed capex for WTP Sludge Drying Capacity and recommended adjustments ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex				0.24	37.61	0.72	-	38.57
Recommended adjustments			0	0	0	0	0	0
Recommended capex			0	0.24	37.61	0.72	0	38.57

Source: Melbourne Water, 2016 Price Submission, Arup

5.4 Major water projects

In contrast to previous price submissions, which included significant expenditure on water projects, investment in water infrastructure in the next regulatory period is relatively modest. Melbourne Water's total forecast expenditure of $616.3 million for water projects represents only 23% of the total proposed capex.

Of this expenditure, over half is focussed on renewal of existing assets, followed by improvements, desalination plant payments and finally compliance and growth related expenditure. The last two categories only represent about 7% each of the total water capex.

Overall, the water capital program is made up of a large number of small projects. Combined, the top five major projects in water represent around 25% of the total water capex, and the top five water programs represent just 19% of total water expenditure.

5.4.1 Winneke WTP UV System upgrade

5.4.1.1 Project description and key drivers

Approximately 40% of Melbourne's water can be supplied from Sugarloaf Reservoir which sources water from an open catchment. To mitigate risks posed by water from this open catchment, the water leaving the Sugarloaf Reservoir is treated at the Winneke Treatment Plant. The Australian Drinking Water Quality Guidelines and Safe Drinking Water Act provide specific guidance around undertaking catchment risk assessments and implementing a multi-barrier approach to mitigating water quality risks.

Melbourne Water has undertaken a number of investigations over the period from 2006 to the present to assess the risks to water quality in the sources treated at Winneke Treatment Plant. These assessments have identified a high risk of pathogens in the supply and have recommended additional treatment options at the plant to mitigate these risks. The driver for this project is 100% compliance, albeit with existing targets.

Melbourne Water has sought the expenditure outlined in Table 5.13 below to investigate and implement these recommendations. While Melbourne Water states that no opex implications have yet been identified for this project, and will be estimated for final Preliminary Business Case approval, the options assessment identified an estimated annual opex of around $250,000.

Table 5.13: Proposed capex for Winneke Treatment Plant UV Disinfection System project ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			-	0.50	1.20	22.72	7.25	31.67

Source: Melbourne Water, 2016 Price Submission

This project was originally incorporated into the current regulatory period, with a BNI completed and approved in August 2011 and again in April 2012. The original submission included around $2.76m for the implementation of a pilot plant to validate pathogen removal by media filtration. However, this expenditure was deferred following further strategic development of options.

5.4.1.2 Options analysis

Melbourne Water stated that 11 options were assessed for this project, including a "do nothing" option, eight non-treatment options and two treatment options. An internal workshop assessed the non-treatment options as delivering uncertain benefits and not delivering on project objectives.

Of the two treatment options assessed, UV and ozone BAC, the UV option was identified as costing approximately 20% of the capital cost and 25% of the operating cost of the ozone option. The do nothing option was dismissed as not delivering on the disease burden target of strategic risk mitigation benefit.

5.4.1.3 Discussion and analysis

Aside from a brief comment on the importance of non-treatment options in the overall management of catch risks, little weight appears to have been given to these alternative,

and often non-infrastructure, options. In addition, it appears no combination options (part infrastructure, part non-infrastructure) were assessed.

The assessment of treatment options also appears light with only two options identified and the non-preferred option easily dismissed with a capital cost five times larger and an operating cost at least four times larger. Potential options including expanded or additional filtration (membrane) might have presented viable alternatives and could potentially reduce the scope of, or even eliminate the need for, the UV system.

The choice of the UV treatment option offers "strategic risk mitigation in the event of a sudden deterioration in filter performance." However the validated log reduction in pathogens for UV is three, the same as that for the filtration process. Together the options provide a maximum 1.2 log buffer above the required target. The UV system is therefore still reliant on the filtration system operating at least at two thirds capacity and is therefore not a standalone option nor can it provide the strategic risk mitigation identified above.

Melbourne Water's standard operating procedure in the event of a significant filter performance issue is to shut down the plant and this would not change with the implementation of the UV system.

The proposed expenditure also appears to include an allowance of approximately $1.4m (compared to $2.76m originally approved but not incurred) for a pilot system to confirm the effectiveness of achieving the required log reduction through the filtration system. The use of filtration systems and UV systems in the reduction of pathogen risks are not new technologies and further, the filtration systems are already in place at the treatment plant and can therefore be tested in-situ using actual water quality monitoring results. We therefore question the requirement for a pilot plant.

In respect of the urgency of the project, we note that the total elapsed time since the initial studies quantifying the high risk of pathogens in the catchment (2006) until the proposed commissioning of the UV plant (April 2021) being around 15 years. There are gaps of three years between investigation and feasibility, and feasibility and functional design, plus four month gaps between other tasks which contribute significantly to this long project period. Despite this, no evidence of increased risks or evidence of potable water quality issues has been presented, leading to a reasonable conclusion that the current system is providing adequate protection.

The timing of cost estimates in the Preliminary Business Case and the 2016 price submission template is not entirely consistent. The template has $22.7m of the construction cost in 2019-20 while the Preliminary Business Case indicates that construction will commence in April 2020 implying that over 75% of the construction cost will be incurred in the three months from April to June 2020. This appears unrealistic and we would expect the majority of construction costs to be incurred in 2020-21.

5.4.1.4 Recommended adjustments

The driver for this project is accepted and the preferred option is expected to deliver the project objectives and allow Melbourne Water to meet its compliance targets. In our draft report we proposed a number of adjustments to this project as outlined below:

- Removal of $1.4m for the pilot plant which does not appear to be required
- Reduction of approximately 10% on the proposed construction costs to target expected savings from utilising more non-infrastructure based catchment interventions and consideration of these options in the next stages of the project

- Re-phasing of expenditure in the 2016 price submission template to match the realistic construction cost timelines in the Preliminary Business Case. This results in deferring the revised (from above) expenditure in 2019-20 to 2020-21 and bringing forward the revised (from above) expenditure in 2020-21 to 2019-20
- Further, we were also inclined to recommend deferral of the revised $27.27m cost into the fifth regulatory period reflecting the apparent lack of urgency of response to the pathogen risks identified in 2006. We invited Melbourne Water to provide additional commentary on their current compliance with water quality targets, the three year delays in between key project stages, and the overall risk of non-compliance to justify keeping the construction cost allowance in the next regulatory period.

Following our draft report, additional information was provided. In particular Melbourne Water provided information on the requirement for the pilot plant, the rephrasing of the project and the options considered in addition to UV.

While we acknowledge Melbourne Water's additional information, we still consider that non-infrastructure options and specifically their associated costs do not appear have developed to their logical conclusion. Similarly investigation of a combination of approaches has not been demonstrated.

In respect of the pilot plant, it is intended to validate the pathogen removal of the filtration system. The guidelines attribute 3-log removal to well-functioning and controlled filtration systems which Melbourne Water would operate. As such, additional pilot plant testing on existing filters with existing critical control points for operation does not appear prudent for inclusion in this project.

Melbourne Water has indicated that new guidance has been provided by the Department of Health relating to the Safe Drinking Water Regulations 2015. Melbourne Water has not demonstrated a legislative or regulatory requirement for the implementation of the UV system. Therefore the delayed capital expenditure to the final year of the regulatory period will still meet the project objectives in line with the current progress of the project.

In summary, our draft recommended adjustments remain unchanged for this project, as outlined in the table below.

