MARSDEN JACOB ASSOCIATES

economics
public policy
markets
strategy

Icon Water 2023-28 expenditure review

Final report

24 April 2023

A Marsden Jacob Report

Prepared for Independent Competition and Regulatory Commission (ICRC)

Marsden Jacob Associates Pty Ltd
ABN 66 663 324 657
ACN 072 233 204

e. economists@marsdenjacob.com.au
t. 03 8808 7400

Office locations
Melbourne
Perth
Sydney
Brisbane
Adelaide

Authors
Rob Nolan
Matthew Clarke
Richard Cawley

LinkedIn - Marsden Jacob Associates
www.marsdenjacob.com.au

Acknowledgements

Marsden Jacob consulted widely for this report. We would like to acknowledge and thank all the people we engaged with during this project. The report is better for your input. All final recommendations and views in this report are attributable to Marsden Jacob unless otherwise stated.

MARSDEN JACOB ASSOCIATES

Contents

Tables

Figures

Executive Summary

Marsden Jacob Associates (Marsden Jacob) has been engaged to review Icon Water's operating and capital expenditure forecasts included in its revised proposal to inform the Independent Competition and Regulatory Commission's (ICRC) 2023 price review.

This review includes an assessment of key elements of Icon Water's operating expenditure and capital expenditure forecasts included in its response to the ICRC's draft decision. The focus of the assessment has been to review and provide advice on:

- the prudency and efficiency of key elements of Icon Water's forecast capital and operating expenditure (capex and opex) for the period 1 July 2023 to 30 June 2028.
- the prudency and efficiency of capital expenditure incurred for the period 1 July 2018 to 30 June 2023.

A summary of our key recommendations to the ICRC on the prudency and efficiency of Icon Water's proposed capital and operating expenditure forecasts is set out below.

Operating expenditure review

Our review and recommendations have focused on the assumptions and inputs used to develop key components of Icon Water's proposed operating expenditure forecasts. Our recommendations include:

- Acceptance of Icon Water's proposed base year controllable operating costs with no additional adjustments
- Based on new information from Icon Water and Quantonomics, the revised productivity growth rate we recommended is between 0.8 per cent and 1.1 per cent. Comparison of recent water regulatory determinations and submissions should also be considered, which reveals the average cost efficiency of recent water regulatory submissions and determination is 1.2 per cent.
- A downward adjustment to real cost increases for electricity relating to wholesale electricity forecasts
- An adjustment to real cost weightings included in the trend and for the latest Consumer Price Index (CPI) assumptions applied to the real cost changes
- A downward adjustment to Icon Water's proposed Security of Critical Infrastructure (SOCI) step change costs
- Acceptance of Icon Water's proposed shift in software as a service cost from capital to operating expenditure.

Capital expenditure review

This review of the proposed capital expenditure is in response to Icon Water's updated proposal dated December 2022 (and subsequent updated information). The key findings and recommendations from the review of capital expenditure for the current 2018-23 regulatory period and the 2023-28 forecast regulatory period are summarised below.

Capital expenditure for the current 2018-23 regulatory period

1. There are a number of inconsistencies in the data provided and this has hampered the assessment of the capital expenditure proposal.
2. The December 2022 update has actual/forecast expenditure of $516.5 million stated in its proposal: however, Appendix 2.1 Capital Investment Plan detailed total expenditure as $506 million. This included the following corrections to the June 2022 actuals/forecast:
    - Add the lease costs of ActewAGL House, which was erroneously omitted ($4.7 million).
    - Update Corporate allocations ($17 million).
    - Correct 2021-22 expenditure (previously not updated for actual expenditure).
    - Corrections to remove duplicate transactions and updates to escalation applied to actual expenditure.
3. In March 2023 Icon Water updated the actual/forecast expenditure for the 2018-23 regulatory period to correct for errors in the previous submission in relation to:
    - Updated actual/forecasts have been provided for FY22 and FY23 (based on end of month October 2022).
    - Updated actuals for the leases and minor assets.
    - The revenue model had inadvertently included FY22 dollars in the place of nominal dollars, resulting in double escalation for FY19 to FY21.
4. The updated total actual/forecast capital expenditure for the 2018-23 regulatory period based upon the March 2023 data is $501million.
5. The updated March 2023 proposed expenditure update is $40 million (8%) above the allowance set by the Commission in the 2018 pricing determination allowance of $461 million ($2022-23). This is compared to $66 million (14%) above the allowance in the June 2022 submission (as corrected).
6. Overall, there is a $26.4 million net reduction between the June 2022 (corrected) and March 2023 submissions.
7. There was insufficient additional information provided to reinstate the expenditure removed from CX11026 AXLE-Asset Management and Maintenance Solution, $7.09 million ($2022-23).

A summary of the capital expenditure adjustments is provided in Table 1.

Table 1: Recommended capital expenditure 2018-23, $million, $2022-23

Capital expenditure adjustment	2018-19	2019-20	2020-21	2021-22	2022-23	Total 2018-23
Icon Water actual/forecast (March 2023)	116.3	131.5	99.2	72.8	81.3	501.0
Adjustments						
AXLE-Asset Management and Maintenance Solution	7.1	0	0	0	0	7.1
Recommended Capital Expenditure	**109.2**	**131.5**	**99.2**	**72.8**	**81.3**	**493.9**

Capital expenditure for the 2023-28 forecast regulatory period

1. There are a number of inconsistencies in the data provided and this has hampered the assessment of the capital expenditure proposal.
2. The December 2022 proposed capital expenditure for the 2023-28 regulatory period of $689 million, included adjustment from the June 2022 proposal:
   - Updated project cost estimates and timing
   - Inclusion of elements of the Draft Determination findings
   - Deferred expenditure from 2018-23
   - New expenditure
   - Removed projects.
3. In March 2023 Icon Water updated to the proposed expenditure for the 2023-28 regulatory period to correct for errors in the December 2022 submission in relation to:
   - Updated cashflows and allocation low value spend projects to match end of month October 2022 forecasts
   - Inclusion of cost escalators inadvertently missing from the previous submission.
4. The March 2023 updated proposed expenditure for the 2023-28 regulatory period is $687 million, and this is a net reduction of $24 million across the 2023-28 regulatory period, in comparison to the corrected June 2022 proposal.
5. Icon Water partially accepted reprofiling of capital expenditure and included their own reprofiling, but this did not push out expenditure beyond 2028.
6. We have recommended that the reprofiling expenditure (excluding the top 10 projects) with a reduction in expenditure of $14.5 million, aligned with the approach used for the Draft Determination with the following adjustments:
   - Is based upon the updated expenditure and timing of expenditure and IPAD phase in the Icon Water December 2022 proposal

- Information and communication technology (ICT) expenditure excluded from the reprofiling based upon shorter project develop periods.

7. We have not recommended the inclusion of the new project CX11335 North Weston Fanhouse Odour Control $9.2 million), as it is not clear that the project is sufficiently well defined in terms of:
   - Confirmation of the scale of the odour issues, including any regulator engagement
   - An option confirmed that will sufficiently and efficiently address the project need
   - A robust cost estimate for the project, the current estimate is +/- 75%.
8. We have accepted Icon Water capital escalation proposal.
9. CX11262 LMWQCC Biosolids Management Renewal – supported Icon Water's proposal.
10. CX11313 Water Meter Renewals – supported Icon Water's proposed meter numbers but not the estimated costs, recommending a reduction in the proposed expenditure of $2 million.
11. CX11337 Office Expansion Space Utilisation – supported Icon Water's proposed project development costs, but not the extended lease costs as it was not demonstrated that this accommodation is required.
12. CX11082 Lower Red Hill Reservoir Tank B (East) – supported Icon Water's updated proposal.

A summary of the capital expenditure adjustments is provided in Table 2.

Table 2: Recommended capital expenditure 2023-28, $million, $2022-23

Capital expenditure adjustment	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water proposal (Mar 2023)	110.67	97.62	114.95	171.43	192.70	687.4
Adjustments						
LMWQCC Biosolids Management Renewal	*0*	*0*	*0*	*0*	*0*	*0*
Water Meter Renewals	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*2.0*
Office Expansion Space Utilisation	*0*	*0.5*	*0.9*	*0.9*	*0.9*	*3.1*
Lower Red Hill Reservoir Tank B (East)	*0*	*0*	*0*	*0*	*0*	*0*
North Weston Fanhouse Odour Control	*0.9*	*1.4*	*1.8*	*2.3*	*2.6*	*9.2*
Reprofiling	*2.1*	*4.0*	*2.8*	*8.8*	*-3.2*	*14.5*
Total of adjustments	*3.44*	*6.31*	*5.96*	*12.45*	*0.73*	*28.9*
Recommended Capital Expenditure	**107.2**	**91.3**	**109.0**	**159.0**	**192.0**	**658.5**

1. Introduction

Marsden Jacob Associates (Marsden Jacob) has been engaged to review Icon Water's revised capital and operating forecasts to inform the Independent Competition and Regulatory Commission's 2023 final decision.

The Independent Competition and Regulatory Commission (the ICRC) is the Australian Capital Territory's (ACT, hereafter the Territory) independent economic regulator. The Territory regulates prices, access to infrastructure services and other matters in relation to regulated industries in the ACT. The ICRC also has functions under the Utilities Act 2000 (Utilities Act) for licensing electricity, natural gas, water, and sewerage utility services, and making industry codes.

The ICRC is undertaking an investigation into Icon Water's regulated water and sewerage services prices for the 2023-28 regulatory period. As a result of this investigation, the ICRC will determine the amount of revenue Icon Water can earn, and what prices it can charge, over the period 1 July 2023 to 30 June 2028. As part of this review, the ICRC will review Icon Water's capital and operating expenditures to ensure they are prudent and efficient.

The focus of the assessment has been to review and provide advice on:

- the prudency and efficiency of Icon Water's revised forecast capital and operating expenditure (capex and opex) for the period 1 July 2023 to 30 June 2028.
- the prudency and efficiency of capital expenditure incurred for the period 1 July 2018 to 30 June 2023.

1.1 Approach and report structure

The next sections of our report include:

- Section 2 outlines our assessment of key elements of Icon Water's revised proposed operating expenditure forecasts for the 2023-28 regulatory period, and
- Section 3 details our assessment of Icon Water's proposed current period capital expenditure and capital expenditure forecasts for 2023-28 regulatory period.

2. Operating expenditure

2.1 Overview of our approach

Our approach to the assessment of Icon Water's proposed operating expenditure for the 2023-28 regulatory period has been based on the following key elements:

- Assessment of the prudency and efficiency of operating expenditure focus areas over the regulatory period compared with baseline expenditure. This has included an extensive review of key categories of expenditure (and associated drivers).
- Assessment of Icon Water's actual 2021-22 base year expenditure. This has included a review of operating expenditure data as well as other supporting documentation, which provides further explanation for the basis for any variations.
- Assessment of Icon Water's revised proposal on cost efficiency including a comparison against publicly available data to compare against other water suppliers.
- Review of Icon Water's revised proposed real cost changes for labour, chemicals, and electricity.
- Assessment of Icon Water's proposed Security of Critical Infrastructure (SOCI) and Software as a Service (SaaS) opex step changes in expenditure from the baseline operating expenditure, resulting in increases in Icon Water's proposed operating expenditure forecasts[1].

We note that all Icon Water actual and proposed figures and our recommended adjustments in this chapter, unless specified, have been adjusted to $2022-23.

2.2 Base year expenditure

2.2.1 Overview of Icon Water revised proposal

Icon Water in its revised proposal set its forecast controllable operating expenditure using a base step trend approach, as outlined below. In setting the base year Icon Water used 2021-22 actual operating costs, consistent with the ICRC's draft decision. In developing its forecast controllable operating expenditure for the 2023-28 regulatory period it applied a trend, which included updated assumptions for output growth and productivity, as well as real cost changes for electricity, chemicals, and labour. Icon Water also included a number of step changes to controllable operating expenditure, which are costs that vary to the baseline operating expenditure. These step changes included:

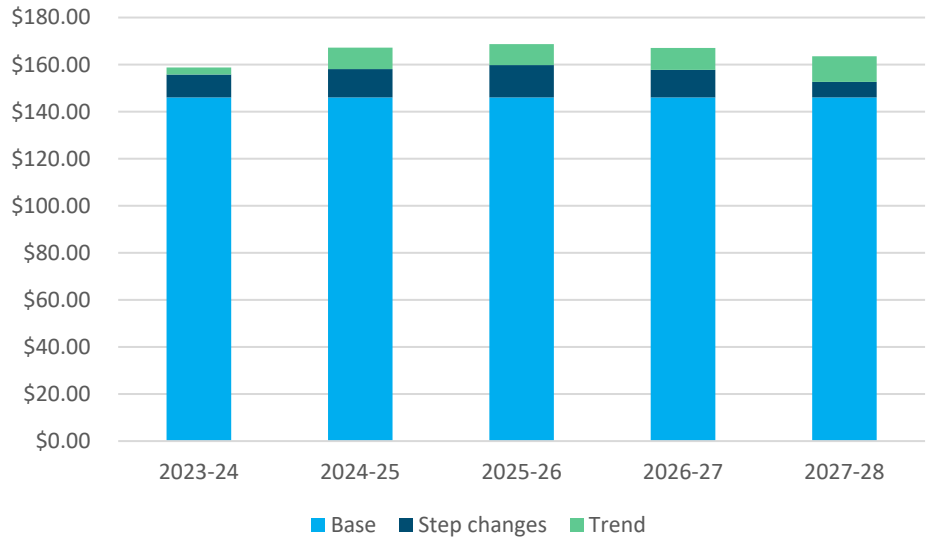
- Insurance premiums
- Security of Critical Infrastructure (SOCI)

[1] Marsden Jacob was not requested to review operating cost step changes for Insurance and Managing Building Better Reforms proposed by Icon Water.

- Software as a Service (Saas) IT costs
- Cotter pump station upgrade
- Managing building better reforms.

Icon Water's proposed controllable operating expenditure forecasts are depicted in Figure 1.

Figure 1: Proposed controllable operating expenditure forecasts, $million, $2022-23



Icon Water accepted the ICRC's draft decision to shift regulatory, compliance and royalty payments from controllable costs and included within non-controllable costs.

Icon Water did not accept the ICRC's draft decision base year adjustments for price submission costs and overhead capitalisation. The next sections outline our review of Icon Water's response on two items.

2.2.2 Price submission costs

In its draft decision, the ICRC removed price submission costs from the base year controllable opex costs based on our recommendation on the basis that these were one-off costs that were not incurred each year of the regulatory period.

Icon Water in its revised proposal did not accept the adjustment to the base year on the basis that additional price submission costs related to or other regulatory review costs are incurred in various years. They also noted that the ICRC's adjustment does not account for potential changes in regulatory review costs that could occur at various stages over the regulatory period.

We note there is precedent for adjusting the base year for one-off costs including regulatory submission costs. A number of Victorian businesses included base year adjustment for price submission costs in their 2023-28 price submissions[2].

[2] This includes Central Highlands Water, East Gippsland Water, Goulburn Valley Water, Lower Murray Water, South East Water, South Gippsland Water, Westernport Water and Yarra Valley Water – refer to ESC website for proposals.

However, we accept Icon Water's argument that additional regulatory costs for price submissions and other regulatory reviews can occur at various stages during the regulatory period. The external costs incurred for a price submission may also vary in each regulatory period.

Additionally, the increase in price submission costs in 2021-22 is within the range of variations of other cost category variations over the current regulatory period. We therefore consider that the increase in price submission costs is within the range of regular movements of the controllable operating cost categories.

On this basis we consider Icon Water's revised proposal to retain price submission costs in the base year costs to be reasonable.

2.2.3 Capitalisation of overheads

In its draft decision, the ICRC removed $1.7 million of opex from the base year on the basis that the capitalisation of overheads was expected to be higher over the regulatory period than the amount capitalised in 2021-22. This adjustment was based on information provided by Icon Water which showed a higher forecast capitalisation of overheads for the 2023-28 regulatory period.

Icon Water in its revised response did not accept this adjustment as being reasonable. It noted that the forecast of overhead capitalisation was used out of context and was not developed in conjunction with the regulatory submission for operating and capital expenditure forecasts. Therefore, the level of capitalisation included in the opex forecast was not consistent with capitalisation included in the capital expenditure forecasts. Additionally, it was a high-level estimate and not developed to be incorporated into the opex forecasts. Icon Water consider that while the level of capitalisation was low in 2021-22 it still provides a sensible basis for forecasting, consistent with the base step trend approach.

We have reviewed Icon Water's revised response and accept Icon Water's position that the forecast was not developed in line with the proposed capital and operating expenditure forecasts. While the actual level of capitalisation was lower than in previous years, it was within the range of variations consistent with other operating cost categories over the current regulatory period. Given Icon Water expect levels to return to similar levels prior to 2021-22 base year, we consider that an adjustment is not required.

On the basis of the additional information provided by Icon Water, we accept Icon Water's revised proposal to not include an additional adjustment to the base year for overhead capitalisation.

—

https://www.esc.vic.gov.au/water/water-prices-tariffs-and-special-drainage/water-price-reviews/water-price-review-2023

2.3 Productivity Growth

In responding to Icon Water[3] and Quantonomics[4]' response to Marsden Jacob's expenditure review report[5] on the productivity growth rate, we have prepared further advice with the assistance of Professor Chris O'Donnell whose research over many years has focused on economic and statistical methods for measuring and explaining productivity and efficiency change.

Our advice focuses mainly on the response by Icon Water and then, where appropriate, the supporting comments and analysis in the Quantonomics' response. As a result, we have not responded to all comments made by Quantonomics. The focus is where Icon Water has made statements in its response.

Our advice first examines issues raised by Icon Water relating to our review of the stochastic frontier model as well as several methodological issues. We then examine the industry and firm growth rates used to generate the productivity growth rate and discuss comparable benchmarks set by other governments. Finally, we summarise our findings and provide additional guidance on the productivity growth rate.

2.3.1 Review of stochastic frontier model by Marsden Jacob

In our previous advice to the ICRC (October 2022), we indicated that further research and independent analysis should be undertaken before applying the sophisticated approach used by Quantonomics. We felt that the Quantonomics' approach is complex, in particular the stochastic frontier model, and we stated that Marsden Jacob has not examined the underlying model or attempted to replicate the results using the same data as Quantonomics. We stated that, therefore, we are not able to verify whether the model is producing reliable and accurate results.

In response, Icon Water has stated that we did not attempt to examine the underlying model and that the study is not unduly complex compared to what is used in the electricity sector[6].

In responding to the feedback from Icon Water, we note that the use of a stochastic frontier model is not commonly used in water price regulation in Australia. Marsden Jacob consider, therefore, that it would be prudent to examine the detailed calculations and modelling if this type of model is to be used to inform price regulation. A stochastic frontier model uses sophisticated econometric calculations and large quantities of data for each water business. As a result, Marsden Jacob would need adequate time to review all the model calculations and underlying data. We assess that a review of the data could not be undertaken by Marsden Jacob within the current review timeframe. However, given the data, a review of the stochastic frontier modelling could be undertaken if the data were provided in a convenient form. We reiterate our previous advice to the ICRC that in future reviews the ICRC could undertake its own productivity modelling or provide for a process to review

[3] Icon Water response, Attachment 1, Operating expenditure, December 2022
[4] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022
[5] Marsden Jacob, 2022, Icon Water 2023-28 expenditure review, Final report, 12 October 2022
[6] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 18

the inner workings of modelling involving stochastic frontier and productivity indices using the National Performance Report (NPR) data.

2.3.2 Methodological issue: model specification (log-log functional form)

In our previous advice to the ICRC (October 2022), we indicated that one limitation of the Quantonomics' approach is that cost functions should not be log-linear in outputs. We also indicated that the Cobb-Douglas' function chosen by Quantonomics is not theoretically plausible – in the situation Quantonomics is dealing with, where firms are price takers in input markets and there is more than one output, the output sets associated with Cobb-Douglas cost functions are unbounded, which means there is no limit to the amount of output that can be produced using a given amount of inputs.

In their response, Icon Water stated Quantonomics' conclusion that "MJA's [Marsden Jacob's] methodological criticisms, including criticisms of the use of log-log functional forms … are inconsistent with established practices" [7]. Quantonomics also indicate that "seven of the most commonly used functional forms for production, cost or profit functions"[8] includes the "Cobb-Douglas and Translog specifications, both log-log forms that are linear in parameters"[9].

We acknowledge that it is common for stochastic frontier models to apply a Cobb-Douglas' functional form as used by Quantonomics. The alternative would be to, for example, apply a cost function that is nonlinear in the parameters (e.g., O'Donnell, 2018, Equation 2.22)[10]. However, it should be noted that implementing nonlinear estimation of stochastic frontier models would be an additional layer of model complexity. The point we were making is that the use of a theoretically-implausible cost function (i.e., one that is log-linear in outputs) means that, strictly speaking, the coefficients of the log-outputs cannot be interpreted as elasticities – they are merely approximations of the elasticities, and the coefficient estimates are estimates of those approximations. In the context of our advice, we consider this to be a minor point and not one that is critical in our critique of the Quantonomics' approach.

2.3.3 Methodological issue: model specification (time invariant inefficiency specification)

In our previous advice to the ICRC (October 2022), we highlighted that Quantonomics has developed cost efficiency scores under the restrictive assumptions that the inefficiency effects are either time-invariant or that they decay over time. We also indicated that if these restrictive assumptions are not true, then estimates of efficiency will be biased and inconsistent. Moreover, we indicated that the restrictive assumptions used by Quantonomics imply that firms learn little or nothing from their

[7] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 18
[8] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 5
[9] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 5
[10] O'Donnell, Christopher J. (2018). Productivity and efficiency analysis: an economic approach to measuring and explaining managerial performance, Singapore, Springer

mistakes. Relatedly, these assumptions do not allow us to understand how variable cost inefficiency is changing over time in different ways for different water businesses.

In their response, Icon Water stated that Quantonomics concluded that "MJA's [Marsden Jacob's] methodological criticisms, including criticisms of the use of … the time-varying decay of inefficiency specification in the SFA model, are inconsistent with established practices[11]". Quantonomics also indicate that "MJA has not put forward a credible alternative which is demonstrated to be feasible in this application"[12]. Quantonomics also state that "MJA has not specified the actual approach they are proposing, nor referred to any studies where their proposed approach has been carried out. Hence, it is not possible to respond specifically to this argument. However, the points we have raised above, and the lack of examples where such an approach has been employed, strongly suggest that it is doubtful that MJA's proposed approach would be feasible in practice in this application"[13]. Quantonomics further stated that "MJA argues that the time-varying decay model is not flexible enough, and there should be utility-specific time trends in the inefficiency parameters" [14].

In responding to the feedback from Icon Water and Quantonomics, we find it useful to restate the functional form of the Quantonomics' stochastic frontier model (Equation 5.1 in the Quantonomics report[15]):

$$\ln VC_{it} = \beta_0 + \beta_1 \ln x_{k(i,t)} + \sum_{m=1}^{M} \emptyset_m \ln q_{m(i,t)} + \sum_{n=1}^{N} \gamma_n z_{n(i,t)} + \lambda t + u_{(i,t)} + v_{(i,t)}$$

where: VC_{it} is the real variable costs of firm *i* in period *t* (i.e., variable cost divided by the price of the variable input); $x_{k(i,t)}$ represents the quantity of the capital input; $q_{m(i,t)}$ is the quantity of the *m*-th output; $z_{n(i,t)}$ is the *n*-th environmental variable; $u_{(i,t)}$ is an unobserved variable representing cost inefficiency; and $v_{(i,t)}$ is an unobserved variable representing functional form errors and other sources of statistical noise.

Quantonomics make the common assumptions that $v_{(i,t)}$ is an independent normal random variable, and that $u_{(i,t)}$ is a half-normal random variable that is not independent of other inefficiency effects. Rather, Quantonomics assume that $u_{(i,t)}$ either does not vary over time (time-invariant assumption) or varies over time at the same constant rate for all firms (time-decay assumption). There is no theoretical justification (or need) for these assumptions, and in the case of water businesses it is difficult to imagine how they can be true. In our previous advice, we indicated that if they are not true, then the results of the stochastic frontier analysis may not be useful (imposing incorrect restrictions on an econometric model leads to biased and inconsistent estimators and predictors). Estimating stochastic frontier models without imposing the time-invariant or time-decay assumptions on $u_{(i,t)}$ is straightforward and not uncommon: for example, O'Donnell (2018[16], Section

[11] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 18
[12] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 8
[13] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 9
[14] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 9
[15] Quantonomics 2022, Final Report: Icon Water Expenditure Benchmarking, 3 August 2022
[16] O'Donnell, C. J. (2018). Productivity and efficiency analysis: an economic approach to measuring and explaining managerial performance, Singapore, Springer

8.3.5) provides a textbook example of how to use panel data to estimate a stochastic frontier model under the assumption that $u_{(i,t)}$ is an independent truncated-normal random variable; Chen et al (2014)[17], Njuki and Bravo-Ureta (2019)[18], Koppenberg and Hirsch (2021)[19], Jin (2022)[20] and Li et al (2022)[21] all use panel data to estimate stochastic frontier models under the assumption that $u_{(i,t)}$ is an independent half-normal random variable.

As a result, our overall assessment continues to be that the stochastic frontier analysis may not be useful for providing insights into Icon Water's variable cost inefficiency relative to other water businesses unless the inefficiency effects in the stochastic frontier model are allowed to vary independently over time and across firms. Moreover, we are not arguing that there should be "utility-specific time trends in the inefficiency parameters". Rather, we are suggesting that Quantonomics simply do not impose the simplifying but restrictive assumptions on the inefficiency effects. These simplifying assumptions were popular last century when many economists thought they were necessary in order to disentangle noise from inefficiency in panel data models. The result of these assumptions is that we do not get to understand how Icon Water's efficiency is changing over time relative to other businesses. Rather, Quantonomics only produces a single cost efficiency score for Icon Water over the period 2006 to 2020 and not a score for each year for each water business.

2.3.4 Methodological issue: Multilateral Total and Partial Factor Productivity Indices

In our previous advice to the ICRC (October 2022), we highlighted a concern that the multilateral and partial factor productivity indexes (MTFP and PFP) produced by Quantonomics may not be 'proper indexes' and, therefore, may provide a misleading picture of productivity.

In response, Icon Water stated that "some of MJA's [Marsden Jacob's] criticisms of the methodology are based on misconceptions, including conflating the Multilateral Törnqvist index with the bilateral or chained Törnqvist index"[22]. Quantonomics state that the "Multilateral Törnqvist index satisfies the property of circularity/transitivity while maintaining a high degree of characteristicity"[23] and that "it is well known that the chained bilateral Törnqvist index does not satisfy the circularity (ie, transitivity) test, and the same applies to the Fisher Ideal index (Coelli et al. 2005, p.96). However, the Multilateral Törnqvist index does meet this test"[24]. They further state that the "Multilateral

—

[17] Chen, Y.Y., Schmidt, P. and H.-J. Wang (2014) Consistent estimation of the fixed effects stochastic frontier model. *J Econometrics*, 181:65–76.

[18] Njuki, E. and B.E. Bravo-Ureta (2019). Examining irrigation productivity in U.S. agriculture using a single-factor approach. *J Prod Anal* 51, 125–136.

[19] Koppenberg, M. and S. Hirsch (2021) Markup estimation: A comparison of contemporary methods at the example of European food retailers. Agribusiness, 38(1):108–133.

[20] Jin, K. (2022) Can business groups survive institutional advancements? Examining the role of internal market for non-tradable, intangible assets. Sustainability, 14:Article 10936

[21] Li, Z., Lin, B. and R. Luan (2022). Impact assessment of clean air action on total factor energy productivity: A three-dimensional analysis. *Environmental Impact Assessment Review*, 93:Article 106745

[22] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 18

[23] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 11

[24] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 10

Törnqvist index satisfies the property of circularity/transitivity while maintaining a high degree of characteristicity" [25].

Quantonomics also stated that "the claim that the chained Törnqvist index is not a 'proper index', and that output or input weights should be constant, is not widely accepted in the relevant discipline"[26]. Additionally, they state that "it is common practice for statistical agencies to use chained indexes (with changing weights) for official statistics, and the Törnqvist and Fisher Ideal index formulae, which do not satisfy the circularity test, are widely used by Australian and international statistical agencies for measuring productivity"[27].

In responding to the feedback from Icon Water and Quantonomics, we note that "most economists consider measures of productivity change to be measures of output quantity change divided by measures of input quantity change"[28]. O'Donnell (2018)[29] explains that proper quantity indexes satisfy six basic axioms from index theory. O'Donnell (2018) states that two of the most important axioms are a transitivity axiom and a proportionality axiom[30]:

- "The transitivity axiom says that a direct comparison of the productivity of two firms/periods must yield the same index number as an indirect comparison through a third firm/period"[31].
- The proportionality axiom says that "if firm B produced λ times as much as firm A, then the index that compares the outputs of firm B with the outputs of firm A must take the value λ"[32].

Several methods for constructing proper indexes are described in O'Donnell (2022)[33]. These proper indexes all satisfy the transitivity and proportionality axioms. Importantly, the binary Fisher and Tornqvist indexes do not satisfy the transitivity axiom[34]. The chained and multilateral Fisher and Tornqvist indexes do not satisfy proportionality. Simple numerical examples that illustrate these failures can be found in O'Donnell (2018)[35].

The implication of this is that Quantonomics' PFP indexes cannot be viewed as measures of output quantity change divided by measures of input quantity change (i.e., they are not proper measures of productivity change). In our original advice we expressed concern that this was the case. As stated in O'Donnell (2022), "indexes that violate these two axioms (i.e. transitivity and proportionality) will say that outputs and inputs have increased and/or decreased when they may in fact have done the

[25] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 11
[26] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 11
[27] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 12
[28] O'Donnell, C. J. (2022). Estimating the effects of weather and climate change on agricultural productivity. *Q Open*, *2*(2), qoac018. Page 1
[29] O'Donnell, C. J. (2018). Productivity and efficiency analysis. Springer Singapore, page 94
[30] O'Donnell, C. J. (2018). Productivity and efficiency analysis. Springer Singapore, page 138
[31] O'Donnell, C. J. (2022). Centre for Efficiency and Productivity Analysis, Working Paper Series, No. WP10/2022, page 13
[32] O'Donnell, C. J. (2018). Productivity and efficiency analysis. Springer Singapore, page 94
[33] O'Donnell, C. J. (2022). Centre for Efficiency and Productivity Analysis, Working Paper Series, No. WP10/2022, page 5
[34] O'Donnell, C. J. (2022). Centre for Efficiency and Productivity Analysis, Working Paper Series, No. WP10/2022, page 6
[35] O'Donnell, C. J. (2018). Productivity and efficiency analysis. Springer Singapore, Section 1.3 and 3.1.

opposite, or perhaps not changed at all" [36]. This fact is either not known or ignored by most experts in the field and continues to be a concern for the multilateral and partial factor productivity analysis undertaken by Quantonomics in their report.

We acknowledge that it is common to use a Fisher or Törnqvist indices in productivity analysis. The use of the Törnqvist index may well be generating sensible results as an approximation for a proper index. However, given that a proper index approach as described by O'Donnell (2018)[37] has not been used alongside the Törnqvist index, it is unclear to us the extent to which the Törnqvist indices are approximating a proper index or not.

Quantonomics indicate that some economists have questioned the proper index approach. The main arguments, and O'Donnell's response to them are summarised in O'Donnell (2022)[38]. In this context, Quantonomics also indicate that there is a trade-off between the transitivity axiom and the property of characteristicity. Caves et al (1982) use the term characteristicity to refer to "the degree to which weights [used in constructing index numbers] are specific to the comparison at hand"[39]. Putting aside the question as to whether or not characteristicity is a desirable property of indexes, Caves et al (1982) claim that "some degree of characteristicity must be sacrificed to obtain [transitivity]"[40]. This is not true, as evidenced by the fact that Benefit-of-the Doubt (BOD) indexes satisfy transitivity and have weights that are permitted to vary from one comparison to the next (i.e., they are transitive and have high, if not perfect, characteristicity; for more details, see O'Donnell (2018)[41]).

2.3.5 Industry wide productivity component

In our previous advice to the ICRC (October 2022), we recommended a forecast continuing industry-wide rate of productivity growth of 0.3 per cent per year. This rate was suggested based on the growth rate of 0.3 per cent in multilateral Opex PFP for the second half of the period 2006 to 2020 and the stochastic frontier analysis which illustrated that the Opex PFP reduces to 0.29 per cent per year if the frontier shift component is excluded. Marsden Jacob also suggested the use of time variables to gain better insights into whether a structural change was occurring in the time trend of Opex PFP.

In their response, Icon Water state that Quantonomics has undertaken further modelling that involves adjusting the stochastic frontier model through the placement of a separate dummy variable for each year in the sample (except the first year). Using the results of this analysis (Figure 1 in the Quantonomics response[42] and displayed below as the left-hand graph in Figure 2), Quantonomics

—

[36] O'Donnell, C. J. (2022). Estimating the effects of weather and climate change on agricultural productivity. *Q Open*, *2*(2), qoac018. Page 1

[37] O'Donnell, C. J. (2018). Productivity and efficiency analysis. Springer Singapore

[38] O'Donnell, C. J. (2022). Sustainable Productivity Indexes. Centre for Efficiency and Productivity Analysis, Working Paper Series, No. WP10/2022, pages 6 to 9

[39] Caves, D., Christensen, L.. and W. Diewert (1982) Multilateral comparisons of output, input, and productivity using superlative index numbers. *The Economic Journal*, 92(365), page 74.

[40] Caves, D., Christensen, L.. and W. Diewert (1982) Multilateral comparisons of output, input, and productivity using superlative index numbers. *The Economic Journal*, 92(365), page 74.

[41] O'Donnell, C. J. (2018). Productivity and efficiency analysis. Springer Singapore, page 99.

[42] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 22

have created a "time-varying opex productivity index" [43]. Using this analysis, Quantonomics states that "the rate of technical change over recent years has closely tracked the long term[44]". On the basis of this analysis, Icon Water state that this analysis supports the conclusion in their original submission that "a forecast industry productivity trend of zero per cent would be optimistic, whilst a continued decline at –0.9 per cent per year is quite possible[45]".

Furthermore, Icon Water state that this conclusion is supported by additional analysis by Quantonomics of a range of other analyses of productivity trends relevant to the water industry, including by the Australian Bureau of Statistics (ABS), the Productivity Commission (PC), the Essential Services Commission (ESC) and the Independent Pricing and Regulatory Tribunal (IPART) [46].

In responding to the feedback from Icon Water and Quantonomics, we note that Quantonomics appears to be suggesting that any change in the production frontier is a technical change. However, we are of the view that the coefficients of the dummy variables cannot be interpreted as measures of technical change or productivity change. The only thing the coefficients tell us is that there is a factor or variable that is not contained in the stochastic frontier model that varies across time. This factor could be technical change, but it could also be an environmental variable that is not contained in the stochastic frontier model (e.g., temperature). The problem with interpreting the coefficients as just relating to technical change is that the results suggest that technical regress is occurring. We do not find the concept of technical regress congenial – it means that society is collectively forgetting the techniques it knows. If Quantonomics wants to interpret the coefficients of the dummy variables as measures of technical change, then we suggest they rule out technical regress by imposing inequality constraints on the coefficients.

Notwithstanding the above comments, the new Quantonomics analysis may be showing us some insights into industry wide changes in cost efficiencies over time. What the new analysis shows is that even after allowing for a dummy variable for each year, the change in cost efficiency across all water businesses is falling over the second half of the modelled period (i.e. 2013 to 2020) by around 0.4 per cent per annum[47]. This is a lower result than the 0.3 per cent growth rate of the Opex PFP from 2013 to 2020[48], as estimated by Marsden Jacob using the results of Quantonomics Opex PFP analysis in its original advice (October 2022). Considering both the new stochastic frontier and original Opex PFP results, a more reasonable estimate of industry wide productivity would be around 0 per cent per annum – which is somewhere in the middle of these two values (i.e. -0.4 per cent per annum and 0.3 per cent per annum).

However, we note that making robust and accurate conclusions on the appropriate level of industry productivity growth rate is very challenging. Using different time periods for both the stochastic frontier analysis and the Opex PFP will produce different results. For example, using a more recent

—

[43] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 22

[44] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 28

[45] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 19

[46] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 19

[47] The 0.4 per cent is estimated by Marsden Jacob estimate based on the left hand graph in Figure 2.

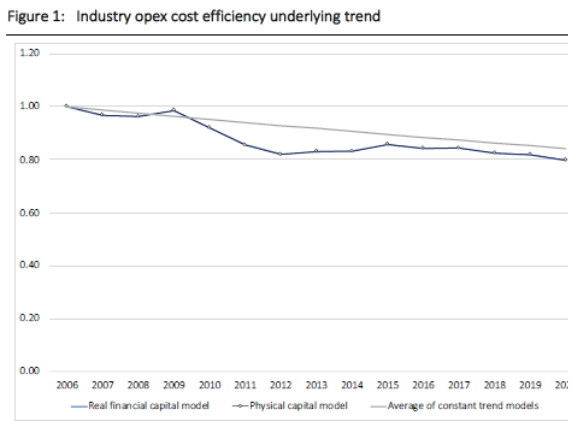
[48] The change in the multilateral Opex PFP is shown in the right hand graph in Figure 2.

time period for the stochastic frontier analysis (left hand graph in Figure 2) will produce a lower value (e.g. 2015 to 2020) and using a longer period (e.g. 2012 to 2020) will produce a slightly higher value.

In our view, even with the addition of the time dummy variables, the results of the stochastic frontier analysis are still potentially problematic because of issues already explained with the simplifying assumptions on the cost inefficiency effect. Furthermore, as explained, it is possible that the decline in the cost efficiency index is caused by environmental variables not contained in the stochastic frontier model and it is unclear how well the (multilateral) Tornqvist PFP index approximates a proper PFP index.

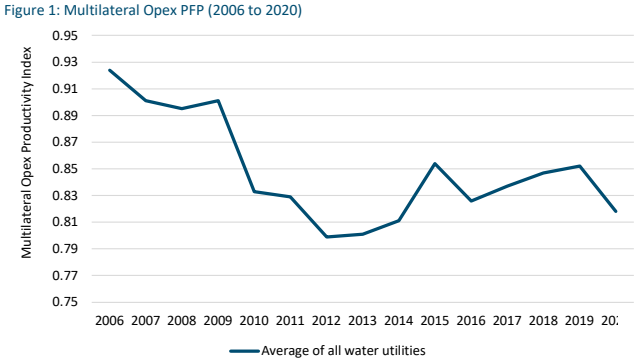
Figure 2: Industry cost index and productivity trends

Industry opex cost efficiency underlying trend



Source: Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 22

Multilateral Opex PFP (2006 to 2020)



Source: MJA analysis of Quantonomics data

Source: Marsden Jacob analysis of table 5.2 of Quantonomics 2022, Final Report: Icon Water Expenditure Benchmarking, 3 August 2022

Finally, we do not place significant weight on Quantonomics' analysis of other productivity indices[49] as these indices or analyses are either much broader in scope (the EGWW measure includes electricity, gas, and waste in addition to water) or do not cover recent time periods.