Table 5.14 Proposed capex for Winneke Treatment Plant UV Disinfection System project and recommended adjustments ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex				0.5	1.2	22.72	7.25	31.67
Recommended adjustments				-0.5	-0.9	-16.195	13.198	-4.40
Recommended capex				0.0	0.3	6.5	20.4	27.27

Source: Melbourne Water, 2016 Price Submission, Arup

5.4.2 St Georges Road Water Main Renewal

5.4.2.1 Project description and key drivers

The M40 water main provides water transfer capacity to a large area of inner Melbourne south of Preston. The M40 main is mild steel originally laid in the 1920s and 1930s and was

assessed as Condition 4 in the 2013 State of the Assets report. Consequence rating for the failure of this main varies between B (high) and C (medium) as the mains encompass a number of land use categories along its length.

The driver for this project is 100% renewals, however there is also some indication of a growth driver relating to the increased transfer capacity from 1350mm to 1700mm to supply the CBD, Docklands and Southbank areas.

The project involves the replacement, by lift and relay, of the existing sections of M40 water mains with new mild steel cement lined water mains.

It appears that this project is the remainder of a project (Replace M040/041 Water Mains) originally submitted for the current regulatory period, however this is unclear as there are no consistent project numbers or project names or reconciliation of expenditure across the periods.

Sections of the M40 water main were replaced from 1992 until 2004 resulting in a significant reduction in the number of leaks in the water main to the lowest level since the 1940s. Investigations in 2006 highlighted a number of sections of main subject to internal and external corrosion, followed by work in 2011 to repair leaks which resulted in the slip lining of one section of the main.

BNI approval was granted in October 2010 with Preliminary Business Case approval in September 2011 and again in June 2015.

Melbourne Water's proposed expenditure on this project is presented in Table 5.15.

Table 5.15: Proposed capex for St Georges Road Water Main Renewal project ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			20.98	5.43	-	-	-	26.41

Source: Melbourne Water, 2016 Price Submission, Arup

5.4.2.2 Options analysis

Three options were considered for this project, a "do nothing" option, renewal on existing alignment, and renewal on alternative alignments. The do nothing and alternative alignment options were dismissed for failure to meet obligations and the lack of alternative alignments identified leaving only the preferred option to undergo options analysis.

The options analysis outlined in the Functional Business Case does not appear to have considered alternative options like slip lining (which was used on a number of sections of M40 in 2011) or other lining options, including structural lining. These alternative options would presumably meet the project objectives of providing leak protection, but at a significantly lower capital cost than lifting and relaying such large pipes in a highly trafficked street. It is recognised, however, that these options would not provide a capacity increase, although this is not a driver for the proposed works.

There is little information on the assessment of options related to the M18 works apart from a brief discussion on the similarity in age and material type with the M40 main, and therefore an implication that the M18 main would likely experience similar failures (leaks).

5.4.2.3 Discussion and analysis

This project appears to be part of a project previously approved by the ESC for the current regulatory period, but delayed from the original work in 2011 to mid-2015. Given a specific leak incident during 2011 which was highlighted as an unacceptable risk and an unrepeatable incident, it is surprising that there was a four year delay before the Functional Business Case.

We have been provided with insufficient information on the M18 related works to adequately assess this section of the project. No evidence of actual condition assessments has been provided nor is there any breakdown of the proportion of costs related to this main.

Despite this, given the project appears to have been assessed in the review of the current regulatory period's expenditure, and that it appears the proposed expenditure in the 2016 price submission template is less than that outlined in the Functional Business Case, we do not recommend any specific adjustments to this project.

5.4.2.4 Recommended adjustments

We do not propose any adjustments for this project.

5.4.3 Merri Creek to MCG Main Renewal

5.4.3.1 Project description and key drivers

The M41 water main provides water transfer capacity to a large area of inner Melbourne south of Preston, predominantly during summer peak periods. The main is mild steel originally laid in 1928 and was recently assessed as Condition 4 in the 2015 State of the Assets report. The consequence rating for its failure varies between B (high) and C (medium) as the mains encompass a number of land use categories along its length.

A recent history of leaks for the M41 main indicates that leaks are increasing in frequency and renewal works have been occurring over the period from 2004 to 2009, however leaks remain in the existing sections.

The driver for this project is 100% renewals.

The proposed works involve the replacement of approximately 4.5 km of mild steel cement lined pipeline. The works are closely related to the proposed renewals of the M40 main on St Georges Road with this M41 main being immediately downstream.

A BNI case was approved in November 2014 with a Preliminary Business Cases approved in July 2015. The proposed works were originally scheduled for delivery in 2015-16 however the works were re-phased to 2017-18 by replacing a divide valve at a key section of the pipeline which reduced the potential impact of a major failure on customers.

Melbourne Water's proposed expenditure on this project is presented in Table 5.16.

Table 5.16: Proposed capex for Merri Creek to MCG Main Renewal project ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			3.62	19.66	11.99	0.35	-	35.62

Source: Melbourne Water, 2016 Price Submission

5.4.3.2 Options analysis

A number of options were identified and investigated for this project however all of the options appear to involve the full renewal or replacement of the entire length of pipeline. No alternative options were considered, such as pipe relining including structural relining options.

There were also no options considered where the highest risk sections of pipeline are scheduled for replacement in the fourth regulatory period, and a lower risk section scheduled for future regulatory periods.

As discussed above, some temporary works (a divide valve) were installed which allowed the deferral of renewal works. No similar options have been identified as part of the options assessment process, that is, other temporary works that would reduce the impact or the likelihood of major failures in the water mains potentially reducing or delaying the need for capital works.

5.4.3.3 Discussion and analysis

Any renewals or replacements on the M40 (St Georges Road) water main potentially affect the performance of the M41, including leakage rates.

The justification for this project is unclear with the primary drivers for renewal being potential reductions in the ability to service customers due to leaks, and maintaining an internally set target of <1% leakage in the water supply network. The Functional Business Case itself indicates that leaks in mild steel mains are "unlikely to be extreme in their material consequences" but that one of the primary issues is that these leaks "do attract significant scrutiny and concern in these densely populated inner urban areas".

Apart from an increasing frequency of leaks recorded against the M41 main, no further evidence of ongoing actual leakage volumes or customers affected was provided by Melbourne Water, nor was any evidence presented demonstrating negative trends in service performance that might explain the requirement for renewal (other than simply the age / assessed condition of the asset).

This project was initially included in the 2013 Water Plan however the expenditure was subsequently re-profiled and the project delayed by two years without objection from the retailers (predominantly City West Water).

5.4.3.4 Recommended adjustments

In our draft report we cited concerns about the lack of supporting evidence for this project and therefore recommended the removal of expenditure for this project until supporting information is provided.

In response to our draft report, additional information was provided by Melbourne Water. In particular, additional information was provided relating to the project drivers, options considered and reasons for selection of the preferred option, and service performance.

Melbourne Water noted that the water main leakage contributes to Melbourne Water's failure to meet its leakage target of 1% across their network. However, information has not been provided demonstrating that the delay of this project will adversely impact customers and result in Melbourne Water being unable to meet their obligations or service levels. As such, our draft recommended adjustments remain unchanged for this project, as outlined in Table 5.17 below.