2.3.6 Firm specific productivity component

In our previous advice to the ICRC (October 2022), we examined the choice by Quantonomics to use the 67th percentile to set the target for future efficiency gains. This target is used to establish the firm growth rate component of the productivity growth rate using the results of the stochastic frontier analysis. In our previous advice, we expressed that the 67th percentile is an arbitrary target, and the choice of percentile could be set at a higher level. We referenced that the Australian Energy Regulator (AER) has previously used the 75th percentile to define an efficient benchmark for electricity distribution companies.

[49] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 23

In response, Icon Water stated that the AER uses a 0.75 comparator score which is not the same as the 75th percentile. Quantonomics support this assertion. However, they also state that "the 75th percentile score is one of the possible comparator standards"[50]. Quantonomics also explains that the reason why they have chosen this percentile is that the "choice of standard should also have regard to the degree of diversity or heterogeneity of comparator firms, with higher thresholds being less reliable for more diverse groups of firms, as is the case in Australia where many [water] utilities are not price regulated, have wide variation in their scale of operation, and differ in their structure and ownership (e.g., as part of local governments or as state-owned enterprises)"[51].

In responding to the feedback from Icon Water and Quantonomics, we accept that the AER refers to the 0.75 comparator score as the benchmark and not the 75th percentile. However, the explanation provided by Quantonomics does not, in our view, provide us with a clear guide as to how the 67th percentile has been chosen. The challenge with setting a benchmark is that it is somewhat an arbitrary choice. The decision to choose a 67 or 75 percentile depends on whether it is reasonable to expect that Icon Water can achieve it at some future point in time.

In this context, two reasons we were comfortable with a 75 percentile were that there would be a 10-year transition period built into the estimated productivity growth rate and that the 75th percentile was half-way between the 50th and 100th percentile. However, we accept that the choice of the 67 or 75 percentile is a decision that is challenging without more information about what is reasonable.

2.3.7 Comparable productivity growth rates used by other regulated water businesses

In our previous advice to the ICRC, we indicated that a growth rate of 1.4 per cent is consistent with the minimum expectations for Victorian water businesses set by the Essential Services Commission (ESC) for their 2023-28 operating expenditure forecasts and comparable to the Office of the Tasmanian Economic Regulator's recent decision for TasWater.

In response, Icon Water indicated that a more comprehensive view of the regulatory context shows "Icon Water's proposed rate of productivity growth is within the range of what utilities in other jurisdictions have been challenged to achieve"[52]. Icon Water also stated that most of the productivity growth required by regulators in recent decisions is "simply having a second attempt at making productivity gains that were expected but not achieved in the previous period[53]". Additionally, they state that "the Victorian businesses proposing 1.4 per cent productivity growth on controllable opex to achieve a 'Standard' rating under the PREMO framework is compensated with a 0.4 percentage point increase in the return on equity relative to a proposal rated 'Basic'. The Commission provides no such compensation in their Draft Decision" [54].

—

[50] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 30
[51] Quantonomics, Response to Independent Competition and Regulatory Commission Draft Report for Regulated Water and Sewerage Services Prices 2023–28, Memorandum, 18/11/2022, page 30
[52] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 18
[53] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 19
[54] Icon Water response, Attachment 1, Operating expenditure, December 2022, page 21

In comparison with other jurisdictions, we have further examined a range of recent regulatory proposals and regulatory decisions, including the fully integrated Victorian water businesses, not just the metropolitan Melbourne businesses. Melbourne Water's operating costs included in its recent price determination included cost efficiency targets, which are passed through to the metropolitan Melbourne water businesses operating costs.

Table 3 provides a comparison of cost efficiency levels set in recent comparable water regulatory decisions and proposed in recent regulatory submissions.

Table 3: Comparison of cost efficiency with other regulatory submissions and decisions

Water business	Cost efficiency	Regulatory Submission/Decision
Icon Water	1.4%	ICRC Draft decision
Icon Water	0.7%	Icon Water Revised proposal
Other Regulatory submissions and Decisions		
Barwon Water	2.0%	ESC draft decision - 2023
Coliban Water	1.4%	2023-28 price submission
Central Highlands Water	1.0%	2023-28 price submission
East Gippsland Water	1.0%	ESC draft decision - 2023
Gippsland Water	1.7%[55]	ESC draft decision - 2023
Goulburn Valley Water	0.4%	2023-28 price submission
GWM Water	1.4%	ESC draft decision - 2023
Lower Murray Water	1.1%	2023-28 price submission
South East Water	2.0%	ESC draft decision - 2023
South Gippsland Water	1.4%	ESC draft decision - 2023
Wannon Water	1.0%	2023-28 price submission
Westernport Water	1.5%	ESC draft decision - 2022
Yarra Valley Water	1.7%	ESC draft decision - 2022
Melbourne Water	1.2%	ESC final decision 2021
TasWater	1.5%	OTTER final decision - 2022
SA Water	0.5%	ESCOSA final decision - 2020
Sydney Water	0.8%	IPART final decision - 2020
Hunter Water	0.8%	IPART final decision - 2020
Average cost efficiency – other jurisdictions	**1.2%**	

[55] Note that this is based on a bottom-up assessment undertaken by Gippsland Water – refer to p.25 of the ESC's draft decision for Gippsland Water.

The average cost efficiency included in recent regulatory proposals and decisions is 1.2%. Icon Water's revised cost efficiency proposal of 0.7 per cent is at the lower end of the cost efficiency targets outlined above.

We note that a number of base year efficiency adjustments were included in Sydney Water and Hunter Water's 2020 final decision operating expenditure forecasts in addition to the continuing efficiency of 0.8%. The continuing efficiency applied by IPART was intended to represent the efficiency savings that even a perfectly efficient firm would make with assumed productivity gains.

Under the ESC's PREMO framework, Victorian water businesses are incentivised to provide a higher cost efficiency above the expected minimum of 1.4 per cent. In some cases, businesses have proposed lower than 1.4 per cent on the basis that they have also forecast low customer growth.

We note Icon Water's argument that Victorian water businesses are rewarded with a higher return on equity for a standard rating compared with a basic rating. However, all businesses are expected to meet at least a standard PREMO rating. A basic rating and lower return on equity is a form of penalty applied by the ESC, if a price submission does not meet their guidance requirements for a standard submission.

2.3.8 Overall conclusions on productivity growth

Using the new information and feedback from Icon Water and Quantonomics, the impact of amending our industry wide growth rate from 0.3 per cent to 0 per cent and showing both the 67 and 75 percentile is shown in Table 4. Therefore, the revised productivity growth rate recommended by Marsden Jacob using the stochastic frontier analysis (SFA) and Opex PFP analysis is between 0.8 per cent and 1.1 per cent. This is below the 1.4 per cent in our previous advice.

However, in deciding on the appropriate benchmark it is also useful to consider comparable benchmarks applied by other water businesses and regulators. Further analysis undertaken by Marsden Jacob in response to the feedback from Icon Water and Quantonomics reveals the average cost efficiency of recent water regulatory submissions and determination is 1.2%.

Table 4: Productivity growth components using SFA and Opex PFP analysis

	Previous Marsden Jacob productivity growth components (October 2022)	Revised Marsden Jacob productivity growth components	
Component		67th percentile	75th percentile
Industry wide factors	0.3%	0.0%	0%
Firm specific factors*	1.1%	0.8%	1.1%
Total	1.4%	0.8%	1.1%

2.4 Real price changes - Electricity

2.4.1 Icon Water revised proposal

Icon Water has proposed a real price change to its electricity operating costs over the 2023-28 regulatory period. Its proposed approach is based on advice from BIS-Oxford Economics (BISOE).

Table 5 outlines Icon Water's proposed real cost changes which it has applied to electricity costs.

Table 5: Icon Water's proposed real cost change – electricity

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed real cost change	30.6%	53.3%	-27.5%	-15.2%	-1.4%

Source: Icon Water, Revised proposal - Attachment 1, Operating expenditure.

The BISOE forecasts include the components of electricity price categorised as follows:

- Wholesale energy prices (paid by Icon Water)
- Network costs – latest AER network decisions
- Green scheme obligations
- Other costs.

The BISOE report described the approach to the modelling of main cost component of energy prices paid by Icon Water. This entailed:

- Illustrating the historical relationship between wholesale volume-weighted energy price and average East Coast Gas Market price
- Outlook of gas and coal costs to power stations
- Analysing and projecting the frequency at which the various generator plant types set the spot price
- Adjusting the outlook to account for noted power station closures and entry
- Delaying the annual prices by 2 years due to an assumption that Icon Water has previously seen delayed prices.

Table 6 provides a further breakdown of the basis for the proposed real cost change for electricity.

Table 6: Breakdown of Icon Water's proposed nominal costs – $ per megawatt-hour ($/MWH)

	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Wholesale electricity costs	$60	$117	$241	$147	$108	$105
Network	$86	$89	$95	$100	$105	$110
Green schemes	$17	$17	$16	$16	$16	$16
Other	$7	$7	$8	$8	$8	$8
Total	$170	$230	$360	$270	$236	$239

Source: *Icon Water response to information request, January 2023.*

The focus of our assessment was on wholesale electricity costs, green scheme, and network costs, outlined below.

2.4.2 Our assessment

Wholesale electricity costs

Marsden Jacob undertook modelling of the future electricity prices to be paid by Icon Water over the review period. The purpose of this modelling was to address the issues identified in the modelling undertaken by BISOE and to present outlook prices based on Marden Jacob modelling.

Issues with Icon's Electricity Price Proposal

The modelling approach presented by BISOE, which was the basis of Icon Water's electricity price proposal, has in the opinion of Marsden Jacob, resulted in electricity energy prices that are higher and that have an annual profile, different than what would be expected. The reasons for this include the following:

- The outlook of coal and gas prices are significantly higher than the outlook as of February 2023
- The approach of extrapolating the frequency at which various plant types clear the market is not explained. Key issues are considerations of the whole National Energy Market (NEM), transmission limits between NSW and other regions, and the clearing price band most often is not a bid at Security Risk Management Consultancy (SRMC)
- The delay in prices appearing in Icon Water's electricity price is associated with contract terms (of say 2 years) , a general change in market prices, and not the spot price outlook in year "n' being translated to year "n+2".

Marsden Jacob Market Modelling Approach

Marsden Jacob used a modelling approach that in our work with regulators, market participants and investors, presents in our opinion, the approach that is used and is considered industry standard.

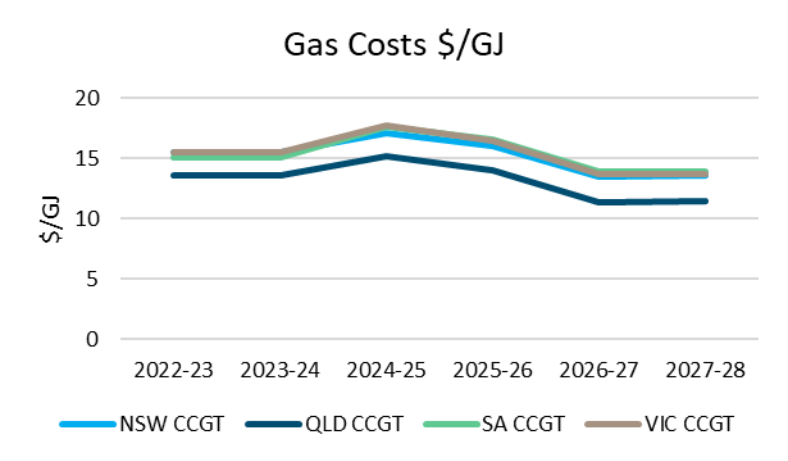
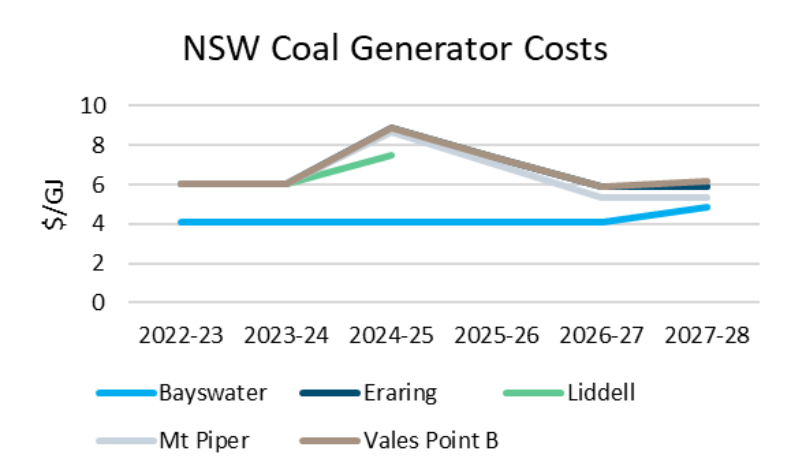
This is as follows:

- NEM simulation modelling based on the most likely set of assumptions to develop 30-minute energy spot prices
- From the spot market modelling, develop swap and cap contract prices
- For demands purchasing electricity, assessment of the impact that daily demand shape would have on electricity purchase costs and the hedging strategy that would be used
- For years where there are forward contract prices (from the ASX), confirm the modelling aligns with these, and use forward prices in the years they are available.

Marsden Jacob Market Modelling Assumptions

The assumptions of the modelling by Marsden Jacob are presented in Table 7 below.

Table 7: Marsden Jacob Modelling Assumption

	Assumption
Demand forecast NEM wide	AEMO 2022 ESOO Central scenario
States schemes	• NSW roadmap: met by 2033 • QLD Energy and Jobs Plan: commenced • VIC: VRET met.
Gas Prices	Capped prices for 2023 and moving to a post 2023 long term gas price of $13/gigajoule (GJ) delivered. See figure below. 
Coal Prices	Cap price of $125/tonne 2023 (or $5.8/GJ), increasing post 2023 to $8.5/GJ, and moving to slightly over $5/GJ by 2027. See Figure below. 
New plants in NSW	• NSW Pumped Hydro: by 2030 • Snowy 2.0: 1 July 2028 • Kurri Kurri: December 2023

	• Tallawarra B: 1 January 2024 • Port Kembla OCGT: January 2026 • NSW Government BESS: November 2025
Coal generator closures	Liddell: 2022, 2023 • Mt Piper: 2029 • Eraring: August 2025 • Yallourn: 2028
New transmission	• VNI Minor: March 2023 • EnergyConnect: July 2027 • Humelink: July 2027
LGCs	To 2030 based on the LGC forward curve and trending to the 2031 green certificate value.

Source: Marsden Jacob

Marsden Jacob Market Modelling Results

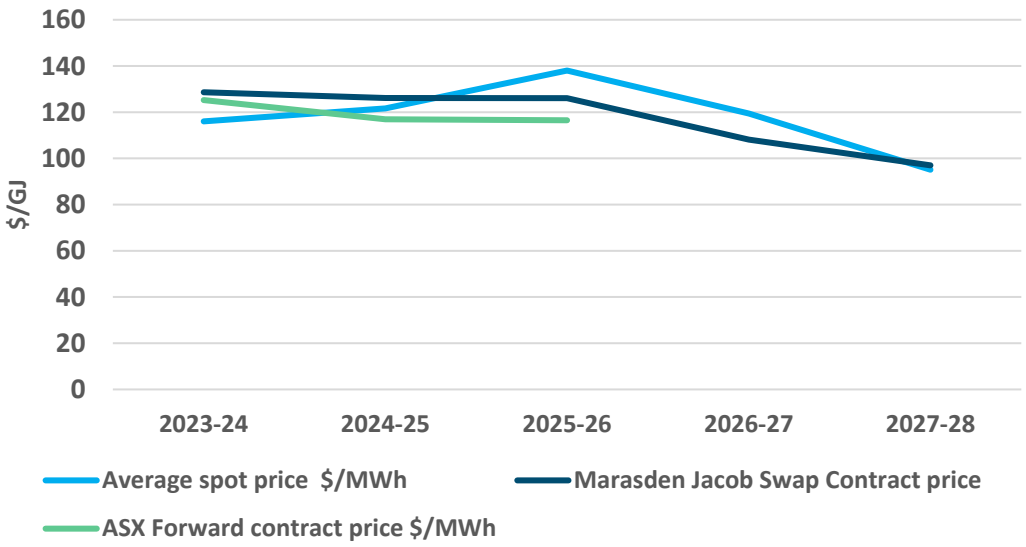
Table 8 and Figure 3 present the results of the Marsden Jacob modelling of NSW average annual spot and swap contract prices, and a comparison to the ASX swap prices (as of 20 February 2023). The results show the Marsden Jacob modelling results are consistent with the ASX forward curve.

Table 8: Marsden Jacob Modelling Results – Spot and Contract Prices $/MWh

	2023-24	2024-25	2025-26	2026-27	2027-28
Average spot price	116	122	138	119	95
MJA Swap contract price	129	126	126	108	97
ASX Forward contract price	125	117	117		

Source: Marsden Jacob and ASX

Figure 3: Marsden Jacob Modelling Results – Spot and Contract Prices $/MWh



Source: *Marsden Jacob*

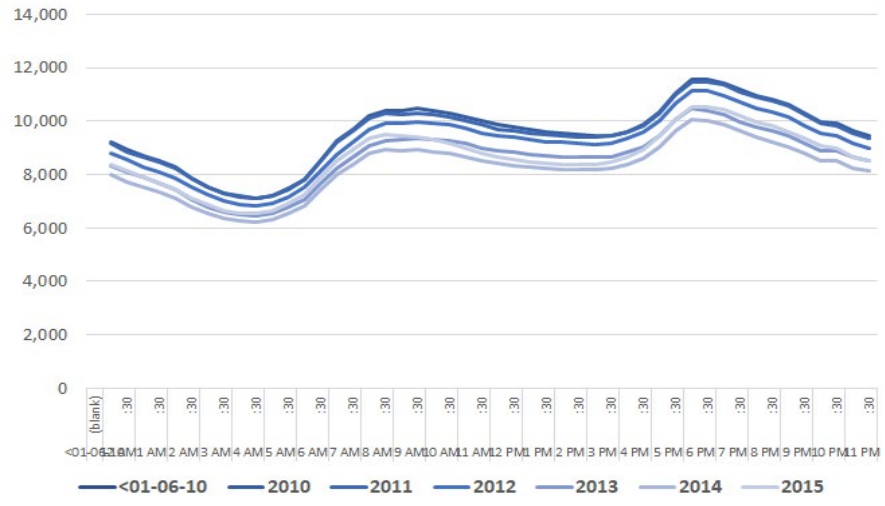
Icon Water Hedging and Translation of Modelled Prices to Icon Water Energy Costs

The modelling results have produced time weighted or flat prices for each year. These must be translated to costs paid by Icon Water (i.e.$ per MWh of Icon Water demand).

Marsden Jacob was provided with the demand profile of Icon Water for June for the years 2011 to 2015 (Figure 4). The demand has some "shape" and a general correlation with demand in NSW, which would suggest the "volume weighted" or load weighted price paid by Icon Water would be higher than the average (or time weighted price).

Marsden Jacob used the modelled spot prices to determine expected increase in Icon Water energy costs over flat costs and found this is about 3%.

Figure 4: Icon Water Average Daily Demand Shape



Note: The figure is based on June data only for the years 2011 to 2025.

Source: Marsden Jacob analysis

Based on the above analysis, Marsden Jacob concluded that the projected energy price to be paid by Icon Water to be as follows:

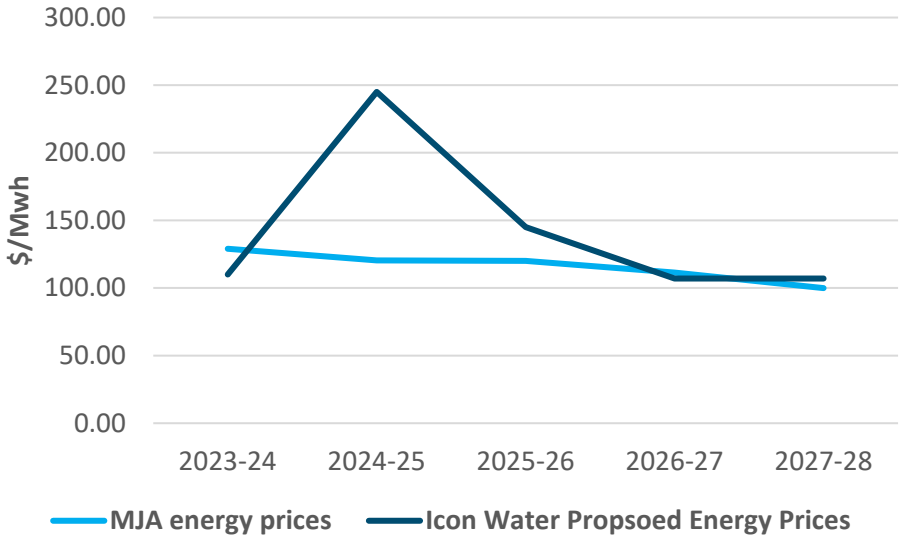
- The ASX forward curve for the years 2023-24 to 2025-26, increased by 3%
- The Marsden Jacob modelled swap contract price for the years 2026-27 to 2027-28, increased by 3%.

Comparison of Marsden Jacob Energy Prices to BISOE

Figure 5 presents the comparison of the energy prices developed by Marsden Jacob to those developed by BISOE as included in the Icon Water proposal. Of note are the following:

- Apart from the 2024-25 year, the projected prices are similar
- The Icon Water 2024-25 proposed price, in the opinion of Marsden Jacob, reflects the erroneous assumed delay on spot prices outcomes to a future year
- The Icon Water prices do not account for demand shape or contract premium.

Figure 5: Comparison of Marsden Jacob Energy Prices to Icon Water Energy Price Proposal $/MWh



Source: Marsden Jacob analysis

Green Schemes

Marsden Jacob have undertaken our own assessment of environmental costs applicable to Icon Water energy demand, which comprises the following:

- Large scale Generation Certificates (LGCs) which are part of the Large-scale Renewable Energy Target (LRET)
- Small scale Technology Certificates (STCs) which are part of the Small-scale Renewable Energy Scheme

(SRES) and

- ACT's Energy Efficiency Improvement Scheme (EEIS).

Using the latest currency forward curve, we assessed Icon Water's proposed prices and consider them reasonable.

Network costs

BISOE states that forecast movements in network costs over the regulatory period are due to network determination prices up to 2023-24 and from 2024-25 onwards are aligned to the real price changes with EvoEnergy's draft regulatory submission, which is currently available for public consultation.

We consider the approach to align the network price changes with EvoEnergy's latest forecast prices included in its draft price submission from 2024-25 onwards to be reasonable and have verified that they align with current draft proposal. We therefore accept the proposed network component of the real cost changes.

2.4.3 Our recommendation

Table 9 outlines our recommended real cost change to be applied to electricity costs which takes into account adjustments for wholesale electricity costs and green scheme costs over the regulatory period.

We have also updated the real cost changes to reflect the inflation estimates being applied to the total opex forecasts.

Table 9: Recommended electricity $MWh ($2022-23), and real cost change

	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Wholesale electricity costs	60	129	120	120	111	100
Network	86	86	89	91	92	93
Green schemes	17	16	16	15	14	14
Other	7	7	7	7	7	7
Total	170	239	233	233	226	216
Recommended real cost change – electricity		40.4%	-2.4%	0.1%	-3.2%	-4.4%

2.5 Real price changes – Labour

2.5.1 Icon Water revised proposal

Icon Water has included a revised real price change to its labour operating costs over the 2023-28 regulatory period. Its proposed approach is based on updated advice from BIS-Oxford Economics

(BISOE). The proposed labour real cost changes are based on BISOE's assessment of ACT labour costs and include a 0.5% adjustment for the superannuation guarantee in 2023-24, 2024-25 and 2025-26.

Table 10 outlines Icon Water's proposed real cost changes which it has applied to electricity costs included.

Table 10: Icon Water's proposed real cost change – labour

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed real cost change	-0.6%	1.4%	1.7%	0.9%	0.7%

Source: Icon Water, Revised proposal – Attachment 1, Operating expenditure.

2.5.2 Our assessment

To assess the reasonableness of the methodology for forecasting real labour cost increases we sought further information from BISOE.

We note that BISOE's Wage Price Index is based on analysis of expected future wage movements in the three main methods of setting pay, as each discrete pay setting method has its own influences and drivers. As noted in BISOE's report, the key difference between BISOE's original forecast and the revised forecast is the significant lift in inflation forecasts.

Overall, BISOE expects the next round of Enterprise Bargaining Agreements (EBAs) negotiated in the sector to rise over the next two years due to high inflation CPI, strong demand for skilled labour, and recent high enterprise agreement outcome in the construction sector.

We have reviewed BISOE's forecasting updated forecasts for labour cost changes and consider the approach to be reasonable and consistent with its approach used to support Icon Water's original proposal, noting that we have not been able to interrogate BISOE's models. We consider in future submissions that greater transparency of the model used to generate any future real labour cost changes is required.

We note that in BISOE, estimating real price changes with the updated CPI is used, which differs from what is applied to the overall opex forecasts. We therefore recommend updating the inflations assumption applied to calculate real cost changes for labour.

2.5.3 Our recommendation

We accept the proposed approach to BISOE's forecast and recommend updating BISOE's proposed real cost changes increase to reflect the updated CPI estimates applied to the total operating costs forecasts (Table 11). This includes superannuation guarantee increase of 0.5% real cost increase from 2023-24 to 2025-26.

Table 11: Our recommended real cost change – labour

	2023-24	2024-25	2025-26	2026-27	2027-28
Recommended labour real cost change	0.60%	1.40%	1.37%	0.73%	0.70%

2.6 Real price changes – Chemicals

Icon Water has proposed a real price change to its chemical operating costs over the 2023-28 regulatory period. Given the real price increase expected in 2022-23, which would not be captured in the base-step-trend approach, Icon Water has proposed a geometric average of the 6 years from 2022-23 to 2027-28 be adopted as the real price change for chemicals.

Table 12 outlines Icon Water's proposed real cost changes, which it has applied to chemical costs included.

Table 12: Icon Water's proposed real cost change – chemicals

	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Chemical producer price index	20.5%	-10.4%	-6.0%	-4.3%	0.1%	-0.1%
Proposed real cost change – 6-year geometric average		-0.5%	-0.5%	-0.5%	-0.5%	-0.5%

Source: Icon Water, Revised proposal – Attachment 1, Operating expenditure.

Forecast changes in chemical costs are based on the producer price index for Basic Chemical Manufacturing and are driven by oil prices, exchange rates, quarrying costs and fuel prices.

2.6.1 Our assessment

BISOE has used the same methodology for estimating chemical costs as was included in Icon Water's original submission and included an updated forecast for the 2023-28 regulatory period.

This includes an updated 2022-23 estimated price increase for the year of 20.5%. BISOE noted in its report that quoted market prices are in line with the Basic Chemicals Manufacturing PPI seen over the past 18 months.

BISOE has forecast over the next regulatory period for chemical prices to decline by an average of 4.1% in real terms. This is based on its view that chemical prices will fall back from current peaks as oil prices decline and then gas and electricity prices ease. Prices are then expected to increase slightly in nominal terms over 2026-27 and 2027-28 and wages and other input prices are forecast to rise.

We have undertaken an assessment of BISOE's approach to forecasting chemical costs over the next regulatory period, including the use of Icon Water's quoted market prices for 2022-23. Based on our assessment of BISOE's approach to chemical real cost changes, we consider its forecast to be reasonable.

In terms of Icon Water's proposal to capture 2022-23 expected price increases, we acknowledge that the material increase would not be captured in the forecast. Therefore, applying subsequent forecast reductions over the 2023-28 regulatory period would be applied to a lower base. We, therefore, consider it reasonable to apply the 6-year geometric average as proposed by Icon Water.

2.6.2 Our recommendation

Based on our assessment we recommend no change to the proposed real price change in chemical costs over the 2023-28 regulatory period, though as with the other real cost increases, we recommend updating to reflect the latest inflation forecasts applied to the overall opex forecasts (Table 13).

Table 13: Recommended real price change – chemicals

	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Chemical producer price index	20.50%	-9.30%	-6.00%	-4.63%	-0.07%	-0.10%
Recommended real cost change – 6-year geometric average		-0.37	-0.37	-0.37	-0.37	-0.37

2.6.3 Real price change weights in the opex model

In reviewing how the real price changes are applied to the overall opex costs, we note that the opex model uses a four-year average, which takes into account 2018-19 and 2019-20. As noted by Icon Water, these two years had abnormally high electricity costs, due to high water sales over that period[56]. We consider that using the four-year average as a basis for applying the real price change weights overestimates the total energy cost as a proportion of total controllable operating costs for the 2023-28 regulatory period. As a consequence, this overinflates the impact of the real price change in electricity costs.

We consider that to better reflect the weights of cost categories within the forecast operating costs for the 2023-28 regulatory period, only 2020-21 and 2021-22 are used to estimate real price change weights in the opex model (Table 14).

Table 14: Real price change weights – Icon Water proposed and MJA recommended approach

	Icon Water Proposed Average 2017-18 to 2022-23	MJA Recommended Average 2020-21 to 2021-22
Labour	40.2%	41.3%
Chemicals	4.1%	4.3%
Electricity	5.5%	4.1%
Other	50.2%	50.3%

[56] Icon Water, 2023-28 regulatory proposal – Attachment 6 operating expenditure, p.9.

2.7 Opex step change – Security of Critical Infrastructure

2.7.1 Icon Water revised proposal

In its draft decision, the ICRC accepted Icon Water's proposed operating cost step change related to cyber and information security costs to meet the SOCI Act requirements, with only a small downward adjustment.

Table 15 provides an outline of the proposed step change in SOCI costs which equals $14.2 million over the 2023-28 regulatory period.

Table 15: Breakdown of Icon Water's proposed SOCI costs, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	**Total**
Total	**4.0**	**2.3**	**2.4**	**2.7**	**2.8**	**14.2**

2.7.2 Our assessment

Based on our assessment of the SOCI new obligations we accept Icon Water needs to undertake the necessary steps to ensure it is meeting the new SOCI Act requirements and Positive Security Obligations. This section outlines our assessment of the proposed step change in operating costs

[57] Icon Water, Revised proposal – Appendix 1.5 SOCI step change paper, p.1.

under each SOCI category including whether additional costs above baseline operating expenditure are required to meet the SOCI obligations.

Cyber and information security

Icon Water's revised proposal for cyber and information security included ongoing upfront costs is consistent with the ICRC's draft decision, though it has shifted $1.4 million in 2023-24 of project costs from capex to opex.

We note that the costs that have been shifted are related to external subscription costs and Icon Water has therefore deemed them to be opex, which is consistent with its accounting treatment of Software as a Service (SaaS) costs – refer to section 2.9.

We therefore accept the proposed increase in opex costs for cyber and information security to be reasonable.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

2.7.3 Our recommendation

As outlined above, we have made a number of recommendations and adjustments related to the SOCI costs, resulting in an overall reduction of $2.5 million in operating costs over the regulatory period compared with Icon Water's proposed step change (Table 16).

Table 16: Recommended step change – SOCI, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total
Proposed step change – SOCI	4.0	2.3	2.4	2.7	2.8	14.2
Recommended SOCI operating costs	3.1	1.9	2.1	2.0	2.1	11.2
Adjustment	1.0	0.3	0.3	0.7	0.7	2.5

2.8 Opex step change – Software as a Service

2.8.1 Icon Water revised proposal

Icon Water's revised proposal includes a new step change of $25.2 million for Information and Communications Technology (ICT) Software as a Service (SaaS) investment. This step change includes a one-off project and ongoing expenditure for eight projects that are shifting from capex to opex.

The basis for this change is to align accounting and regulatory approaches for the treatment of SaaS costs. In its original proposal SaaS costs had been included as capital expenditure. The key change is that costs associated with system solutions using software licences are to be considered an opex item as no asset is being generated within the business.

Icon Water has undertaken a project-by-project assessment to determine whether all or part of the IT projects should be capitalised.

A key driver of these changes is that as new IT system upgrades are required by Icon Water has found that the most efficient solution has been required a greater number of software solutions are being provided as cloud solutions.

Icon Water has provided a breakdown of the proposed opex changes as outlined in Table 17.

Table 17: Proposed step change – SaaS IT investment, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total
SaaS – Project costs	3.30	5.45	8.26	5.91	1.07	23.99
SaaS - Ongoing costs	-	0.01	0.29	0.46	0.47	1.23
Total	3.30	5.45	8.55	6.37	1.54	25.22

Source: Icon Water revised proposal – Attachment 1

1.1.1 Our assessment

Table 18 outlines Icon Water's proposed approach allocating IT costs between operating and capital expenditure.

Table 18: Icon Water's approach to allocating IT expenditure

Capital expenditure	Operating expenditure
System solutions using perpetual software licences On-premises hardware Physical ICT devices	Software as a Service System solutions using subscription-based software licences Cloud based hardware

Source: Icon Water Revised proposal – Attachment 1

We have reviewed Icon Water's methodology for allocating IT costs between operating and capital expenditures. We consider Icon Water's proposed approach is consistent with the International Financial Reporting Standards guidance, published in April 2021.

Icon Water's approach is consistent with the approach taken in other regulated industries and has been accepted in recent regulatory decisions. We note some Victorian water businesses have elected to continue capitalising SaaS costs for the 2023-28 regulatory period. However, this was an internal business decision to apply separate approaches to accounting treatment compared with the regulatory treatment.

We have reviewed the approach applied to each project and the underlying costs associated with each project that has shifted fully or partially from capex to opex. We accept the basis for the shift in each project is reasonable.

We have also reviewed the impact on prices for the 2023-28 regulatory period. We note as all of the projects included in the shift to opex have short asset lives, the shift from capex to opex will not have a material increase on customer prices in the 2023-28 regulatory period, compared with Icon Water's original proposal. Therefore, we consider the change to be consistent with the ICRC's pricing principles which seek to ensure any adverse impacts on customers are transitioned in over time.[61]

We have also reviewed Icon Water's capital expenditure to ensure there is no double counting of costs.

Based on the above, we recommend accepting Icon Water's proposed operating costs step change for SaaS costs.

[61] ICRC, Regulated water and sewerage services prices 2023–2028 – Issues paper, p.15.

3. Capital Expenditure

3.1 Overview of approach

The following outlines our scope for the review of capital expenditure forecasts included in Icon Water's revised proposal.

2018-23

The updated actual capital expenditure for the 2018–23 regulatory period, including

- The updated capex forecast for the 2022–23
- Additional information provided to support the efficiency of Project AXLE expenditure.

2023-28

- Review included revisions to forecast capital projects:
  - Biosolids Management Renewal
  - Water Meter Renewals Program
  - Office Space Utilisation
  - Lower Red Hill Reservoir Tank B.
- The updated forecast for the remaining capital expenditure program, including the differences between the reprofiling methodology recommended in Stage 1 and the methodology applied by Icon Water in its revised proposal
- The updated cost escalators for general labour and engineering and construction costs based on BIS Oxford Economics forecasts.

To confirm that the review of ongoing and catch up efficiency adjustments was excluded from the scope of this review.

3.2 Historic expenditure (2018-23)

3.2.1 Overview

Icon Water, in its December 2022 proposal, updated its capital expenditure for the 2018-2023 regulatory period to reflect the revised actual/forecast expenditure since the June 2022 submission.

The December 2022[62] update has actual/forecast expenditure of $516.5 million, Appendix 2.1 Capital Investment Plan detailed total expenditure as $506 million. It was not clear which of these was the correct value. In March 2023 Icon Water updated the actual/forecast expenditure for the 2018-23 regulatory period to correct for errors in the previous submission in relation to:

[62] Icon Water, Attachment 2 Capital Expenditure, December 2022, p22-23

- Updated actual/forecasts have been provided for FY22 and FY23 (based on end of month October 2022).
- Updated actuals for the leases and minor assets.
- The revenue model had inadvertently included FY22 dollars in the place of nominal dollars, resulting in double escalation for FY19 to FY21.

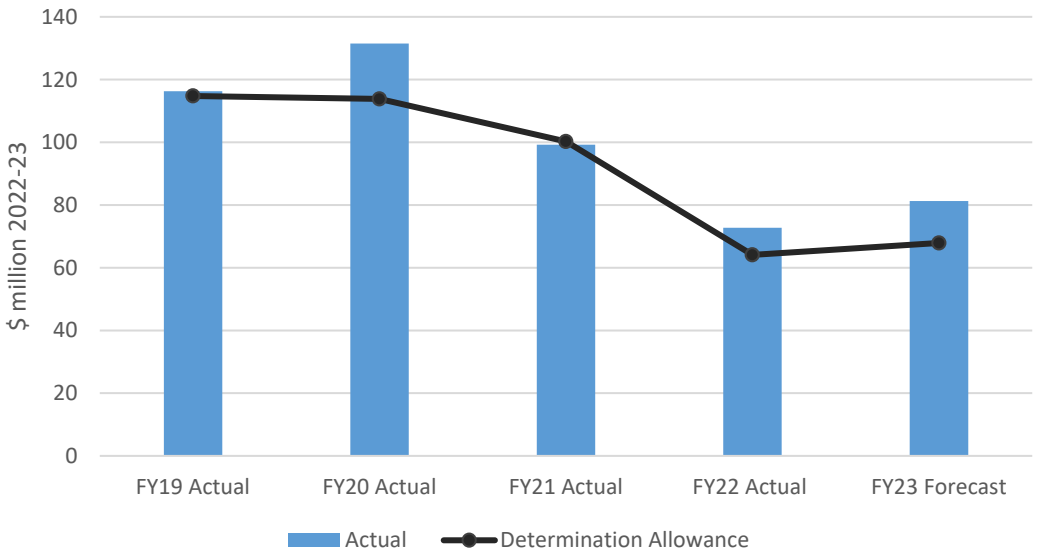
The updated total actual/forecast capital expenditure for the 2018-23 regulatory period is now $501million.

Using this latest total of $501 million, including $170 million for water, $260 million for sewerage and $71 for non-system assets, in comparison to the corrected June 2022 submission which has actual/forecast the capital expenditure of $527 million, including $174 million for water services, $270 million for wastewater services and $84 million for non-system assets. Icon Water have revised its original submissions provided in June 2022 to address:

- The lease costs of ActewAGL House ($4.7million)
- Updating Corporate allocations ($17 million)
- Corrected 2021/22 expenditure (previously not updated for actual expenditure).