Table 5.17 Proposed capex for Merri Creek to MCG Main Renewal project and recommended adjustments ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			3.62	19.66	11.99	0.35	-	35.62
Recommended adjustments			-3.62	-19.66	-11.99	-0.35	-	-35.62
Recommended capex			0.0	0.0	0.0	0.0	0.0	0.0

Source: Melbourne Water, 2016 Price Submission, Arup

5.4.4 Maroondah Aqueduct Renewal

5.4.4.1 Project description and key drivers

Maroondah aqueduct was originally built in the early 1890s to transfer water from the Maroondah weir on the Watts River to Preston. In 2008 Melbourne Water commissioned a study to review the options to secure water transfers between Maroondah Reservoir and the Melbourne water supply system, and identify an appropriate management plan for the aqueduct (renewal or replacement) for the long term. That study recommended the implementation of a risk based priority replacement or refurbishment schedule for the aqueduct, like for like, or with a pipeline as required. Currently sections of the Maroondah Aqueduct from chainage 9.58 to 15.28 km are considered to present significant risks due to age, condition and the consequences of failure which include the possibility of flooding a major road.

The driver for expenditure is 100% renewals, due to the age and assessed condition of the asset and in particular the risk of failures at the Melba Highway crossing and near Balgownie Estate.

A BNI business case was approved in July 2011 and a Preliminary Business Case was approved in January 2013. Initial investigations began in October 2009 based on a 2008 study to review options to securely transfer water from Maroondah Reservoir to Melbourne's water supply system. A Functional Business Case was developed in 2015 with further feasibility analysis to be undertaken in the latter half of 2015 and early 2016, with construction expected to commence in 2016-17.

The proposed works include the replacement of around 5.7km of open aqueduct, siphons and tunnels with a new 1750mm pipeline.

The proposed expenditure for this project is outlined in Table 5.18 below.

Table 5.18: Proposed capex for Maroondah Aqueduct Renewal project ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			35.03	0.01	-	-	-	35.04

Source: Melbourne Water, 2016 Price Submission

5.4.4.2 Options analysis

A number of options were identified and assessed including the "base case" option involving essentially maintaining the current system, replacing the current aqueducts and replacing the current arrangements with a pipeline along either the current or alternative routes.

The options assessment process was carried out by a consultant and appears relatively robust with several options considered. However, the options assessment and Multi-Criteria Analysis (MCA) process was conducted in 2010 based on 2007 guidelines developed by Melbourne Water. An update of this process is expected as part of the Functional Design.

The options assessment did not appear to take account of a reduced scope option whereby only those areas specifically identified as high risk (the Melba Highway crossing and area near Balgownie Estate) are targeted for improvements. These improvements could involve piping sections or could simply be improvements to the aqueduct structure and therefore provide a minimum cost option.

The consultant's report on the options assessment implies that its preferred option involves some lengths of aqueduct being retained however it is unclear whether this preferred option is the same as the preferred option in the Functional Business Case.

The preferred Option 5 in the Functional Business Case is not the lowest cost option and also does not actually appear in the consultant's options assessment report as an option but merely an opportunity for further works. The lowest cost option appears to be Option 4b however this is also unclear as there are no comparative cost estimates in the business case and there is no updated or consolidated map showing the options and their respective lengths of pipes and/or retained aqueduct sections.

The Functional Business Case lists the Net Present Cost (NPC) of Option 4b to be $16m while the NPC for Option 5 is listed as $28m. However, the text in the business case discussing the advantages of the preferred option (Option 5) indicates that one of the main factors in distinguishing the chosen option was that the cost was lower than other pipelining options. Further the increase of $12m over the Option 4b cost is significantly different to the consultant's options assessment which indicated that the further works would likely increase the base capital cost by $6m.

Both of the preferred options (Option 4b from the consultant's report and Option 5) also involve a new alignment through private property. Both options listed community concern over the proposed alignment as a major issue that will require consultation; the result of which may be a revised alignment.

Following the review of our draft report Melbourne Water provided additional commentary indicating that a new option 6 has been developed which represents a combination of previous options. Predominantly aligned to the existing route, the new option reduces the impacts on property owners, an issue which Melbourne Water states it has already resolved. Further details and assessment of the new option 6 are expected in an updated business case which Melbourne Water has indicated will be completed in February 2016.

5.4.4.3 Discussion and analysis

While the original options assessment covers a good range of options, it is not clear that a reasonable alternative option has been considered, which involves only the renewal of

those specific sections of the aqueduct that have an identified high risk. We recommend that this be included as part of the updated business case.

Melbourne Water has indicated that the timing of proposed expenditure remains at the front end of the regulatory period with the majority in the first year. We have concerns that given it is a new option (albeit based on existing options) and given the accelerated timing proposed that expenditure in the first year is likely to be delayed.

5.4.4.4 Recommended adjustments

In the absence of an updated business case, including a full assessment of the new option 6 and an option of replacing only parts of the aqueduct, it is difficult to fully assess this project. Further, while we accept Melbourne Water's view that the proposed new alignment will result in fewer landholder issues, we still consider it unlikely that the entire project will be delivered in 2016-17.

For the purposes of this report we recommend, at a minimum, rephasing of expenditure over the first two years of the regulatory period. However we also suggest the ESC reconsider this project when the updated business case is completed.

Table 5.19Proposed capex for Maroondah Aqueduct Renewal project and recommended adjustments ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			35.03	0.01	-	-	-	35.04
Recommended adjustments			-17.51	+17.515				0
Recommended capex			17.52	17.52	0.0	0.0	0.0	34.04

Source: Melbourne Water, 2016 Price Submission, Arup

5.4.5 Holden Supply Tank & Inlet Augmentation

This project involves building an approximately 3.25 km 1150 mm diameter water supply pipeline along the Melton Highway, from Greenvale to the Sydenham Pipeline, to supply water to growth areas between Caroline Springs and Melton.

This in one of five related projects to implement the recommendations of the Bulk Potable Water Growth Servicing Plan Review: Optimisation of Bulk Potable Water Supply Capital Works for Sunbury, Holden, Melton and Sydenham Systems. The remaining components are to be completed up to 2025-26 and involve a new reservoir, inlet and outlet pipelines and a new pumping station.

The servicing plan was developed in consultation with, and endorsed in principle by, City West Water and Western Water. These projects will provide bulk water transfer infrastructure to supply the growth area in the longer term (beyond 2040).

The sole driver for this expenditure is growth with the works required to ensure that new development areas are supplied with water that meets Melbourne Water's obligations and service performance targets.

Table 5.20: Proposed capex for Holden Supply Tank & Inlet Augmentation project ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			-	-	4.56	19.21	-	23.77

Source: Melbourne Water, 2016 Price Submission

5.4.5.2 Options analysis

The options considered for this project appear to be reasonably comprehensive and appear to have been discussed with the retail customers in a workshop environment (as part of the water growth servicing plan review in March 2014).

The NPV/NPC of the five option variants assessed differs significantly from $77.1m to $43.4m however the results from the MCA process are quite similar across the options apart from the preferred option which is significantly better than the others.

5.4.5.3 Discussion and analysis

The results from the MCA process appear unusual particularly in the case of the preferred option 2 and its variant option 2A. The only difference between these two options is a slight alignment variation, which adds only 3.5% to the capital cost but which makes a significant difference to the MCA score. No detailed explanation of the MCA scores is provided apart from the summary MCA results which appear to indicate that the key scoring differences were in impacts on flora and fauna and cultural heritage.

A key issue raised in the growth servicing plan review report was around the use of peak day demand factors and the applicability of factors given the long time frame over which this project has been developed. However it is noted that all the options considered have common works requirements in the fourth regulatory period and beyond to 2022-23 and therefore that potential future changes to demand will not affect the immediate works.

Given the driver for this project and the options assessment process (including customer consultation) we are reasonably satisfied with this project expenditure.

5.4.5.4 Recommended adjustments

We do not propose any adjustments to this project.

5.5 Major waterways and drainage projects

The major projects associated with the waterways and drainage services comprise approximately 10% of the overall capital spend across the 2016 price submission. The projects primarily comprise the rehabilitation or upgrade of existing drainage and flood protection infrastructure in the area of drainage and flooding.

Most waterways and drainage capital works are forecast to occur within the first two years of the fourth regulatory period.

5.5.1 Murrumbeena Main Drain Flood Mitigation

5.5.1.1 Project description and key drivers

The Murrumbeena Main Drain Flood Mitigation project involves the reduction of flooding of properties located in Melbourne's south east within Glen Eira and Stonnington municipalities.

A flood mitigation solution has been proposed by Melbourne Water which involves the construction of approximately 2km of new drainage pipeline to reduce flood risk from Extreme to High. The proposed flood mitigation works option involves pipe works from Bute Street to the catchment outlet into Gardiners Creek at the Monash Freeway.

Table 5.21 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 98% of the P50 estimate (real dollars) in the business case. The BNI was approved in 2015.

The sole driver for this project has been identified as compliance, specifically legislative requirements under the Water Act relating to floodplain management.

The operating costs incurred as a result of delivering this project have not been calculated by Melbourne Water.

Table 5.21: Proposed capex for Murrumbeena MD Flood Mitigation Works ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			1.23	18.27	17.83	0.09	-	37.42

Source: Melbourne Water, 2016 Price Submission

5.5.1.2 Options analysis

Investigation of the flooding occurring in Bute Street and surrounding properties commenced in July 2011, by the City of Glen Eira. Since that time, a number of studies and assessments have been undertaken by Melbourne Water, including a preliminary options assessment in December 2014.

The options assessment generally appears reasonable and thorough, considering a number of alternatives to reducing the impact of flooding on the residences identified in the area.

5.5.1.3 Discussion and analysis

Melbourne Water has modelled the number of properties impacted by flooding and the reduction which could be achieved with the construction of the preferred option. Table 5.22 below summarises the estimated benefits against a range of return periods.

Table 5.22: Properties removed from flooding with implementation of proposed project

Average Recurrence Interval (ARI)	Existing – Residential Properties Flooded	Proposed Flood Mitigation Works – Residential Properties Flooded	Properties removed from the flood extent as a result of works
100yr	736	671	65
50yr	599	545	54
20yr	484	419	65
10yr	310	233	77
5yr	151	93	58

Source: Melbourne Water, 2016 Price Submission.

The modelling indicates that up to 65 properties will be removed from flooding across all return periods. The business case also states that the proposed option would reduce the flood risk of all 736 properties from extreme to high.

We requested that Melbourne Water provide a benchmark of typical costs for flooding works against properties benefitted from flood mitigation projects. Melbourne Water advised that a general rule of thumb of $50,000 per property for reduction of flood risk from extreme to high. If applied, and it was assumed that 736 properties were removed from extreme flood risk to high flood risk, this would equates to approximately $50,800 per property and in line with Melbourne Water's typical expectations. It is also noted that a detailed cost estimate has not yet been developed for the project. As such, the benchmark value provides a suitable comparison to evaluate the efficiency of the proposed approach.

5.5.1.4 Recommended adjustments

We do not propose any adjustments to this project.

5.5.2 Alexandra Parade Main Drain Redecking

5.5.2.1 Project description and key drivers

This project entails the replacement of approximately 780 metres of roof deck panels on the Alexandra Parade Main Drain between Nicholson St in Fitzroy, and Gold St in Collingwood.

Melbourne Water has identified approximately 780 metres of the drain decking as being in poor condition, and suggests that it does not have the capacity to support required vehicle loadings.

Previous projects to replace sections of the drain decking have been undertaken, and in the meantime a perimeter fence was constructed for the full length of the median strip from Nicholson St to the Eastern Freeway to exclude vehicles until the future upgrade of the drain. The post and chain style fence (2.8 km length) was constructed by Melbourne Water in 1996.

Table 5.23 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 99% of the P50 estimate (real dollars) in the business case. The BNI was approved in 2011.

The sole driver for this project has been identified as renewals.

The operating costs incurred as a result of delivering this project have not been calculated.

Table 5.23 Proposed capex for Alexandra Pde Main Drain Redecking ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			-	-	2.33	13.36	13.36	29.05

Source: Melbourne Water, 2016 Price Submission

5.5.2.2 Options analysis

A detailed options analysis was not originally provided for this project. The business case notes two options: do nothing and the proposed project. We do not believe a level of rigour

has been applied to the development of alternative options, with a reliance on historical delivery of redecking of the asset and a cost estimate developed in 2011.

Options which do not require costly excavation of the drain decking including restricting and controlling access which would appear to offer more efficient solutions do not appear to have been considered.

5.5.2.3 Discussion and analysis

The application of AS5100 Bridge Design Code as the basis for the redecking appears to be conservative, noting that the drain is located within the median strip along Alexandra Parade, is fenced off from access by vehicles, and bound by large trees on both sides. Vehicular access is currently limited to vehicles required for mowing and access to the drain for maintenance.

Melbourne Water has indicated that one failure of the decking has occurred since the fence was installed in 1996. This appears to have occurred due to excavation works being undertaken within the median strip which resulted in damage to the asset. As the fence is maintained by Melbourne Water, and access is only granted to VicRoads for mowing, Melbourne Water has a reasonable level of control on the access to the area over the drain.

Further it is understood that the East-West Link Freeway may have included the widening of Alexandra Pde which may have required these works as vehicles would traffic directly over the drain. As the East-West Link Freeway has been cancelled, widening of Alexandra Pde and therefore the potential loading requirements for the drain are no longer required.

5.5.2.4 Recommended adjustments

Our draft report recommended that this project be rejected as it did not appear to reflect efficient or prudent expenditure. We suggested that the fencing and tree lined median strip have been sufficient to protect the drain to date, and with Melbourne Water able to control access to the area, an upgrade to AS5100 did not appear reasonable. However, we noted that funding for investigation and development of alternative options should be provided and undertaken within the fourth regulatory period.

In response to our draft report Melbourne Water provided information including:

- An options study indicated that a shorter length of drain required repair compared with the original intent to repair the full 760m and this could be achieved at approximately half the cost;
- A reduced cost estimate had been developed for the shorter section; and
- Areas along the drain are at risk with low loading of 10 tonnes (small to medium vehicles) which would be required to undertake normal maintenance of the drain or median strip.

Large sections of the drain which have been identified for repair are located within the median strip. The proposed approach would see these sections upgraded to AS5100 Bridge Code which in our view appears unreasonable. However, the sections which have been noted to be in poor condition have the potential to fail with small to medium loads which would be reasonably expected to enter the median strip for normal maintenance works. As such, it would appear prudent to upgrade these sections to standard of the existing drain to cater for these small loads rather than meeting AS5100. There does not appear to be any external driver for upgrading the entire length of the drain to the bridge code at this time.

Based on the new information provided by Melbourne Water, our recommended adjustments to this project are:

- Repair of the identified damaged sections only (estimated to be approximately 400m) rather than the full 760m appears reasonable;
- Repairs of the drain within the median strip are not required to meet the bridge code but should be repaired to existing standard to cater for small to medium vehicles necessary for maintenance; and
- Cost estimates should reflect efficiencies gained from framework agreements. A 10% reduction in the revised cost has been included in our adjustment below.

Our final recommended adjustments for this project are summarised in the table below.

Table 5.24: Proposed capex for Alexandra Pde MD Redecking and recommended adjustments ($m, 01/01/2015)

Opex item	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex	-	-	2.33	13.36	13.36	29.05
Recommended adjustments	0	0	-0.83	-6.7	-6.7	-14.23
Recommended capex	0	0	1.5	6.66	6.66	14.82

Source: Melbourne Water, 2016 Price Submission, Arup

5.5.3 Regan St Flood mitigation project

5.5.3.1 Project description and key drivers

Melbourne Water has undertaken a flood risk assessment of part of the St Albans West Drain catchment area and has identified an area of extreme flood risk between the railway lines at Regan Street to Gladstone Street in Cairnlea.