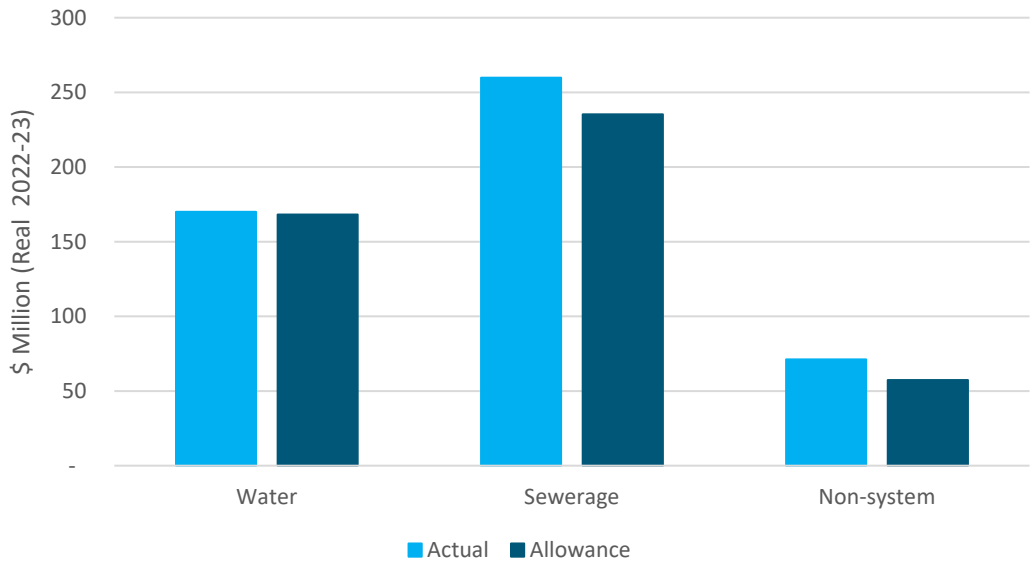
In comparison to the 2018 Determination, the March 2023 update is $40 million (8%) above the allowance set by the Commission in the 2018 pricing determination allowance of $461 million ($2022-23), compared to $66 million (14%) above the allowance in the June 2022 submission (as corrected) (Figure 6).

Figure 6: Comparison of the March 2023 actual/forecast to the Determination 2018-23, $million, $2022-23



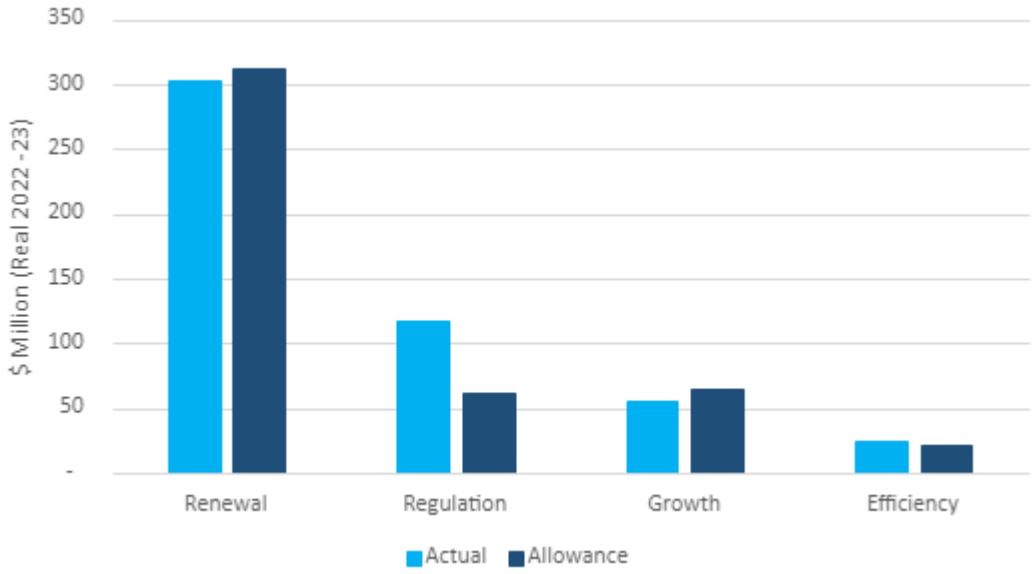
The variance to the 2018 determination assessed by function (water, sewerage, and non-system), shows that the majority of the variance is in increased expenditure for sewer assets ($25 Million), refer to Figure 7.

Figure 7: Comparison of actual/forecast and determination (2018-23) by Asset Class, $million $2022-23



The variance in expenditure was also assessed by driver (renewal, regulation, growth, and efficiency), as shown in Figure 8.

Figure 8: Comparison of actual/forecast and determination (2018-23) by regulatory driver, $million $2022-23



Icon Water's actual/forecast expenditure is an increase of $56 million for Regulation, in comparison to the 2018 determination allowance, and an increase of $4 million for Efficiency. Decreases are forecast for $10 million Renewal expenditure and $9 million for Growth.

The variance by both asset class and driver is shown in Table 19.

Table 19: 2018-23 capital expenditure variance by Asset Class and Driver across the June and March 2023 submission, $2022-23

Expenditure class	March 2023 Updated Actual/Forecast ($M)	June 2022 (Corrected) Actual/Forecast ($M)	Variance ($M)	Percentage variance
Water	**170.0**	**173.9**	**-3.9**	**-2.2%**
Renewal	93.3	93.9	-0.6	-0.7%
Regulation	58.9	61	-2.1	-3.4%
Growth	13.0	13.3	-0.3	-2.2%
Efficiency	4.8	5.6	-0.8	-13.8%
Sewerage	**259.9**	**270.1**	**-10.2**	**-3.8%**
Renewal	144.4	153.4	-9.0	-5.9%
Regulation	56.3	58.7	-2.4	-4.1%
Growth	41.2	39.2	2.0	5.1%
Efficiency	18.0	18.7	-0.7	-3.9%
Non-system assets	**71.1**	**83.4**	**-12.3**	**-14.7%**
Renewal	65.4	74.1	-8.7	-11.8%
Regulation	2.0	4.4	-2.4	-53.9%
Growth	1.1	0.9	0.2	17.0%
Efficiency	2.7	4	-1.3	-32.6%
Total	**501.0**	**527.4**	**-26.4**	**-5.0%**

There is an overall $26.4 million net reduction between the June submission and the March 2023 update. Icon Water has provided explanations for $13.7 million of the total $26.4 million variance, as detailed in Table 20.

Table 20: Projects with variance analysis for the 2018-23 period, $million $2022-23

Project Name	Project Title	Reason for variance	Variance ($M)
CX10066	Belconnen Trunk Sewer Augmentation	Scope increase	4.2
CX10888	Minor Assets	Updated forecasts based on current capitalisations	6.8
CX10958	Customer Relationship Management (CRM)	Project bundled	-0.9
CX10989	Digital Water Network Trial	Deferral (out of 2018-23 reg period)	-0.6
CX11035	LMWQCC Furnace 2 Overhaul Capex Component	Scope decrease	-0.8
CX11059	Icon Water Website Renewal	Accounting Treatment Change	-0.7
CX11061	LMWQCC Secondary Treatment Bioreactors Capacity Upgrade	Deferral (out of 2018-23 reg period)	-1.6
CX11066	Sewerage System Ladders and steelwork Renewal	Deferral (out of 2018-23 reg period)	-0.5

Project Name	Project Title	Reason for variance	Variance ($M)
CX11070	O'Connor Reservoir Roof Replacement	Cost decrease - Post Market Testing	-1.2
CX11072	LMWQCC Mechanical Renewals	Deferral (out of 2018-23 reg period)	-1.3
CX11177	Vehicle Lease Renewals for Maintenance vehicles (Light & heavy commercial; plant and equipment)	Delay (out from 2018-23 reg period)	0.5
CX11178	LMWQCC Office Accommodation refurbishment project	Delay (out from 2018-23 reg period)	-0.9
CX11181	Vehicle Lease renewals for passenger vehicles	Delay (out from 2018-23 reg period)	1.0
CX11186	Desktop Refresh	Project bundled	-1.1
CX11193	Trunked Mobile Radio (TMR) Replacement	Delay (out from 2018-23 reg period)	-1.2
CX11195	GIS Upgrade	Cost increase - Post Market Testing	0.6
CX11204	Geodetic Datum Upgrade	Deferral (out of 2018-23 reg period)	-0.5
CX11205	Water Emergency Capex	Scope decrease	-0.7
CX11248	Corin Dam Spillway Erosion, River Remediation and Future Damage Prevention Works	Deferral (out of 2018-23 reg period)	-0.6
CX11250	Coppins Crossing Closure	Deferral (out of 2018-23 reg period)	-0.7
CX11259	Stromlo DAF Design Review and Modifications	Cost increase - Post Market Testing	1.0
CX11262	LMWQCC Biosolids Management Renewal	Deferral (out of 2018-23 reg period)	-0.8
CX11263	Icon Water Multimedia Server	Deferral (out of 2018-23 reg period)	-1.1
CX11275	Hume Block 1210 – Tralee Street PRV	Other	0.1
CX11282	Bendora Left Abutment Track Repairs	Delay (out from 2018-23 reg period)	-1.0
CX11283	Cyber Security - Network Visibility Monitoring Solution, SOC & SIEM	Scope decrease	-0.4
CX11299	WASP Decommission - AXLE Technical Debt	Project bundled	-0.6
CX11322	OnePM Integration	Delay (into 2018-23 reg period)	-0.4
CX11331	Exchange Online Migration	Accounting Treatment Change	-0.6
CX11357	Cyber for SOCI	Accounting Treatment Change	-0.9
	AAH Capitalisation of lease	Accounting Treatment Change	0.0
TOTAL			**-5.0**

Although the variance in Table 34 nets to a $5 million variance, there is $13 million of expenditure categorised as delay or deferral of expenditure into the 2023-28 regulatory period. In considering the actual expenditure in excess of the Determination allowance, consideration needs to be given to this deferral.

A breakdown of the variance from the Determination allowance, by driver is provided in Table 21.

Table 21: 2018-23 capital expenditure variance by Asset Class and Driver across the 2018 Determination and March 2023 submission, $million $2022-23

Expenditure class	2018 Determination	March 2023 Actual/Forecast	Variance	Percentage variance
Water	**168.2**	**170.0**	**1.8**	**1%**
Renewal	128.5	93.3	**-35.3**	**-27%**
Regulation	24.5	58.9	**34.5**	**141%**
Growth	8.1	13.0	**4.9**	**61%**
Efficiency	7.1	4.8	**-2.3**	**-32%**
Sewerage	**235.2**	**259.9**	**24.6**	**10%**
Renewal	137.0	144.4	**7.4**	**5%**
Regulation	33.8	56.3	**22.5**	**66%**
Growth	54.3	41.2	**-13.1**	**-24%**
Efficiency	10.1	18.0	**7.9**	**79%**
Non-system assets	**57.4**	**71.1**	**13.8**	**24%**
Renewal	47.6	65.4	**17.8**	**37%**
Regulation	3.0	2.0	**-1.0**	**-32%**
Growth	2.0	1.1	**-1.0**	**-48%**
Efficiency	4.8	2.7	**-2.1**	**-44%**
Total	**460.8**	**501.0**	**40.2**	**9%**

3.3 CX11026 AXLE-Asset Management and Maintenance Solution

3.3.1 Project Overview

CX11026 AXLE-Asset Management and Maintenance Solution (AXLE) was a project designed to upgrade Icon Water's asset management and maintenance ICT solution that provides works management (planning and scheduling of planned and reactive work) and asset management (storing asset information and maintenance history) functionality to multiple work groups across Icon Water.

The justification for the project was to replace 'poorly integrated and bespoke ICT systems' that support asset management practices with one, updated solution, as well as address end of life issues emerging with existing solutions. The corporate risk rating had been rated as 'high' using Icon Water's corporate risk management framework, due to the risk of 'continued reliance on aged and inadequately supported critical operational technology systems that are unable to be integrated to meet operational requirements, resulting in failure to deliver a significant aspect of the Enterprise Asset Management strategic objective.'

Icon Water selected an Oracle product to deliver the benefits it was hoping to achieve from this project and commenced project delivery using the newly implemented Icon Water Investment Planning and Delivery framework, known as IPAD, and an agile project management methodology was adopted 'with the aim to achieve better solution development, greater certainty around schedule, improved change readiness and cost containment.'

The delivery team included internal resources, vendor resources and a range of contracted resources based both on and off site.

The project was closed in June 2019 following deployment to the Icon Water business, at a final cost of $35 million, against a regulatory allowance of $29.96 million (both in $2021-22). However, Icon Water reports that due to "product immaturity, insufficient estimating and dependencies on other projects, scope items were dropped from most releases and created a backlog that became non-recoverable" within the project lifespan.

Scope items and issues with the way the solution was functioning were ultimately pushed out to Project Hypercare (detailed in the project closure report under 'Handover of issues' (to Hypercare)).

3.3.2 Draft determination

The project was selected for review as part of an ex-post assessment of the capital expenditure for the 2018-23 regulatory period, based upon the variance of the actual expenditure from the 2018 Determination allowance.

The draft determination considered that the project was prudent but considered that elements of the capital expenditure were not efficient and reduced the recoverable expenditure for this project by $7.09 million ($2022-23) on the basis that:

- there were a number of issues with the design and management of this project that Icon Water was best placed to manage and bear the risk of, not customers; and
- that a number of scope items were not delivered and were pushed into Project Hypercare, meaning if the costs were allowed in this project and Project Hypercare, customers would effectively be paying for them twice.

3.3.3 Project status

The project is now closed having been completed in June 2019.

3.3.4 Documents reviewed

Original review

- 15.0 AMMS Project pass 2 Business Case + attach-
- AXLE closure report
- AXLE PCR 4 – Board Paper
- Copy of Asset Systems Status Summary Sep'21

- PCR5 (1)
- WAM Unplanned outages
- 2023-28 Water & Wastewater Price Proposal, AXLE-Asset Management and Maintenance Solution (CX11026), July 2022 presentation from Icon Water
- C058_C059
- DTG Finalised Structure_1 September 2021 (1)
- Hypercare closure report
- Item 5a – Lessons Learned_16 Sept 21
- Program Assurance Framework_Final_080422
- Program Nova Lessons Learnt Attachment
- RAC Project AXLE Scope report June 2022
- Responses to RFI C131 and C132

Updated proposal (December 2022)

- Executive Summary.pdf
- Attachment 2 - Capital expenditure.pdf
- Appendix 2.2ii AXLE health check (confidential)
- Appendix 2.3i AXLE status report (confidential)
- Appendix 2.3iii AXLE health check follow-up (confidential)
- Response to RFI C152 (provided in RFI register)
- Appendix 2.1 CIP – RFI response Mar2023

3.3.5 Icon Water updated proposal (December 2022)

In its updated proposal, Icon Water asserted its management of Project AXLE was efficient, providing various reports and data on the successful delivery of IT projects of this nature.

However, it did not provide further justification for the two key issues for the recommended reduction:

- That Icon Water, not customers, is better placed to bear the risk of overspend when that overspend is due to design and management of the project, and
- Failing to reduce the recoverable cost of project scope not delivered and/or pushed into Project Hypercare means customers pay for that scope twice when it is recovered from this project and Project Hypercare.

Attachment 2 of the December 2022 updated proposal[63], questioned the Draft Determination decision, noting that:

- The total project cost of $33.2 million was only $3 million over the (internal) budget and not the $6.6 million as suggested in the Draft Determination
- In 2017 the project had been assessed as efficient by the Commission's expenditure consultant
- Research notes that IT projects in general have a history of costing more than original estimates.

The above points have been considered in assessing the efficiency of the expenditure with Marsden Jacob's assessment of the impact on the efficiency assessment noted below:

- The Marsden Jacob assessment was based on the regulatory allowance (2018-23) and was not an assessment of the expenditure prior to this period.
- The assessment was a comparison to the 2018 determination allowance and not to internal budgets or Board approved figures. The project had a determination allowance of $9.5 million with an actual expenditure of $16.8 million (2021-22), a variation of $7.3 million.
- The project did not deliver the scope requirements in entirety and an additional project (CX11026 AXLE Hyper Care), was established to deliver the remaining scope. This project had expenditure of $3.2 million, with no allowance in the 2018 Determination.

It was not considered that the additional information provided as part of Icon Water's updated December 2022 has provided new arguments to suggest that the above criteria is not appropriate in determining the efficiency of the project expenditure. Therefore, the assessment is in line with that used for the Draft Determination with a recommendation that some elements of the expenditure are not efficient and that $7.09 million should be excluded from the expenditure added to the Regulatory Asset Base (RAB).

3.3.6 Recommendation

Icon Water has not provided sufficient justification that the overspend on Project AXLE was an efficient use of customer funding, or that customers are not paying for scope items twice (in this project and in Project Hypercare), if the full project spend is allowed. We therefore recommend the initial adjustment set out in Table 22 is retained (in $2022-23).

Table 22: Recommended adjustment to allowable expenditure on CX11026 AXLE-Asset Management and Maintenance Solution, $million, $2022-23

	2018-19	2019-20	2020-21	2021-22	2022-23	Total Program Forecast
Actual expenditure	16.32	0.38				16.7
Recommended Adjustment	*-7.09*	*0*	*0*	*0*	*0*	*-7.09*
Recommended Capex	9.23	0.38	0	0	0	9.61

[63] Icon Water, Attachment 2 Capital Expenditure, December 2022, p36-39

3.4 Proposed capital expenditure (2023-28)

In its December 2022 updated proposal, Icon Water revised its proposed capital expenditure for the 2023-28 regulatory period to account for:

- Updated project cost estimates and timing
- Inclusion of elements from the Draft Determination findings
- Deferred expenditure from 2018-23
- New expenditure
- Removed projects, including, but not limited to, ICT projects that were moved to opex.

This expenditure totalled $689 million for the 2023-28 regulatory period. In March 2023, Icon Water updated the proposed expenditure for the 2023-28 regulatory period to correct for errors in the December 2022 submission in relation to:

- Updated cashflows and allocation low value spend projects to match end of month October 2022 forecasts; and
- Inclusion of cost escalators inadvertently missing from the previous submission.

The March 2023 updated proposed expenditure for the 2023-28 regulatory period is $687 million. The breakdown of the updated capital expenditure proposal is provided in Table 23.

Table 23: Icon Water March 2023 proposed capital expenditure 2023-28, $million $2022-23

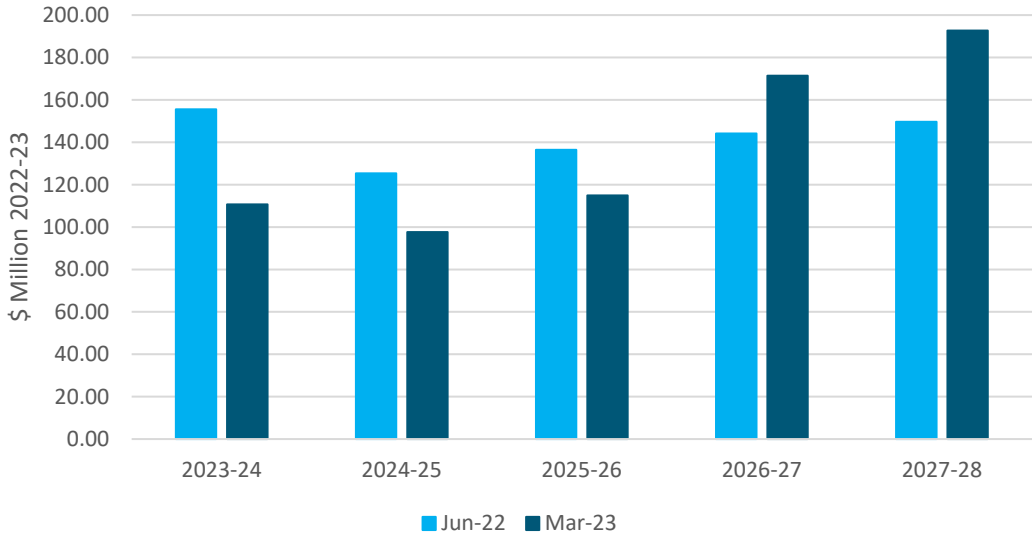
	2023-24	2024-25	2025-26	2026-27	2027-28	**Total**
Water	**45.5**	**25.9**	**33.8**	**39.2**	**31.5**	**175.9**
Renewal	44.3	24.1	31.3	36.0	28.3	164.0
Growth	0.0	0.0	0.0	0.1	0.1	0.2
Efficiency	0.3	0.4	0.6	0.7	0.4	2.4
Regulation	1.0	1.4	1.9	2.4	2.7	9.3
Sewerage	**51.7**	**58.2**	**71.9**	**123.4**	**147.9**	**453.1**
Renewal	34.1	30.8	32.3	42.2	62.7	202.1
Growth	14.5	25.5	36.2	76.6	80.4	233.2
Efficiency	0.4	0.7	1.6	2.3	2.6	7.6
Regulation	2.7	1.3	1.7	2.2	2.4	10.3
Non-renewal	**13.5**	**13.5**	**9.2**	**8.9**	**13.2**	**58.3**
Renewal	13.0	12.8	7.9	7.1	11.2	52.0
Growth	0.0	0.0	0.0	0.0	0.0	0.0
Efficiency	0.4	0.6	1.2	1.6	1.7	5.5
Regulation	0.1	0.1	0.2	0.3	0.3	0.9

Total	**110.7**	**97.6**	**114.9**	**171.4**	**192.7**	**687.4**

As shown in Table 23, the key driver for investment is renewal of assets which accounts for $418 million (61%) of the total proposed investment. The next most significant investment driver is Growth for sewer, which accounts for $233 million (34%). The remainder of the proposed expenditure for the drivers Efficiency $16 million (2%) and Regulation, $20 million (3%). This spread of expenditure by driver is not significantly different to the June 2022 original proposal.

The timing in the expenditure has changed significantly, with expenditure deferred from the first two years of the 2023-28 regulatory period, into the latter two years of the period, as shown in Figure 9.

Figure 9: Comparison of proposed capital expenditure 2023-28, June 22 and March 23, $million $2022-23



This change in timing coincides with Icon Water's reprofiling of expenditure at an individual and portfolio level.

3.4.1 Key Documents reviewed

- Attachment 2 Capital Expenditure
- Appendix 2.1 Capital Investment Plan
- Updated Appendix 2.1 Capital Investment Plan
- CX11335 North Weston Fanhouse Odour Control, Concept Development Statement
- Appendix 2.1 CIP – RFI response Mar2023

3.4.2 Updated expenditure

As noted, previously, the movement from the Icon Water June 2022 (the updated data to correct for previous errors and omissions) proposal to the updated March 2023 proposal is a net reduction of

$23 million across the 2023-28 regulatory period. Excluded from this reduction (as captured in the correct June 2022 data) is the removal of $25 million of ICT expenditure from capital to operating expenditure based upon:

- A trend in ICT projects to move from provision of hardware to cloud-based solutions
- Alignment with the latest guidance on accounting treatment for capitalisation of expenditure.

Excluding the ICT reclassification, the net movement of the $23 million across the 2023-28 regulatory period is made up of a combination of a number of reductions and increases across the various capital projects and programs.

Table 24 details the projects or programs with a movement of greater than $1 million movement between the June 2022 and March 2023 proposals.

Table 24: Key movement in capital expenditure between the June 2022 and March 2023 Icon Water proposal, $million 2022-23

Project Number	Project Name	Increase/ Decrease	Variance from Original Submission ($M)	Reasoning for movement
CX11335	North West Fanhouse Odour Control	Increase	9.2	New Project
CX11178	LMWQCC Office Accommodation refurb	Increase	3.1	Deferred from 2018 -23
CX11282	Bendora Left Abutment Track Repairs	Increase	2.3	Deferred from 2018 -23
CX10989	Digital Network Trial	Increase	1.3	Deferred from 2018 -23
CX11072	LMWQCC Mechanical Renewals	Increase	1.3	Deferred from 2018 -23
CX11263	Icon Water Multimedia Server	Increase	1.2	Deferred from 2018 -23
CX11193	Trunked Mobile Radio (TMR) Replacement	Increase	1.1	Cost increase
CX11266	Cotter Pump Station Upgrade	Increase	1.1	Cost Increase aligned to the Draft Determination
CX10951	LMWQCC EIM&C Renewal 2018 to 2023	Decrease	-1.4	Expenditure reprofiled
CX11053	Treatment Plant Office Accommodation	Decrease	-1.6	Scope decrease
CX11082	Lower Red Hill Reservoir Tank B (East)	Decrease	-2.4	Cost reduction, partially aligned to the Draft Determination
CX11324	Googong WTP Improvements for Water Quality	Decrease	-2.5	Realignment of project timing
CX11313	Water Meter Renewals	Decrease	-3.3	Cost reduction, partially aligned to the Draft Determination
CX11337	Office Expansion Space Utilisation	Decrease	-8.1	Cost reduction, partially aligned to the Draft Determination

The majority of the increase form the June 2022 submission is the deferral of expenditure from the 2018-23 period to the 2023-28 period. The largest single movement is a new project, CX11335 North Weston Fanhouse Odour Control at $9.3 million.

3.4.3 CX11335 North Weston Fanhouse Odour Control

This project was briefly mentioned in the June 2022 Icon Water Submission, but no expenditure was put forward. The project has now been included in the new submission, but no details as to the reasoning or justification for its inclusion were provided as part of the December 2022 updated proposal. In February 2023 Icon Water provided a Concept Development Statement approved in April 2022. The document notes that:

- The project was initiated in 2008 to address sewer odour issues and improve ventilation of the sewers in the proposed North Weston development area and in the existing areas of Weston and Holder.
- The project has a cost estimate of $8.8 million (+/- 75%) and is schedule to be completed by February 2027.
- The project as required to address odour complaints received during the first two months of operation (January/February 2021). Whilst there were few official odour complaints, up to 23 instances mentioning nuisance odours were reported on social media coming from residents in a radius of up to 2.5 km around the vent. Most of the reports could be correlated with the vent being operational and wind blowing in the direction validating the complaint.
- The ventilation system installed in the North Weston Vent Fan is unable to be operated as originally intended due to high odour and H2S emissions from the newly constructed ventilation fan house.
- The ventilation rates provided by the North Weston Vent Fan are below minimum required ventilation rates set out by project CX10382 and Weston Vortex cannot be decommissioned.
- Weston area sewers are inadequately ventilated which will result in sewer corrosion impacting asset life.

As this project was not put forward as part of the original proposal in June 2022, it has not been reviewed in any detail. If it was known about at the time of the review for the Draft Determination it may have influenced the decision on the selection of the individual projects for review. From the information received to date it is not clear that the project is sufficiently well defined in terms of:

- Confirmation of the scale of the odour issues, including any regulator engagement.
- An option confirmed that will sufficiently and efficiency address the project need.
- A robust cost estimate for the project, the current estimate is +/- 75%.

Although this project may not be sufficiently significant in value to trigger a Pass-Through event, a possible solution to address this current level of uncertainty and to balance the sharing of risk between customers and Icon Water, is to address the expenditure via an ex-post review. Aligned with general regulatory practice, the Commission may address projects and capital expenditure with a low certainty of being delivered by excluding them from the Determination and then considering them at the time of the subsequent Determination as part of an ex-post review, adding any expenditure deemed as prudent and efficient to the RAB.

3.4.4 Recommendation (CX11335 North Weston Fanhouse Odour Control)

In relation to the March 2023 updated capital expenditure, it is recommended to accept the proposal with the exception of the adjustment to the top ten projects, the reprofiling of expenditure and the CX11335 North Weston Fanhouse Odour Control project (Table 25). The top ten projects and reprofiling are dealt with later in the report. The recommendation for CX11335 North Weston Fanhouse Odour Control is exclude the expenditure from the Determination and for it to be assessed as part of an ex-post review once sufficient information is available.

Table 25: CX11335 North Weston Fanhouse Odour Control Recommended capital expenditure, $million 2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water updated proposal (December 2022)	0.9	1.4	1.8	2.3	2.6	9.2
Proposal adjustment	*0.9*	*1.4*	*1.8*	*2.3*	*2.6*	*9.2*
Update capex Recommendation	0	0	0	0	0	0

3.5 Capital Reprofiling

3.5.1 Draft Determination

The ICRC's Draft Determination analysed the ability to deliver on the top ten projects or programs, assessed as part of an individual assessment. The ability to deliver the remaining projects and programs (which represented approximately 39% of the capital expenditure) was also reviewed.

The Draft Determination assessment noted that 68% of proposed project and programs over 2023-28 regulatory period (excluding the top ten projects) were at the Evaluate stage, with only 9% of expenditure at the Plan, Develop or Execute stages. It was also noted that much of the expenditure reviewed was not supported by developed options or a viable options analysis.

For the Draft Determination, based upon the limited evidence of supporting data and the proposed timing of the expenditure, using the IPAD stage status of the projects, the delivery timeframe was reprofiled to allow sufficient time to develop the projects. This not only reprofiled the projects and program across the years but also deferred $26 million of expenditure ($2022-23) beyond the regulatory period.

The Draft Determination proposed adjustments to the 2023-28 capital expenditure was based on a prudence assessment, and was about the timing of the expenditure, not an efficiency reduction in expenditure.

3.5.2 Key Documents reviewed

- Attachment 2 Capital Expenditure
- Appendix 2.1 Capital Investment Plan
- Updated Appendix 2.1 Capital Investment Plan
- Appendix 2.1 CIP – RFI response Mar2023

3.5.3 Icon Water Updated Proposal (December 2022 and March 2023)

The Icon Water December 2022 updated proposal responded to the reprofiling in the Draft Determination noting:

- That the revised forecast included approximately 51% of projects having reached the implementation phase in the IPAD process, and about half of the remaining forecast reflected ongoing programs of work in areas of core business.
- 8% of projects represented IT projects or corporate initiatives, requiring smaller planning processes and lead times to deliver, and applying a high-level simplistic reprofiling of the forecast based on IPAD stage did not reflect the true and likely delivery timeframe.
- Reprofiling did not reflect a prudency adjustment because it did not consider the optimum delivery timing needed to achieve to provide value to customers.
- The revised forecast took into consideration the Commission's view, and we understood a comprehensive analysis of all project delivery assumptions to ensure delivery of the program over the next five years.

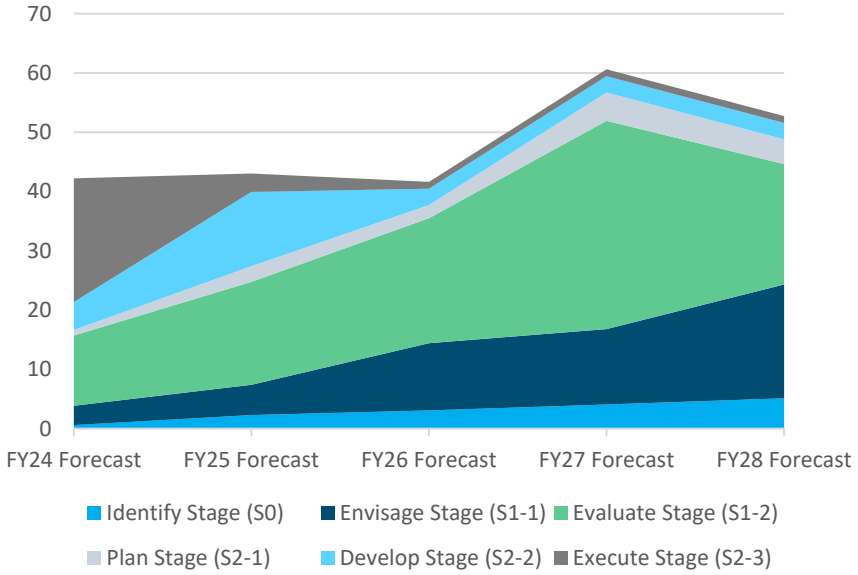
Having raised these concerns with the approach in the Draft Determination Icon Water's updated proposal does accept some reprofiling. Their approach utilises the same factors as applied for the Draft Determination, but to a lesser extent, with approach differed from the Draft Determination as follows:

1. The percentages applied to the current project phase (December 2022), rather than the project phase that applied for the Marsden Jacob assessment (June 2022)
2. Not reprofiled annual programs of works or budget allocations such as minor capex allocations
3. The remaining ICT projects were not reprofiled, based upon the assumptions that ICT project lifecycle is shorter
4. The projects that are co-funded through the Water and Sewerage Capital Contributions (WSCC) have also not been reprofiled, as this reprofiling will introduce inconsistencies with the WSCC funding model, and population forecasts.

The revised forecast and approach to reprofiling applies to 23 per cent of the remaining portfolio; and has a smaller impact than the Draft Determination as more projects have moved past initial phases. In this approach no expenditure is proposed to be deferred beyond the 2023-28 regulatory

period. Icon Water reprofiled expenditure proposal, updated for the March 2023 capital expenditure proposal is shown in Figure 10.

Figure 10: Icon Water updated Proposal (March 2023) reprofiled capital expenditure (excluding top ten projects, CX11335 and IT projects), $million, $2022-23



3.5.4 Assessment

In reviewing the capital expenditure (excluding the top 10 projects) we noted that much of the expenditure was not supported by developed options or a viable options analysis. We also noted that, linked to the early stage of development for a significant proportion of the proposed expenditure, this has impeded the ability to assess the level of efficiency of this expenditure as there is:

- Limited evidence to support the proposed expenditure
- A low certainty of costs estimates
- Questions regarding the ability to develop the projects in the timeframe.

In responding to the concern raised regarding the limited evidence to support the proposed expenditure, in Attachment 2 of its updated proposal Icon Water noted that for projects or programs >$5 million an independent estimate and strategic or feasibility studies had been developed[64].

As part of the consideration of Icon Water's updated proposal these supporting documents were requested in order to assess the level of development of the projects.

Excluding the top 10 projects already reviewed, supporting documentation was provided for 12 out of the 19 projects with expenditure greater than $5 million in the 2013-28 regulatory period. The level of detail in the supporting information varied significantly across the projects.

[64] Icon Water Attachment 2 Capital Expenditure December 20222, P10

A review of the documents identified that although there were examples of projects with a reasonable level of justification, this was not common across all projects.

Additionally, no evidence was provided as to the process for the development of estimates for projects with capital expenditure less than $5 million.

In considering the prudence of the proposed timing of the project and program expenditure, we assessed the approach adopted by Icon Water as noted below:

- **Updating for the current status on the IPAD process**: Since the June 2022 proposal, Icon water has continued to develop the projects and a number of projects have advanced in the IPAD process. Icon Water has updated the expenditure profile based upon this revised status. The update is supported. We have maintained the Draft Determination method to expenditure profiling based upon each updated IPAD classification as at December 2022.
- **Reprofiled annual programs of works or budget allocations:** In assessing the actual expenditure versus the regulatory determination for the 2018-23 regulatory period, there is evidence of deferral of expenditure for annual programs. It is not proposed to exclude annual programs for expenditure reprofiling.
- **ICT projects were not reprofiled:** Icon Water had excluded ICT projects from its reprofiling as the project lifecycle is shorter. This is considered a reasonable assumption and in updating the reprofiling we have excluded ICT expenditure.
- **Projects co-funded through the WSCC:** Icon Water excluded projects linked to the WSCC funding model and population forecasts from the reprofiling based upon having a high degree of confidence in the timing of the projects. No evidence has been provided to support this assumption. We have not excluded Projects co-funded through the WSCC from the update reprofiling.
- **Timing of projects at Plan, Develop and Execute Stages:** In its December 2022 and March 2023 updates Icon Water adopted a different spread of expenditure to that applied in the Draft Determination. We consider the spread of the expenditure for these projects to be reasonable and have adopted this approach for the updated recommendation on reprofiling.

Based upon this approach and using the March 2023 proposal, we have updated the capital expenditure profiling, and this has the impact of reducing capex by $14.5 million from the Icon Water March 2023 updated proposal (deferring expenditure beyond the period as per the Draft Determination). The reprofiling is shown in Table 26 and

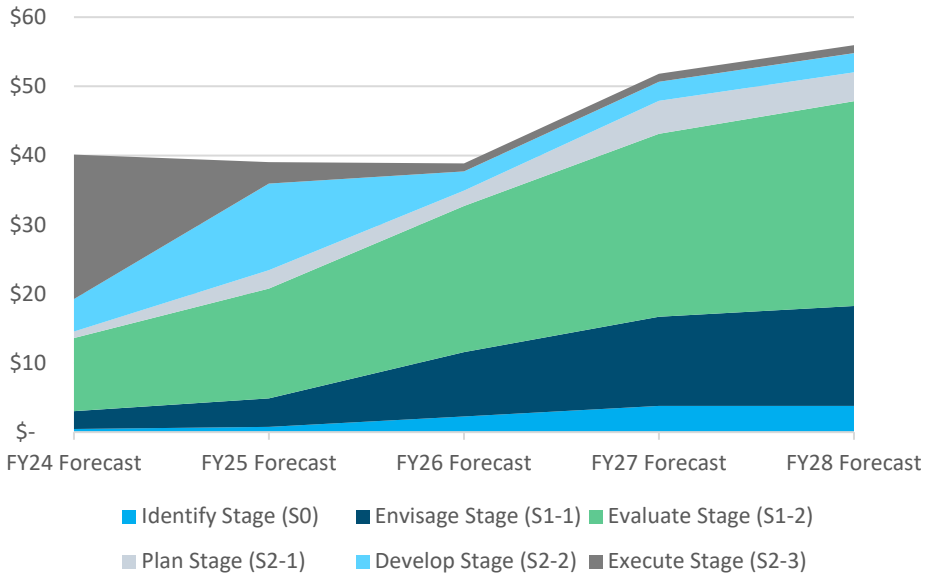
Figure 11.

Table 26: Final reprofiled capital expenditure (excluding top ten projects, CX11335 and IT projects), $million, $2022-23

IPAD Stage	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Identify Stage (S0)	0.45	0.76	2.27	3.79	3.79	**11.07**

IPAD Stage	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Envisage Stage (S1-1)	2.58	4.13	9.29	12.90	14.45	**43.35**
Evaluate Stage (S1-2)	10.57	15.86	21.15	26.43	29.60	**103.62**
Plan Stage (S2-1)	0.94	2.67	2.22	4.78	4.17	**14.78**
Develop Stage (S2-2)	4.70	12.52	2.77	2.76	2.77	**25.51**
Execute Stage (S2-3)	20.87	3.11	1.16	1.15	1.16	**27.46**
Total	**40.12**	**39.05**	**38.86**	**51.82**	**55.95**	**225.79**

Figure 11: Final reprofiled capital expenditure (excluding top ten projects, CX11335 and IT projects) $million, $2022-23



3.5.5 Recommendation

It is recommended that the reprofiling expenditure (excluding the top 10 projects) aligned with the approach used for the Draft Determination with the following adjustments:

- It is based upon the updated expenditure and timing of expenditure and IPAD phase in the Icon Water December 2022 proposal
- Excludes ICT expenditure.

Based on this approach, the overall capital expenditure in the 2023-28 regulatory period is reduced by $14.5 million, compared to a reduction of $26 million in the Draft Determination. The variations to the Icon Water March 2023 proposal are shown in Table 27.