In 2006 Melbourne Water identified that a retarding basin could be constructed at a private property at 51 Regan St once the property was developed by the owners. The property is currently undeveloped, and Melbourne Water has commenced discussions with the owner to utilise a portion of the site for the retarding basin in an otherwise highly developed area.

The construction of the retarding basin is expected to reduce flooding for 210 properties and provide amenity to the area.

Table 5.25 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 97% of the P50 estimate (real dollars) in the business case. The BNI was approved in 2014 and subsequently reapproved in 2015.

The sole driver for this project has been identified as compliance, specifically legislative requirements under the Water Act relating to floodplain management.

The operating costs incurred as a result of delivering this project have been calculated at $20,000 per annum.

Table 5.25: Proposed capex for Regan St Flood Mitigation Project ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			9.20	0.13	-	-	-	9.32

Source: Melbourne Water, 2016 Price Submission

5.5.3.2 Options analysis

A detailed assessment of options has not been undertaken, and no options report or investigation exists specifically for this project. The recommendation for the construction of a retarding basin originates from a 2006 report but it appears that further assessment has not been undertaken.

A simplified options analysis is outlined in the business case provided by Melbourne Water which includes a comparison of the proposed retarding basin, acquisition of 29 properties currently at extreme flood risk ('subject to flooding above floor level'), and duplication of existing St Albans West Drain. The options analysis appears limited. In particular, consideration of key civil costs, such as geotechnical investigations and therefore construction costs are not outlined. This is particularly notable as Melbourne Water has noted rock excavation as a disadvantage of the preferred option, but this has not been specifically investigated for this project.

Melbourne Water has advised that the design of the retarding basin and timing for its construction is dependent on the developer who will deliver the project on Melbourne Water's behalf.

5.5.3.3 Discussion and analysis

The preferred solution for the construction of a retarding basin at Regan St was originally identified in 2006. In the 10 years since there appears to have been little progression of investigations, detailed options analysis or design. Further detailed analysis of the options is required to progress this project.

The preferred option involves the purchase of additional land from the current owners. The Business Case does not currently consider the full implications of constructing the retarding basin on the development site including the cost implications of land tax (if included), or access for maintenance. Furthermore, the location of the retarding basin next to the railway tracks and any requirements to meet ANCOLD guidelines given the higher risk in the event of a failure are not identified.

5.5.3.4 Recommended adjustments

Subsequent to our draft report, Melbourne Water provided additional information relating to the timing of the project and the status of negotiations with the owner. Our original concerns regarding the timing of the project have been alleviated, however, alternatives to the retarding basin solution have not been provided. Ultimately, while we expect that the retarding basin solution is reasonably cost effective, Melbourne Water has not necessarily demonstrated this or that the broader implications of this project have been considered.

At the same time, we expect that a reduction in cost can achieved by Melbourne Water in the delivery of this project. In our draft report we recommended a reduction of 10% of capital cost and the deferral of construction to 2017-18, in line with the project business case. We still believe this cost reduction is reasonable.

Table 5.26 Proposed capex for Regan St Flood Mitigation Project and recommended adjustments ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			9.2	0.13				9.33
Recommended adjustments			-0.92	0.01				-0.93
Recommended capex			8.28	0.12				8.40

Source: Melbourne Water, 2016 Price Submission, Arup

5.5.4 Mile Creek East Retarding Basin Upgrade

5.5.4.1 Project description and key drivers

Mile Creek East Retarding Basin is located 25km south-east of Melbourne CBD off Wellington Rd, near the Monash Freeway, Mulgrave. The basin consists of an earthen embankment constructed around 1971 by the Dandenong Valley Authority. The embankment structure has an uncontrolled low level outlet. In 2013, a Spillway Capacity Assessment was undertaken and determined that the retarding basin was a High A consequence category 'dam' based on ANCOLD Guidelines. As such, this project includes upgrades to the Retarding Basin to meet the ANCOLD Guidelines and the accepted limit of tolerability for existing dams.

The preferred option involves raising the earthfill embankment and limiting the overtopping height, plus a new spillway to achieve the target flood capacity.

Table 5.27 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 95% of the P50 estimate (real dollars) in the business case. A BNI was approved in 2014 and a Preliminary Business Case was developed in 2015.

The sole driver for this project has been identified as compliance, specifically requirements under Melbourne Water's Statement of Obligations.

The operating costs incurred as a result of delivering this project have been calculated at $2,000 per annum.

Table 5.27 Proposed capex for Mile Creek Retarding Basin Upgrade ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			6.08	0.08	-	-	-	6.16

Source: Melbourne Water, 2016 Price Submission

5.5.4.2 Options analysis

An options assessment has been provided in the business case developed for the project, however, a standalone assessment report has not been provided for the project. Although simplified, the options analysis within the business case demonstrates that a level of rigour has been applied to the identification and assessment of options, including broader concerns of the community and stakeholders.

The options assessment also provides a MCA for the options. The preferred option and proposed project achieves the highest MCA score, and is also the most expensive of the three options considered which included 'do nothing' and construction of a concrete parapet to raise the embankment.

5.5.4.3 Discussion and analysis

This project appears to achieve the required outcomes at a reasonable cost. We had initial concerns that timing of this project appeared to be delayed, however subsequent to our draft report Melbourne Water indicated that the design and construction of these works has been awarded to one of its contractors for delivery in 2016-17.

5.5.4.4 Recommended adjustments

Our view is that Melbourne Water's proposed capex for this project is reasonable, as set out in Table 5.28.

Table 5.28: Proposed capex for Mile Creek Retarding Basin Upgrade and recommended adjustments ($m, 01/01/2015)

Capex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			6.08	0.08	-	-	-	6.16
Recommended adjustments								
Recommended capex			6.08	0.08				6.16

Source: Melbourne Water, 2016 Price Submission, Arup

5.5.5 Jacana retarding basin upgrade

5.5.5.1 Project description and key drivers

Jacana Retarding Basin is located approximately 14km north of Melbourne in Glenroy on Moonee Ponds Creek. The basin was formed by the construction of an earthen embankment. The basin was design and built in 1967.

A report was prepared in 2010 by SMEC which categorised the dam as an extreme consequence category dam. In 2013, URS carried out a risk assessment for Jacana Retarding Basin, and identified the modes of failure. In 2015, URS completed a further risk assessment and identified that the current risk posed by the retarding basin exceeds the limit of tolerability for existing dams based on ANCOLD guidelines.

The preferred option involves raising the earthfill embankment by 1.15m with the inclusion of a full height filter buttress.

Table 5.29 below provides the breakdown of proposed capex over the fourth regulatory period. This equates to approximately 90% of the P50 estimate (real dollars) in the business case. A BNI business case was approved in 2014 and a Preliminary Business Case was developed in 2015.

The sole driver for this project has been identified as compliance, specifically requirements under the Statement of Obligations.

The operating costs arising from this project have not been calculated but are expected to be minor.

Table 5.29 Proposed capex for Jacana Retarding Basin Upgrade ($m, 01/01/2015)

Opex item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Proposed capex			4.94	-	-	-	-	4.94

Source: Melbourne Water, 2016 Price Submission

5.5.5.2 Options analysis

An options assessment has been provided in the business case developed for the project, and it is understood that options were developed by URS in 2013 as part of a Retarding Basin Risk Assessment. Although simplified, the options analysis within the business case demonstrates a sound approach to the identification and assessment of options, including broader concerns of the community and stakeholders.