Table 27: Recommended capital expenditure reprofiling (excluding top ten projects), $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water Updated Proposal	42.2	43.0	41.6	60.6	52.7	**240.3**
Updated Recommendation	40.1	39.0	38.9	51.8	56.0	**225.8**
Final Adjustment	*-2.1*	*-4.0*	*-2.8*	*-8.8*	*3.2*	***-14.5***

3.6 Capital escalation

3.6.1 Draft Determination

As previously stated in the original submission (June 2022), Icon Water applied a real escalation factor to the estimates for the capital expenditure proposal within the 2023-28 regulatory period. This was achieved by engaging BIS Oxford Economics to develop ACT-specific escalation factors for engineering construction costs and labour cost escalators, based on the labour and materials cost escalation forecast for ACT.

Subsequently, the price inflator for engineering construction costs was applied to all non-ICT capex projects, and for ICT capex projects, the electricity, gas, water, and wastewater services wage price was applied in Table 28.

Table 28: Icon Water Original submission (June 2022) Real implicit price inflator for engineering capex for the ACT (%)

	2023-24	2024-25	2025-26	2026-27	2027-28	Average
Price inflator for engineering construction costs	0.2%	0.6%	0.6%	0.3%	0.0%	0.3%
Price inflator for ICT capex	1.0%	1.3%	1.3%	0.6%	0.6%	1.0%

The Draft Determination considered these inflationary indicators and construction sectors cost forecasts and determined that Icon Water applied a reasonable level of real cost escalation to its capital expenditure proposal. The Draft Determination noted that Icon Water stated it would update the capital escalation forecast as part of an updated proposal.

3.6.2 Documents referenced:

- Attachment 2 Capital Expenditure
- Appendix 2.1 Capital Investment Plan

- Appendix 1.3 BIS Oxford Economics: Icon Water: Input Escalation Forecasts to 2027/28
- Icon Water - Capex data and model inputs -IW response to Draft Report
- C146 Inflation and cost escalators

3.6.3 Updated Proposal

The Updated Capital Proposal (Attachment 2) does not specifically reference as to how escalation has been applied to the capital expenditure, however Appendix 2.1 Capital Investment Plan and Icon Water - Capex data and model inputs -IW response to Draft Report do apply the escalators from the BIS Oxford Economics report.

3.6.4 Escalation assessment

Clarification was sought from Icon Water regarding the escalation application process through an RFI. Icon Water provided clarification both through a meeting on 06/02/22 and subsequent document *C146 Inflation and cost escalators*, confirming use of real escalation values, based on the below:

'*BIS Oxford Economics provide real escalators for electricity, construction, chemicals, and labour costs. We apply these real cost escalators and the inflation forecast to escalate costs in the capital investment plan. This approach is consistent with industry practice and with the approach endorsed by the ICRC in its draft report, and the approach adopted by Icon Water (and accepted by the ICRC) in previous regulatory proposals.'*[65]

To apply escalation, Icon Water has taken the real change for escalation from Appendix 1.3 BIS Oxford Economics report Table 1.1 (Summary – Labour & Materials Cost Escalation Forecasts: ACT). Relevant sections summarised in Table 29.

Table 29: Summary – Labour & Materials Cost Escalation Forecasts: ACT (per cent change, year average, year ended June).

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Average (h)
NOMINAL CHANGES		**Actuals**					**Forecasts Next Revenue Determination Period**						
Construction Costs (e)	0.1	1.3	3.1	2.7	2.2	5.2	7.1	4.8	3.0	2.5	2.5	2.5	3.0
Consumer Price Index (headline) (f)	1.7	1.9	1.6	1.3	1.6	4.4	7.1	4.8	3.0	2.5	2.5	2.5	3.1
REAL CHANGES (g)													
Construction Costs (e)	-1.7	-0.6	1.5	1.4	0.5	0.8	-1.7	-1.9	0.3	0.5	0.5	0.4	0.0

(e) Construction costs proxied by Water & Sewerage Construction Implicit Price Deflator for Australia
(f) Inflation forecasts are RBA forecasts to December 2024 from latest 'Statement of Monetary Policy'. Beyond that, inflation forecasts are based on the mid-point of RBA inflation target (2.5%).
(g) Real price changes are calculated by deducting the inflation rate from nominal price changes.

[65] Icon Water, C146 Inflation, and cost escalators

(h) Average for the next revenue determination period i.e. from 2023/24 to 2027/28 inclusive.

Source: BIS Oxford Economics, 2022.

To calculate the nominal escalators, Icon Water has taken the real change from the BIS Economics Assessment and combined this with an assessment of CPI using the ICRC guidelines. This approach does not consider that the forecast CPI adopted by Icon Water differs from that assessed by BIS Oxford Economics. These two CPI forecasts are provided in Table 30.

Table 30: Icon Water Real implicit price inflator for engineering capex for the ACT (%)

CPI Forecast	2022-23 Forecast	2023-24 Forecast	2024-25 Forecast	2025-26 Forecast	2026-27 Forecast	2027-28 Forecast	Average
Icon Water	7.12%	3.35%	3.35%	3.35%	3.35%	3.35	3.98%
BIS Oxford	7.10%	4.80%	3.00%	2.50%	2.50%	2.50%	3.73%

Over the 2023-28 regulatory period, the average CPI forecast adopted by Icon Water is very marginally higher (0.25%) than the BIS Oxford Economics forecast.

In comparison to the general assessment of construction indexation, the CPI and construction forecast values by BIS Oxford Economics are reasonable, and generally aligned with market factors.

They are, in fact, lower than the previous assessment. This follows the trend of construction prices increasing due to labour and material shortages stemming from 2022-23. Following this, downward economic pressures and slowing workloads forecast to reduce construction indexation from 2024, stabilising in line with the forecast CPI (around 3%) over the 2023-28 period.

3.6.5 Recommendation

To accept the BIS Oxford Economics forecast escalators and how this has been applied by Icon Water as inputs into the capital cost inputs into the revenue model.

3.7 CX11262 LMWQCC Biosolids Management Renewal

3.7.1 Project Overview

All the waste solids from the sewage treatment process at Lower Molonglo Water Quality Control Centre (LMWQCC) are processed using two multi-hearth furnaces. The furnaces have been in operation since the 1970s and are nearing their end of nominal service life. The LMWQCC Biosolids Management Renewal project is the upgrade of the biosolids treatment infrastructure to address:

- Technologies becoming outdated, such as the emission control system
- Remediation of the refractories and steel shell, and
- Increased capacity to manage the projected population increases.

The project is the design and construction of technology to address the following objectives:

- Recovery and reuse of the resources in waste solids such as lime and phosphorous

- Utilising generated heat/electricity to provide energy to either heat the water temperature of incoming sewage at LMWQCC to assist the biological process or generate electricity for the process, and
- Cater for the ACT population growth until 2060.

3.7.2 Draft Determination

The Draft Determination deemed project CX11262 LMWQCC Biosolids Management Renewal as prudent based on the need to renew the assets to maintain critical infrastructure and sewerage services, cater for future growth and reduce the risk of non-compliance.

The proposed timing of the capital expenditure was not deemed prudent as the construction activities and costs were spread across seven years (2025-26 to 2031-32) which is longer than is required for construction of this type and scale of project. It was considered that without linking the timing of expenditure for the earthworks to coincide with other project earthworks, the construction phase of the project can be realigned closer to the timing of the need for renewal, i.e., post 2030, with a short construction period and reduced project overheads. The Draft Determination reprofiled project expenditure for the 2023-28 regulatory period, and an efficient estimate for the project as detailed in Table 31.

Table 31: Draft Determination capital expenditure allowance CX11262 LMWQCC Biosolids Management Renewal, $million, $2021-22

$ Real 2022	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water June 2022 Proposal	7.91	5.61	23.44	10.39	14.12	61.47
Adjustment	*-4.52*	*-2.22*	*-16.67*	*3.16*	*16.36*	*-3.89*
Draft Determination Allowance	3.39	3.39	6.77	13.55	30.48	57.57

Source: Icon Water capital expenditure data for 2018-23. Marsden Jacob Associates (2022).

3.7.3 Current Status

At the time of the June 2022 Icon Water Submission the project was at the Evaluate stage of the Icon Water IPAD process, based upon the updated proposal dated December 2022 the project has now reached the Plan stage.

3.7.4 Key Documents reviewed

Original review

- CX11262 - LMWQCC Biosolids Renewal Concept Design Options Assessment Report, Hunter h2o, June 2022
- Lower Molonglo Biosolids Management Options Review Study Report, GHD, January 2019
- CX11262 LMWQCC Biosolids Management Renewal Concept Development Statement (endorsed) February 2020
- CX11262-GEN-003F Project Objectives and Weightings

- CX11262-REG-001A_DOAR Register
- CX11262-REG-024 Business Risk Assessment
- Icon Water presentation: 2023-28 Water & Wastewater Price Proposal, LMWQCC Biosolids Management Renewal
- CX11262-CAL-G-003 Cost Estimate Rev C Internal
- CX11262-GAN-G-002_Biosolids construction plan
- Lower Molonglo Asset Condition Assessment Report

Updated proposal (December 2022)

- Attachment 2 Capital Expenditure
- Appendix 2.1 Capital Investment Plan
- X11262-GEN-002D–LMWQCC Biosolids Management Renewal Business Case (Version D.21 October 2022)
- CX11262 Cost Estimate Final Draft - Updates per Comments (Deleted No Thermal Delta Odour Included)
- Report-Biosolids CX11262 - Option 1 Stage 1 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 1 Stage 3 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 2 Stage 1 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 2 Stage 2 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 2 Stage 3 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 3 Stage 1 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 3 Stage 2 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 3 Stage 3 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 3a Stage 1 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 3a Stage 2 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 3a Stage 3 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 5 Stage 1 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 5 Stage 3 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 2a Stage 1 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 2a Stage 2 Monte Carlo Simulation
- Report-Biosolids CX11262 - Option 2a Stage 3 Monte Carlo Simulation

3.7.5 Icon Water Updated Proposal (December 2022)

Since the original capital expenditure assessment and the Draft Determination, Icon Water has progressed the project through its IPAD process and a business case identifying the preferred technical option was endorsed by its Investment Review Committee in November 2022 and the Icon Water Board in December 2022.

Icon Water has updated its proposal to include the Draft Determination adjustment and to incorporate latest expenditure forecast as detailed in Table 32.

Table 32: CX11262 Revised cost estimate for Biosolids Management Renewal, $million, 2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water June 2022 Proposal	8.3	6.0	25.2	11.2	15.2	66.0
Draft Determination Allowance	3.6	3.6	7.3	14.6	32.8	61.9
Icon Water Updated Proposal Dec 2022	3.8	3.9	7.8	15.6	35.0	66.0
Variance	*0.2*	*0.2*	*0.5*	*1.0*	*2.2*	*4.2*

Source: *Icon Water Attachment 2 Capital Expenditure December 2022, Table 2-7*

This updated capital expenditure forecast is based upon data in the updated business case dated 21 October 2022. Icon Water had accepted the position in the Draft Determination de-linking the timing of expenditure for the earthworks from the timing other project earthworks, which removed $4.2 million of expenditure from the 2023-28 regulatory period. However, the updated estimate proposed the higher expenditure (as per the June 2022 proposal) totalling $66 million for the regulatory period.

As part of its IPAD, Icon Water has processed the project development with an option now endorsed (Option 5 Gasification).

The Project was designed to be implemented in three stages. However, for the Gasification option, due to the size of the gasification units currently available, the capacity increase between Stage 1 and 2 is too small to be practical, therefore, Icon Water has proposed that the project is delivered in two stages instead of three, with stages 1 and 2 combined.

The indicative timing for the initial stage has estimated a commissioning date in 2030 and the final stage is expected to be commissioned in 2056. The Business Case is seeking approval for the investment in Stage 1 with future stages to be incorporated into the Icon Water Asset Management Plan to be delivered when triggered.

The total capital expenditure estimate for the renewal to 2070, the delivery of each stage of the Gasification option using P10, P50 and P90 estimates is shown in Table 33.

Table 33: CX11262 Biosolids Management Renewal estimated capital cost, $millions, 2021-22

Stage	**Total Design and Delivery Capital Cost**		
	P10	P50	P90
Stage 1 (inc. Stage 2)	[redacted]	[redacted]	[redacted]
Stage 3	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]

These capital costs are proposed to be incurred in alignment with the delivery timeframe of stage 1 by 2030 and stage 3 by 2056.The business case does also provide a more detailed breakdown of the

timing of the expenditure, and this was used to support the assessment of the planned expenditure for the 2023-28 regulatory period. Table 34 compares the year-by-year project capital expenditure in the Icon Water proposal (Attachment 2 and Appendix 2.1) and the project business case.

Table 34: Comparative cost estimate for CX11262 Biosolids Management Renewal ($million)

Source	2023-24	2024-25	2025-26	2026-27	2027-28	2023-24	Basis of costing
Appendix 2.1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Attachment 2 (Table 2-7)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Business case (Table 5-5)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

As show in Table 34 costings in Appendix 2.1 and Attachment 2 are $ real 2022-23, and the business case references nominal and P90 (as opposed to P50). Although this would not have material impact on project costs, it does not explain why the project Business Case costs are approximately double the other reference costs.

This difference was explained by Icon Water during the initial review in July 2022, in that the proposed costs of $66 million for the regulatory period do not include the contingency element of the total capex costs as Icon Water have excluded these based upon some uncertainty for the timing of the project delivery, therefore not recovering these costs from customers within the 2023-28 regulatory period.

Additionally, in the updated proposal, approximately $0.9 million has been deferred from 2022-23 and reallocated to 2023-24 and this partially explains the increase from the Business Case estimated cashflow in 2023-24.

3.7.6 Recommendation

The project was previously deemed prudent based on the need to renew the assets to maintain critical infrastructure and sewerage services, cater for future growth and reduce the risk of non-compliance. This review is focused on the revised project cost estimate and the timing of the project.

Although the project has progressed since the previous review, there remains some uncertainty in relation to the project capital cost and timing. However, this does not represent a risk for the determination and customer prices, as Icon Water has excluded the contingency costs for the 2023-28 regulatory period from their proposed capital cost and this is evident by the proposed costs being significantly lower than the project budget (refer to Table 35).

As the contingency has been deferred outside the 2023-28 period, it is reasonable to assume the $66 million included in the period is an effective balance of risk and therefore considered an efficient allowance of capital expenditure for the period.

The assessment of capital expenditure is provided in Table 35.

Table 35: CX11262 LMWQCC Biosolids Management Renewal Capital Expenditure Recommendation, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water December Proposal	3.8	3.9	7.8	15.6	35.0	**66.0**
Recommended Adjustment	*0*	*0*	*0*	*0*	*0*	***0***
Recommended Capex	3.8	3.9	7.8	15.6	35.0	**66.0**

3.8 CX11313 Water Meter Renewals

3.8.1 Project Overview

CX113113 Water Meter Renewals is a program designed to:

- Install new water connections and meters
- Reactively replace faulty meters, and
- Carry out the planned replacement of water meters as they reach the end of their useful life, and in accordance with regulatory requirements.

The ICRC endorsed a program of $20.77 million over the 2018-23 period to install or replace 49,961 water meters.

In its initial submission, Icon Water proposed an ongoing program of water meter replacements for 2023-2028 at a cost of $31.19 million to install or replace 67,149 water meters.

The proposed scope of this program was to:

- Issue and inspect new meters for infill and greenfield development
- Proactively replace 20mm water meters approaching end of life (scheduled by suburb and categorised by type of works required: meter only replacement, meter replacement and service connection upgrade or meter replacement and service connection upgrade in driveway)
- Proactively replace 25-150mm water meters approaching end of life
- Reactively replace meters that fail prior to their expected end of life, and
- Perform in-service compliance testing and analysis of data to inform proactive meter replacements.

3.8.2 Draft determination

The Draft Determination deemed CX11313 Water Meter Renewals prudent but adjusted the number of meters replaced in the period, based upon assessment of historic replacement and installation

numbers (in the absence of the provision of further justification). The draft allowed for meter installs/replacements for 2023-2028 as follows:

- 8,820 new meters/connections
- 3,705 reactive meter replacements
- 40,909 proactive meter replacements.

This was a total of 53,434 installations/replacements, a 20% reduction on the 67,149 proposed by Icon Water. This reduced the capital allowance for the 2023-28 regulatory period from $31.14 million to $24.91 million, a reduction of $6.24 million ($2021-22).

3.8.3 Documents reviewed

Original review

- Stream 3 Tue 330 - 5 CX11313 Water Meter Renewals
- CX11313 CDS - Meter Replacement Program 2023-28
- CX11313 CDS costs_C044
- RFI C044_water meter program CX11313
- Meter Replacement Program Data Request
- Meter Replacement Program_Data Request updated

Updated proposal (December 2022)

- Executive Summary.pdf
- Attachment 2 - Capital expenditure
- Appendix 2.1 Capital Investment Plan
- RFI148 and 149 CX11313 Water meters renewals program
- Appendix 2.1 CIP – RFI response Mar2023

3.8.4 Icon Water updated proposal

In its updated proposal, Icon Water provided a revised forecast for new meter installations and reactive meter replacements (see Table 36) based on:

- Aligning the forecast growth in new connections (new meter installations) with the Commission's forecast growth in connections of 8%, and
- Historic trend analysis being inappropriate to estimate future reactive meter replacements due to the impact of COVID policy on historic data.

Table 36: Icon Water revised meter forecast (December 2022)

	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
New meters	1,949	2,047	2,152	2,267	2,304	10,719
Reactive meter replacement	859	872	885	899	914	4,429

This compares with our forecast based on historical trend analysis (Table 37).

Table 37: Marsden Jacob meter forecast (Draft Determination)

Water Meter Renewals	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
New meters	1,764	1,764	1,764	1,764	1,764	8,820
Reactive meter replacement	741	741	741	741	741	3,705

This is a proposed increase of 2623 meter replacements above that included in the Draft Determination.

Icon Water explained in its response to RFI 148, that during COVID impacted years, fewer reactive meter replacements were performed for the following reasons:

1. *Indirectly, government required suspension of the water meter reading program reduced the **identification** of meters requiring reactive replacement. This was compounded by more general territory wide shutdowns, and wide-spread work from home arrangements which shifted individual consumption patterns. This delayed the identification of reactive water meter renewals.*
2. *Directly, the more intense lockdowns in the ACT (and impacts of staff quarantining) meant that reactive meter replacement was lower priority than responding to water outages or sewer blockages. Reactive meter replacement was a higher priority than other proactive activities, including the proactive meter replacement program.*
3. *Further to this, Government advice was to not interrupt supply to households where residents were under a direction to quarantine so reactive work on these houses would have been postponed if it was deemed to be non-critical. A burst meter may have been replaced (damage to property) while a meter that was misreading would have been postponed for replacement. This delayed the timeliness of the installation of reactive meters.*[66]

[66] Icon Water, RFI148 and 149 CX11313 Water meters renewals program[8472], p.1-2

In RFI C148, we requested an explanation of the differences in cost between new meters and reactive meters, with reference to Icon Water's updated proposal amounts.

Icon Water responded to this RFI with the below information:

> *As outlined in Table 2-10 and page 30 of Attachment 2 of the revised proposal, reactive meter replacement has additional Icon Water activities compared to new meter issue.*
>
> *"The new meter program only covers the cost of issuing the meter, with installation occurring at the cost of the developer. Refer to Table 2-10 which shows the activities undertaken for each program and cost of each meter replacement relative to a new meter issue. The renewal programs also require investigation and potential reconfiguration to either ensure that the meter matches the consumption profile, or to upgrade older meter installation with the current standard configuration of valving and location."*

Icon Water also advised that new meter installations are less costly than reactive meter replacements for the following reasons:

- *For new meter issue, Icon Water issues (and pays for) the new water meter, however installation of the meter is completed and paid for by the builder or developer (registered plumber). Icon Water then does a post installation inspection to confirm this is done to the Icon Water standards to ensure safe and effective ongoing operation and data integrity supporting accurate customer billing. The cost is primarily the materials (rather than transport and labour).*
- *For reactive meter replacement, Icon Water may undertake an inspection to determine if the meter installation requires reconfiguration (such as replaced with a different size of meter), or if the installation requires upgrade to current standards. Icon Water also undertakes and pays for the installation of the new meter as well as providing the new water meter and sign-off that the replaced meter meets the standards. The cost of this includes material, as well as transport and Icon Water labour costs.*[67]

As noted in Attachment 2, Icon Water proposed a total expenditure allowance of $30 million over the 5-year regulatory period in 2022-23 dollars, a reinstatement of $3.3 million in comparison to the Draft Determination, but lower than its original proposal of $33.4 million. This updated proposal was based upon its assessment of the meter replacement numbers and using their unit costs[68].

In response to RFI C148, Icon Water did not provide a further detailed breakdown or quantification of the drivers for the cost differences between the two activities visible in Figure 12 above or an explanation of how these costs relate to the updated figures proposed by Icon Water, nor did it provide a breakdown and evidence that reconciled the proposed expenditure to this information.

3.8.5 Recommendation

We accept Icon Water's revised casts for the number of new and replacement meters on the basis of:

- Aligning the forecast growth in new connections (new meter installations) with the Commission's forecast growth in connections of 8%, and

[67] Icon Water, RFI148 and 149 CX11313 Water meters renewals program[8472], p.1
[68] Icon Water, Attachment 2 Capital Expenditure, December 2022 Table 2-11, p31

- Historic trend analysis being inappropriate to estimate future reactive meter replacements due to the impact of COVID policy on historic data.

In the absence of a detailed and quantified explanation from Icon Water that demonstrates and reconciles previously provided unit rates, activities required to carry out the works for each category of meter replacement, and their costs, MJA adopted the same cost benchmarking approach for the review for the Draft Determination. We have increased our recommendation for the meter replacement program based upon the proportionate uplift in the number of meters deemed as appropriate for the regulatory period.

The increase in recommended allowance of the number of meters replaced of 2,623 meters is 3.9% of Icon Water's original forecast of 67,149 metre installations/replacements over the regulatory period. Icon Water originally proposed $33.4 million across the regulatory period to install these new meters and replace existing meters where required, 3.9% of that forecast is $1.3 million.

We recommend adjusting the allowance in the Draft Determination ($26.7 million in $ 2022-23), proportionate to the increase of 2,623 meters over the regulatory period. This is an increase in allowable expenditure of $1.3 million to a total of $28 million. This is $2 million lower than the Icon Water December 2022 updated proposal. This recommendation is provided in Table 38.

Table 38: Recommended expenditure on Water Meter Renewals, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water updated proposal (December 2022)	5.6	5.9	6.0	6.1	6.3	30.0
Proposal adjustment	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*2.0*
Update capex Recommendation	5.2	5.5	5.6	5.7	5.9	28.0

3.9 CX11337 Office Expansion Space Utilisation

3.9.1 Project Overview

CX11337 Office Expansion Space Utilisation is a project proposed by Icon Water to relocate approximately 40 staff from current premises (Level 5 ActewAGL House, 40 Bunda Street) when the lease expires in December 2024, and to redesign its working spaces to leverage changed ways of working post-COVID to promote culture and productivity gains in the workspaces.

Icon Water proposed to spend $12.3 million in 2023-28 to design and implement its strategic accommodation with a further $5.7 million to be incurred in the 2028-33 regulatory period to bring additional corporate services in-house if required.

Icon Water is considering the 'hybrid mobile workforce model' as a solution to its accommodation issues. This is an evolving, post-pandemic version of activity-based work and Icon Water sees it as an opportunity to consolidate office accommodation and drive cultural change. Icon Water envisages

improved space utilisation, reduced capacity constraints, a more centralised location for office staff, more flexible work, mobility, collaboration, efficiency, and a sense of cohesion.

3.9.2 Draft determination

The draft determination did not consider this project prudent in the proposed timeframe as the project was not sufficiently developed, with no clear case demonstrated as to the need for the additional accommodation. The Draft Determination provided an allowance of $1.4 million for development funding for Icon Water to plan the project well to achieve its strategic accommodation objectives over the longer term, at the most efficient cost for customers. The Draft Determination allowance is provided in Table 39.

Table 39: CX11337 Office Expansion Space Utilisation, Draft Determination allowance, $million $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023- 28
Icon Water June 2022 Proposal	8.1	4.7	0	0	0	12.7
Adjustment	*-6.18*	*-4.32*	*0*	*0*	*0*	*-10.5*
Draft Determination Allowance	1.5	0	0	0	0	1.5

3.9.3 Current status

The project is currently deferred to the 2028-33 regulatory period, so Icon Water can undertake investigation and design the most efficient new accommodation solution for its business.

3.9.4 Documents reviewed

Original review

- [1] EN05.00.23 Land and Buildings Strategy
- [2] GSG - Risk assessment - Office expansion and space utilisation optimisation - CDS - December 2021
- [3] PR-013363 - 1 - ICON Water Report - JO r1 redacted
- CX11337 Staff Office Accommodation CDS 23022022
- Detailed Project Costing for Resourcing-09MAR2022 (1) AIMS
- Price review RFI C046 (CX11337)

Updated proposal (December 2022)

- Executive Summary.pdf
- Attachment 2 - Capital expenditure.pdf
- Appendix 2.1 Capital Investment Plan

- RFI C150 - Office Expansion Space Utilisation (CX11337)

3.9.5 Icon Water updated proposal (December 2022)

Icon Water accepted the Draft Determination allowance of $1.5 million ($2022-23) to strategically develop this project during the 2023-28 regulatory period. In addition, Icon Water noted that it had allowed for the cost of capitalised leases (including the lease to accommodate 40 staff that expires in December 2024) which were erroneously excluded from its original proposal (June 2022). This adjustment increased the proposed capital expenditure by $3.1 million to a total of $4.6 for the 2023-28 regulatory period. Icon Water's updated capital expenditure proposal is provided as Table 40.

Table 40: CX11337 Office Expansion Space Utilisation, Icon Water Updated capital expenditure proposal, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023- 28
Icon Water regulatory proposal	8.1	4.7	0	0	0	12.7
Draft Determination	1.5	0	0	0	0	1.5
Icon Water updated proposal	1.5	0.5	0.9	0.9	0.9	4.6

3.9.6 Recommendation

We accept the proposed $1.5 million to strategically develop this project during the 2023-28 regulatory (as per the Draft Determination).

Icon Water in its response to an information request (RFI C150) noted that it would not be possible to fit the additional 40 FTEs in the existing office space with the current fit out.

Increased office space utilisation and efficiency could be achieved via adopting flexible work arrangements and a potential pilot program of future possible accommodation scenarios to inform the efficient and effective design of CX11337 Office Expansion Space Utilisation could accommodate 40 FTE from December 2024.

This approach affords Icon Water the time to observe the changes occurring post-pandemic, the evolving workplace accommodation models, and its own future needs to implement strategic changes to accommodate its staff into the future. It also affords Icon Water the opportunity to pilot ideas that could inform an optimal solution for the overall project.

Based upon this approach, the 40 FTEs could be accommodated within existing Icon Water office space as therefore no allowance is required for the capitalised lease from January 2025.

The recommended capital expenditure allowance is provided as Table 41.

Table 41: CX11337 Office Expansion Space Utilisation capital expenditure recommendation, $million, $2022-23

Office Expansion Space Utilisation	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Proposed Capex (December 2022)	1.5	0.5	0.9	0.9	0.9	4.6
Recommended Adjustment	*0*	*0.5*	*0.9*	*0.9*	*0.9*	*3.1*
Recommended Capex	1.5	0	0	0	0	1.5

3.10 CX11082 Lower Red Hill Reservoir Tank B (East)

3.10.1 Project overview

Icon Water has 21 post tensioned, wire wound concrete reservoirs in service that were constructed between 1953 and 1977 and range between 4.5ML to 27.3ML in size. The Lower Red Hill Tank B is one of these tanks and was constructed in 1953-54, with a nominal capacity of 9.3ML.

Lower Red Hill Tank B's condition has deteriorated substantially and currently presents the most concern from a structural integrity perspective. The tank, together with Lower Red Hill Tank A; Deakin (DEAR); and Narrabundah (NARR) reservoirs, supplies the South Canberra (SCAN) pressure zone.

Of all the pressure zones and their respective reservoirs, SCAN has the lowest ratio of water stored to throughout of all reservoirs in Canberra. There is also a sizable portion of the reservoir's storage attributed to fire-fighting supply due to the institutions that are located within SCAN.

This project was identified in 2016 and originally planned to be completed in 2021-22. In November 2017 a detailed external inspection and condition assessment of the reservoir, and subsequent assessment, recommended a strategy to replace or substantially strengthen the reservoir. In January 2020 Engineering Services advised for the operating water level in the reservoir to be kept below 5 metres and for the 5-metre level to be set as the maximum allowable until further notice, due to concerning deterioration evident in the top half of the reservoir wall. In April 2020, and based on current existing knowledge, Engineering Services advised that a replacement of the reservoir is the preferred approach due to the reservoir's deteriorating condition.

Tank B was permanently removed from service on 2 September 2021 following a recommendation from Icon Water's Senior Structural Engineer, due to the risk of catastrophic failure.

Although having the tank offline has not impacted the delivery of water services it does remove contingency and increases the risk of a service interruption.

3.10.2 Draft Determination

The Draft Determination deemed project CX11082 Lower Red Hill Reservoir Tank B (East) as prudent based on the need to restore the storage contingency and address the risk to continued uninterrupted water supplies.

Icon Water's proposed capital costs for the project was $12.6 million, with $11.9 million ($2021-22) in the 2023-28 regulatory period. This was regarded as on the high side of efficient costs based on benchmarking with similar volume concrete water storage tanks across the Australian water sector. Adjustments were made to the capital expenditure allowance, reducing the total cost to $8.9 million, with $8.5 million for the regulatory period ($2021-22). This included adjustments to:

- project and design management ($0.4 million)
- Site access and landscaping ($0.7 million)
- Contractor on costs ($0.18 million)
- Contingency ($1.9 million)
- Project on costs ($0.32 million).

The Draft Determination reprofiled project expenditure for the 2023-28 regulatory period is detailed in Table 42.

Table 42: Draft Determination capital expenditure allowance CX11082 Lower Red Hill Reservoir Tank B (East), $million, $2021-22

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water June 2022 Proposal	4.82	7.04	0	0	0	11.87
Adjustment	*-1.41*	*-2.11*	*0*	*0*	*0*	*-3.51*
Draft Determination Allowance	3.40	5.10	0	0	0	8.50

3.10.3 Current Status

At the time of the June 2022 Icon Water Submission, the project was at the Evaluate stage of the Icon Water IPAD process. Based upon the updated proposal in December 2022 the project is still at the Evaluate stage.

3.10.4 Documents reviewed

Original review

- Five Post Tensioned Concrete Service Reservoirs In ACT Detailed Inspection and Condition Assessment, SAS TTI JV, 2017
- Report of Concrete Water Reservoir Structural Assessment Progress Report, GHD, 2005
- Report on Post-Tensioned Concrete Service Reservoirs Final Report, GHD 2006

- Internal Memo - Lower Red Hill Tank B Replacement Sizing and Preliminary Options Investigation, 2021
- Growth Forecast Study Planning Horizon 2020 to 2043, 2021
- Memo to IRC, Proposed Portfolio Adjustment, 2020
- ISG - Risk assessment - CDS - Lower Red Hill Tank B reservoir replacement - July 2021
- CX11082 Lower Red Hill Reservoir Tank B Concept Development Statement DS 010921, 2021
- Icon Water presentation: 2023-28 Water & Wastewater Price Proposal, Lower Red Hill Reservoir Tank B (East) (CX11082)

Updated proposal (December 2022)

- Attachment 2 Capital Expenditure
- Appendix 2.1 Capital Investment Plan
- Appendix 2.2 Detailed Lower Red Hill Reservoir cost adjustments (confidential)
- Icon Water Memorandum RFI C145 Lower Red Hill Reservoir Tank B (CX11082)

3.10.5 Icon Water Updated Proposal (December 2022)

In its December 2022 updated proposal, Icon Water accepted some aspects of the Draft Determination allowances, but did not accept changes to site restoration and landscaping and only partially accepted the reduction in contingency. Changes to these elements of the cost build up also impacted on the contractor prelims and margin, and Icon Water's management costs. Icon Water's updated proposal is detailed in Table 43.

Table 43: CX11082 Lower Red Hill Reservoir Tank B, Icon Water's Response to the Draft Determination

Description	MJA's rationale to recommend removal	Icon Water's response
Icon Water project management and stakeholder review cost during detailed design	Reduced by 80% due to overall reductions in project forecast and assumed lower external support	Accepted; and reforecast.
Site access improvements	Reduced to 45% of original estimate	Accepted; noting actual costs will depend on road condition during and post construction.
Site restoration and landscaping	Removed	Icon Water disagrees with this assessment and propose to include the original $0.38million. The demolition and construction works will disturb a sizable area within Red Hill Nature Reserve which will require reinstatement on completion. The allowance includes replanting 3000 sqm with

Description	MJA's rationale to recommend removal	Icon Water's response
		variable treatments, stormwater management and reinstatement of site security fences.
Contingency	Removed	Modified contingency forecast to only include for demolition, site access and landscaping as these do not have benchmarked comparators.
Contractor preliminaries, contractor margins and Icon Water project management	Reduced based on previous adjustments	Recalculated noting adjustment above.

Source: Icon Water Attachment 2 Capital Expenditure December 2022, Table 2-13

Based upon the response detailed in Table 43 Icon Water have proposed a reviewed project cost as detailed in Table 44.

Table 44: CX CX11082 Lower Red Hill Reservoir Tank B (East) proposed cost adjustment, $million, $2021-22

Description	Icon Water original proposal	Adjustment	Draft Determination	Icon Water proposed adjustment	Icon Water proposed revised expenditure
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					
[redacted]					

Description	Icon Water original proposal	Adjustment	Draft Determination	Icon Water proposed adjustment	Icon Water proposed revised expenditure
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

In addition to the proposed changes to the project capital cost, Icon Water also proposed an update to the timing of the project, deferring expenditure in 2023-24 and 2024-25, into 2025-26. It is understood this adjustment in the timing of expenditure is to align to a more realistic project delivery timeframe. The revised proposal for the capital expenditure is detailed in Table 45.

Table 45: Icon Water Updated capital expenditure proposal CX11082 Lower Red Hill Reservoir Tank B East, $million, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water June 2022 Proposal	5.1	7.6	0	0	0	12.6
Draft Determination Allowance	3.6	5.5	0	0	0	9.1
Icon Water Updated Proposal Dec 2022	0.3	2.7	7.4	0	0	10.4
Variance from Draft Determination	-3.3	-2.8	7.4	0	0	1.3

The key variance in the updated proposal from the Draft Determination is the cost of the landscaping ($0.28 million). At the time of the draft determination the details of the landscaping element of the works were not fully defined. Icon Water has since provided further clarification of the landscaping requirements, particularly the area required to be landscaped and the need to replace drainage and fencing:

- Landscaping is required to remediate the tank area, lay down areas and the area allocated of the vale pits (300m^2)

- Replace fence removed for the construction activities (100m)
- Install site drainage is required to manage stormwater from the site. In particularly the reservoir roof and adjacent impervious surfaces to manage environmental impacts.

The cost estimate developed at the Concept Development Stage is provided as Table 46.

Table 46: CX11082 Lower Red Hill Reservoir Tank B, landscaping cost estimate

Landscaping	Quantity	Rate ($)	Total $ 2021 ($M)	Converted to $2022-23 ($ M)
Soft landscape. Allow 3000 sq.m	3000m2	[redacted]	[redacted]	[redacted]
Make good fence. Allow 100 m	100m	[redacted]	[redacted]	[redacted]
Drainage	total	[redacted]	[redacted]	[redacted]
Total			[redacted]	[redacted]

This cost estimate has been used by Icon Water for both the original and updated expenditure proposals.

The other elements of the cost estimate which have been updated by Icon Water: Contractor prelims (12%), Contractor margin (15%), Contingency (30%), Icon Water Project Management and site surveillance (10%) were recalculated based upon the revised construction cost.

In the Draft Determination the allowance for the 30% project contingency was removed on the basis that the estimate is based upon the full cost of a recent similar project and also external cost benchmarking. In its updated proposal Icon Water included 30% contingency but limited this to the demolition, site access and landscaping as these did not have benchmarking comparators. This inclusion of contingency only for limited elements of the project is considered a reasonable approach.

3.10.6 Recommendations

The project was previously deemed prudent based on the need to replace the tank to restore the storage contingency. This review is focused on the revised project cost estimate.

The updated proposal is closely aligned with the Draft Determination, with the only variances increased landscaping allowance and partial reinstatement of the contingency and is $2.2 million lower than the original proposal. Based upon the information confirming the scope of the landscaping element of the project, reduced contingency and the associated adjustments to the on-costs the revised project cost is assessed as reasonable.

Additionally, the adjustment to the timing of the expenditure is also deemed prudent. The recommended capital expenditure allowance is provided as Table .

Table 47: Lower Red Hill East Tank B (east) capital expenditure recommendation, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water December 2022 proposal	0.3	2.7	7.4	0	0	**10.4**
Recommended Adjustment	*0*	*0*	*0*	*0*	*0*	***0***
Recommended Capex	0.3	2.7	7.4	0	0	**10.4**

3.11 Summary of Recommendations

A summary of the proposed capital expenditure adjustments is provided in Table 48 and Table 49.

Table 48: Recommended capital expenditure 2018-23, $million, $2022-23

	2018-19	2019-20	2020-21	2021-22	2022-23	Total 2018-23
Icon Water actual/forecast (December 2022)	**116.3**	**131.5**	**99.2**	**72.8**	**81.3**	**501.0**
Adjustments						
AXLE-Asset Management and Maintenance Solution	*7.1*	*0*	*0*	*0*	*0*	*7.1*
Recommended Capital Expenditure	**109.2**	**131.5**	**99.2**	**72.8**	**81.3**	**493.9**

Table 49: Recommended capital expenditure 2023-28, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water proposal (Dec 2022)	**110.67**	**97.62**	**114.95**	**171.43**	**192.70**	**687.4**
Adjustments						
LMWQCC Biosolids Management Renewal	*0*	*0*	*0*	*0*	*0*	***0***
Water Meter Renewals	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	***2.0***
Office Expansion Space Utilisation	*0*	*0.5*	*0.9*	*0.9*	*0.9*	***3.1***
Lower Red Hill Reservoir Tank B (East)	*0*	*0*	*0*	*0*	*0*	***0***
North Weston Fanhouse Odour Control	0.94	1.41	1.88	2.35	2.64	***9.2***
Reprofiling	*2.1*	*4.0*	*2.8*	*8.8*	*-3.2*	***14.5***
Total of adjustments	***3.44***	***6.31***	***5.96***	***12.45***	***0.73***	***28.9***
Recommended Capital Expenditure	**107.2**	**91.3**	**109.0**	**159.0**	**192.0**	**658.5**