The options assessment also provides the MCA for the options. The preferred option and proposed project achieves the highest MCA score, and is also the most expensive of the three options considered which included 'do nothing' and construction of 0.5m embankment rise while decreasing the spillway by 0.9m. The cost difference between the construction options and MCA scores are negligible and both appear to offer adequate solutions.

5.5.5.3 Discussion and analysis

This project appears to achieve the required outcomes at a reasonable cost. Timing for delivery of the works appears reasonable.

5.5.5.4 Recommended adjustments

We do not propose any adjustments to this project.

5.6 Major Programs Review

Melbourne Water has outlined its top 15 capital programs across each of the service areas in addition to specific projects. The major programs are a significant component of the capital forecast for each area, and in particular for waterways and drainage.

While the capital projects are supported by business cases and a number of investigations and design, less information was provided for the programs. Following the review of our draft report, we received some supporting documents / business cases, however they were generally dated from 2011 and 2012. It was not stated whether cost estimates, key drivers or justifications had been updated since this time. In addition, a number of the supporting documents were incomplete and were mostly at BNI stage. Furthermore, the business case approvals were dated in 2011 and 2012 and often by staff no longer working for Melbourne Water. This would appear to indicate that these business cases have not been through a robust review process or received internal sign off for the costs determined for the next regulatory period and would appear to demonstrate that efficiencies gained over the past three years have not been included. Particularly where increased allocations were being requested, it would seem necessary for these business cases to have received internal approval for the additional capital. Therefore, our assessment is predominantly based on the information provided in the 2016 Price Submission, historical spend on programs (where comparisons could be made), and communications received in the course of the review.

The review of Melbourne Water's progress against the programs included in the current regulatory period showed underspending against the forecast, ranging from 19% to 100%. While Melbourne Water has provided some explanation for the significant underspend across the programs (primarily around contract changes and contractor resourcing issues), we believe there are generally further efficiencies that can be achieved in the delivery of

the programs. In particular, these efficiencies might be achieved using lower contract rates from new design and delivery panel arrangements, and an expected focus on delivering programs that achieve service levels more efficiently with greater emphasis on lower cost, non-asset solutions.

Given this, we recommend that unless otherwise indicated for specific projects below, a reduction in the proposed programs is warranted, and a nominal figure of 20% has been selected. This reflects both the slower progress compared to forecast as well as the efficiencies achieved from the design and construct framework agreements and the in-house delivery of waterways projects to be reflected in reduced costs for each of the programs.

5.6.1 Water Allocations

5.6.1.1 Allocations Description and Drivers

Melbourne Water has provided a summary of the major capex allocations for water service delivery. Table 5.30, below, provides the breakdown of the allocation programs, drivers and program areas.

Table 5.30 Proposed major Water allocation programs ($m, 01/01/2015)

Allocation Program Name	Drivers	Program	Total 2016 Price Submission
Water Quality – M&E Assets Renewals Program	Renewals (100%)	Water Quality	37.9
Aqueducts Renewals Program	Renewals (80%) Improvement in Service (20%)	Water Production and Storage	27.8
Water Supply Tank Renewals	Renewal (100%)	Water Transfer	22.6
Water Transfer – M&E Assets Renewals Program	Renewals (100%)	Water Transfer	19.0
Maroondah Aqueduct Renewal of Tunnel Sections	Improvement in Service (60%) Renewals (40%)	Water Production and Storage	11.4

Generally, only limited information has been provided for each of the allocation programs. Further, the naming of the allocations cannot be readily reconciled against previous regulatory submissions to allow for a historical comparison.

Aside from the information in Table 5.30, which has been sourced from Melbourne Water's pricing submission, we have been provided with 2011-12 business cases that are often incomplete. Our view is that these business cases do not adequately justify the programs and the expenditure requested, not clearly demonstrating the revised capital requirements have been approved as a requirement for the business by Melbourne Water's management.

5.6.1.2 Discussion

Melbourne Water has not provided any detailed information to support the allocations programs. We understand that the allocations listed above are continued programs of work, however, naming conventions limits comparative analysis against historical forecasts.

Based on the performance and summary of major projects and program outcomes from the current regulatory period, it has been observed that Melbourne Water has typically underspent against these programs by 19-50%.

5.6.1.3 Recommended Adjustments

It is recommended that the current allocations are reduced by 20% as discussed above to include efficiencies recently gained on design services and design and construct contracts, as well as the historical trend of underspending on capital budgets.

Table 5.31 Proposed capex for Water Programs and recommended adjustments ($m, 01/01/2015)

Allocation Program Name	Total 2016 Price Submission	Recommended Capex
Water Quality – M&E Assets Renewals Program	37.9	30.3
Aqueducts Renewals Program	27.8	22.2
Water Supply Tank Renewals	22.6	18.1
Water Transfer – M&E Assets Renewals Program	19.0	15.2
Maroondah Aqueduct Renewal of Tunnel Sections	11.4	9.1
Total	118.7	95.0

5.6.2 Sewerage Allocations

5.6.2.1 Programs Description and Key Drivers

Melbourne Water has provided a summary of the major capex allocations for sewerage service delivery. Table 5.32, below, provides the breakdown and comparison to historical performance where information was available.

Table 5.32 Proposed major Sewer allocation programs ($m, 01/01/2015)

Allocation Program Name	Drivers	Program	Total 2016 Price Submission	Historical comparison
ETP – M&E Assets Renewal Program	Renewals (100%)	Sewerage Treatment/Disposal ETP	90.7	78.7
Hobsons Bay Main Yarra Crossing Optimisation Program	Renewals (70%) Improvement in Service (30%)	Sewerage Transfer	40.2	-
Sewer Transfer – M&E Assets Renewals Program	Renewal (100%)	Sewerage Transfer	37.1	-
WTP – M&E Assets Renewal Program	Renewals (100%)	Sewerage Treatment/Disposal WTP	29.2	-

ETP – Minor Capital Assets Renewals Program	Renewals (100%)	Sewerage Treatment/Disposal ETP	18.8	-

As discussed previously, information received for the allocations programs includes the 2016 Pricing Submission and the 2011-12 business cases for these allocations. Further, the naming of the allocations cannot be readily reconciled against previous regulatory period submissions to allow for a historical comparison.

5.6.2.2 Discussion

A comparison of the ETP Mechanical and Electrical Assets Renewals Program historical and forecast cost shows an increase cost of 15% for the fourth regulatory period. When also compared with the actual spend against the Mechanical and Electrical Assets Renewals program, Melbourne Water underspent by approximately 19%. Without further justification for the reasons for the increase in this allocation, and the works and need for all the sewerage allocation programmes, our recommendation is that a reduction should be applied to the proposed costs.

5.6.2.3 Recommended Adjustments

It is recommended that the current allocations are reduced by 20% as discussed above to include efficiencies recently gained on design services and design and construct contracts, as well as the historical trend of underspending on capital budgets.

Table 5.33 Proposed capex for Sewer Programs and recommended adjustments ($m, 01/01/2015)

Allocation Program Name	Total 2016 Price Submission	Recommended Capex
ETP – M&E Assets Renewal Program	90.7	72.6
Hobsons Bay Main Yarra Crossing Optimisation Program	40.2	32.2
Sewer Transfer – M&E Assets Renewals Program	37.1	29.7
WTP – M&E Assets Renewal Program	29.2	23.4
ETP – Minor Capital Assets Renewals Program	18.8	15.0
Total	216.0	172.8

5.6.3 Waterways and Drainage Allocations

5.6.3.1 Programs Description and Key Drivers

Melbourne Water has provided a summary of the major capex allocations for waterways and drainage service delivery. Table 5.34 provides the breakdown of the allocation programs, drivers and program areas.

Table 5.34 Proposed major Waterways and Drainage allocation programs ($m, 01/01/2015)

Allocation Program Name	Drivers	Program	Total 2016 Price Submission	Historical Comparison
Land Development Works	Growth (100%)	Land Development	423.2	304.3*
Flood Mitigation Works	Compliance (100%)	Drainage and Flood Protection	128.2	105.3
Healthy Waterways Strategy Delivery	Compliance (100%)	Waterways Condition	68.4	-
Rehabilitation of Existing Wetlands	Renewals (100%)	Stormwater Quality	52.8	-
Retarding Basin Spillway/ Embankment Upgrades	Compliance (100%)	Drainage and Flood Protection	45.9	56.4

*Melbourne Water Price Submission Template, 2013

Melbourne Water has developed a Waterways and Drainage Investment Plan and a Healthy Waterways Strategy to support the allocation program proposed for the 2016 pricing period. The Investment Plan outlines the considerations for each of the major allocation programs, scope of the programs and recovery of costs (where appropriate). The Healthy Waterways Strategy provides some more detail on the works required across five key catchment areas.

Allocations represent 81% of the total waterways and drainage capex with land development comprising the largest component.

5.6.3.2 Discussion

While there is limited information in Melbourne Water's 2016 Price Submission, a more robust discussion of the allocations programs has been provided in the Investment Plan and Healthy Waterways Strategy. This provides some additional confidence regarding the ability of Melbourne Water to deliver against the program with a strategic commitment to delivery of the works.

Melbourne Water indicated that over 130,000 properties are currently at risk of flooding. With the allocated budget, it would be expected that Melbourne Water nominates the target number of properties removed from extreme flooding risk for this program. It is expected that this number should exceed 2,500 properties based on the benchmark of $50,000 per property removed from a 1 in 100 year storm event.

A comparison of the customer contributions expected in its 2013 and 2016 price submissions indicates that Melbourne Water is expecting to receive 4% less from developer and customer contributions than in previous years.

5.6.3.3 Recommended Adjustments

It is recommended that the current allocations are reduced to include efficiencies gained on design services and design and construct contracts, historical trend of underspending on capital budgets and the in-house delivery of waterways and drainage projects.

During our review we identified that the total project costs listed in the supporting business case for Land Development Works was $10 million lower than the costs listed in Melbourne Water's price submission for this program. Accordingly, we have adjusted Melbourne Water's capex for this program to align with the business case funds, before applying the overall reduction of 4%.

Table 5.35 Proposed capex for Waterways and Drainage Programs and recommended adjustments ($m, 01/01/2015)

Allocation Program Name	Total 2016 Price Submission (gross)	Recommended Capex (gross)	Percentage Adjustment Applied
Land Development Works	423.2	396.3	4% reduction to meet 70% developer contribution, plus $10m reduction to reflect business case costs
Flood Mitigation Works	128.2	102.6	20% reduction based on historical underspend and efficiencies from design and construct framework
Healthy Waterways Strategy Delivery	68.4	54.7	20% reduction based on efficiencies from design and construct framework and in-house delivery of projects
Rehabilitation of Existing Wetlands	52.8	42.2	20% reduction based on efficiencies from design and construct framework and in-house delivery of projects
Retarding Basin Spillway/ Embankment Upgrades	45.9	41.3	10% reduction to include efficiencies from design and construct contract
Total	**718.5**	**637.1**	

5.7 Summary of our recommendations

We have summarised our review of the major capital projects in the tables below, providing the proposed forecast, our recommended adjustments and the net change or impact of our recommendations.

Across the major projects, a total reduction of approximately $162.5 million is recommended, which reflects 26% reduction on Melbourne Water's 2016 price submission proposal for these projects. Across the top 15 programs, we have recommended $148.4 million of reductions, which reflects 14% of the total proposed capex for these programs.

Given our finding of recommended reductions for a number of the top five projects and top five programs reviewed, with the projects and programs typically comprising over 50% of the capital expenditure for each service, we expect that a review of the remainder of the capital projects and programs will most likely identify similar issues. We therefore propose

an overall reduction of 5% across the broader capital program, excluding the projects and programs already reduced. This overall reduction reflects both anticipated delays in progress compared to forecast as well as the efficiencies achieved from the design and construct framework agreements and the in-house delivery of waterways projects to be reflected in reduced costs for each of the programs. Our proposed overall reduction of 5% results in a reduction of $50 million over the fourth regulatory period, as set out in Table 5.44. The adjustment is lower than the actual reductions made to the top the five projects and programs which reflects the efforts Melbourne Water is making to improve delivery performance and to reduce the impact of contract transition periods.

Overall, the impact of our recommendations is a 13% reduction on total capex over the 2016 price submission period.

Table 5.36: Melbourne Water's forecast capex (Sewerage Top 5 Projects) and recommended adjustments ($m, 01/01/2015)

		2016 Price Submission forecast					Total for
Capex item		2016-17	2017-18	2018-19	2019-20	2020-21	period
ETP Sludge Digestion Augmentation	Proposed	0.42	1.12	1.31	19.36	18.89	41.10
	Recommended	0.42	1.12	1.31	19.36	18.89	41.10
	Net change	0.00	0.00	0.00	0.00	0.00	0.00
Upper Hobsons Bay Sewer Renewal	Proposed	1.95	20.47	19.97	0.00	0.00	42.39
	Recommended	1.95	0.00	0.00	0.00	0.00	1.95
	Net change	0.00	-20.47	-19.97	0.00	0.00	-40.44
WTP 55E Renewal	Proposed	0.34	0.42	2.04	5.04	66.87	74.71
	Recommended	0.34	0.42	2.04	5.04	0.00	7.84
	Net change	0.00	0.00	0.00	0.00	-66.87	-66.87
WTP Treatment Capacity	Proposed	31.02	110.41	37.61	2.17	1.02	182.23
	Recommended	31.02	110.41	37.61	2.17	1.02	182.23
	Net change	0.00	0.00	0.00	0.00	0.00	0.00
WTP Sludge Drying Capacity	Proposed	0.00	0.24	37.61	0.72	0.00	38.57
	Recommended	0.00	0.24	37.61	0.72	0.00	38.57
	Net change	0.00	0.00	0.00	0.00	0.00	0.00

Source: Melbourne Water, 2016 Price Submission, Arup

Table 5.37: Melbourne Water's forecast capex (Water Top 5 Projects) and recommended adjustments ($m, 01/01/2015)

		2016 Price Submission forecast					Total for
Capex item		2016-17	2017-18	2018-19	2019-20	2020-21	period
Winneke WTP UV System upgrade	Proposed	0.00	0.50	1.20	22.72	7.25	31.67
	Recommended	0.00	0.00	0.30	6.53	20.45	27.27
	Net change	0.00	-0.50	-0.90	-16.20	13.20	-4.40
St Georges Road Renewal	Proposed	20.98	5.43	0.00	0.00	0.00	26.41
	Recommended	20.98	5.43	0.00	0.00	0.00	26.41
	Net change	0.00	0.00	0.00	0.00	0.00	0.00
Merri Creek to MCG Main Renewal	Proposed	3.62	19.66	11.99	0.35	0.00	35.62
	Recommended	0.00	0.00	0.00	0.00	0.00	0.00
	Net change	-3.62	-19.66	-11.99	-0.35	0.00	-35.62
Maroondah Aqueduct Renewal	Proposed	35.03	0.01	0.00	0.00	0.00	35.04
	Recommended	17.52	17.53	0.00	0.00	0.00	35.04
	Net change	-17.52	17.52	0.00	0.00	0.00	0.00
Holden Supply Tank & Inlet Augmentation	Proposed	0.00	0.00	4.56	19.21	0.00	23.77
	Recommended	0.00	0.00	4.56	19.21	0.00	23.77
	Net change	0.00	0.00	0.00	0.00	0.00	0.00

Source: Melbourne Water, 2016 Price Submission, Arup

Table 5.38: Melbourne Water's forecast capex (Waterways and Drainage Top 5 Projects) and recommended adjustments ($m, 01/01/2015)

		2016 Price Submission forecast					Total for
Capex item		2016-17	2017-18	2018-19	2019-20	2020-21	period
Murrumbeena Main Drain Flood Mitigation	Proposed	1.23	18.27	17.83	0.09	0.00	37.42
	Recommended	1.23	18.27	17.83	0.09	0.00	37.42
	Net change	0.00	0.00	0.00	0.00	0.00	0.00
Alexandra Parade Main Drive Redecking	Proposed	0.00	0.00	2.33	13.36	13.36	29.05
	Recommended	0.00	0.00	1.50	6.66	6.66	14.82
	Net change	0.00	0.00	-0.83	-6.70	-6.70	-14.23
Regan St Flood mitigation project	Proposed	9.20	0.13	0.00	0.00	0.00	9.33
	Recommended	8.28	0.12	0.00	0.00	0.00	8.40
	Net change	-0.92	-0.01	0.00	0.00	0.00	-0.93
Mile Creek East Retarding Basin Upgrade	Proposed	6.08	0.08	0.00	0.00	0.00	6.16
	Recommended	6.08	0.08	0.00	0.00	0.00	6.16
	Net change	0.00	0.00	0.00	0.00	0.00	0.00
Jacana retarding basin upgrade	Proposed	4.94	0.00	0.00	0.00	0.00	4.94
	Recommended	4.94	0.00	0.00	0.00	0.00	4.94
	Net change	0.00	0.00	0.00	0.00	0.00	0.00

Source: Melbourne Water, 2016 Price Submission, Arup

Table 5.39: Melbourne Water's forecast capex allocations (sewerage services) and recommended adjustments ($m, 01/01/2015)

Allocation Program Name	Total 2016 Price Submission	Recommended Capex
ETP – M&E Assets Renewal Program	90.7	72.6
Hobsons Bay Main Yarra Crossing Optimisation Program	40.2	32.2
Sewer Transfer – M&E Assets Renewals Program	37.1	29.7
WTP – M&E Assets Renewal Program	29.2	23.4
ETP – Minor Capital Assets Renewals Program	18.8	15.0
Total	216.0	172.8

Table 5.40: Melbourne Water's forecast capex allocations (water services) and recommended adjustments ($m, 01/01/2015)

Allocation Program Name	Total 2016 Price Submission	Recommended Capex
Water Quality – M&E Assets Renewals Program	37.9	30.3
Aqueducts Renewals Program	27.8	22.2
Water Supply Tank Renewals	22.6	18.1
Water Transfer – M&E Assets Renewals Program	19.0	15.2
Maroondah Aqueduct Renewal of Tunnel Sections	11.4	9.1
Total	118.7	95.0

Table 5.41: Melbourne Water's forecast capex allocations (waterways and drainage) and recommended adjustments ($m, 01/01/2015)

Allocation Program Name	Total 2016 Price Submission	Recommended Capex
Land Development Works	423.2	396.3
Flood Mitigation Works	128.2	102.6
Healthy Waterways Strategy Delivery	68.4	54.7
Rehabilitation of Existing Wetlands	52.8	42.2
Retarding Basin Spillway/ Embankment Upgrades	45.9	41.3
Total	718.5	637.1

Table 5.42: Total recommended adjustments - Top 15 Major Projects ($m, 01/01/2015) ($m, 01/01/2015)

	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Total proposed capex – major projects	114.81	176.74	136.45	83.02	107.39	618.41
Recommended capex – major projects	92.76	153.62	102.76	59.78	47.02	455.92
Net change	-22.06	-23.13	-33.69	-23.25	-60.37	-162.49
% adjustment	-19%	-13%	-25%	-28%	-56%	-26%

Source: Melbourne Water, 2016 Price Submission, Arup

Table 5.43: Total recommended adjustments - Top 15 Major Programs ($m, 01/01/2015) ($m, 01/01/2015)

	Sewerage allocations	Water allocations	Waterways and Drainage allocations	Total
Total proposed capex – major programs	216.00	118.70	718.50	1053.20
Recommended capex – major programs	172.80	94.96	637.07	904.83
Net change	-43.20	-23.74	-81.43	-148.37
% adjustment	**-20%**	**-20%**	**-11%**	**-14%**

Source: Melbourne Water, 2016 Price Submission, Arup

Table 5.44: Total recommended adjustments – Total capex impact ($m, 01/01/2015) ($m, 01/01/2015)

	2016-17	2017-18	2018-19	2019-20	2020-21	Total for period
Total proposed capex (gross, excluding VDP capitalisation)	503.7	562.6	526.0	500.7	479.0	2,572.0
Recommended reductions for projects	-22.1	-23.1	-33.7	-23.2	-60.4	-162.5
Recommended reductions for programs						-148.4
Recommended reductions across capital program (projects and programs not reviewed)	-11.0	-8.9	-8.5	-9.2	-7.4	-45.1
Total recommended change						-355.9
% adjustment overall (excluding VDP capital)						-14%

Source: Melbourne Water, 2016 Price Submission; Arup

Limitation of our work

General use restriction

This report is prepared solely for the internal use of the Essential Services Commission. This report is not intended to and should not be used or relied upon by anyone else and we accept no duty of care to any other person or entity. The report has been prepared for the purpose of Melbourne Water's expenditure review. You should not refer to or use our name or the advice for any other purpose.

Contact Us

Deloitte Access Economics Pty Ltd
ACN 149 633 116

550 Bourke Street
Melbourne VIC 3000
GPO Box 78
Melbourne VIC 3001 Australia

Tel: +61 3 9671 7000
Fax: +61 3308 7001
www.deloitte.com.au

About Deloitte

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee, and its network of member firms, each of which is a legally separate and independent entity. Please see www.deloitte.com/au/about for a detailed description of the legal structure of Deloitte Touche Tohmatsu Limited and its member firms.
Deloitte provides audit, tax, consulting, and financial advisory services to public and private clients spanning multiple industries. With a globally connected network of member firms in more than 150 countries, Deloitte brings world-class capabilities and high-quality service to clients, delivering the insights they need to address their most complex business challenges. Deloitte has in the region of 225,000 professionals, all committed to becoming the standard of excellence.

About Deloitte Australia

In Australia, the member firm is the Australian partnership of Deloitte Touche Tohmatsu. As one of Australia's leading professional services firms, Deloitte Touche Tohmatsu and its affiliates provide audit, tax, consulting, and financial advisory services through approximately 6,000 people across the country. Focused on the creation of value and growth, and known as an employer of choice for innovative human resources programs, we are dedicated to helping our clients and our people excel. For more information, please visit Deloitte's web site at www.deloitte.com.au.
Deloitte Access Economics is Australia's pre-eminent economics advisory practice and a member of Deloitte's global economics group. The Directors and staff of Access Economics joined Deloitte in early 2011.
Liability limited by a scheme approved under Professional Standards Legislation.
Member of Deloitte Touche Tohmatsu Limited