MARSDEN JACOB ASSOCIATES

economics
public policy
markets
strategy

Icon Water 2023-28 expenditure review

Final report

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A Marsden Jacob Report

Prepared for Independent Competition and Regulatory Commission (ICRC)

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

This review includes an assessment of operating expenditure, capital expenditure, asset management practices, and ring-fencing arrangements for costs of Icon Water's water and sewerage services. The focus of the assessment has been to review and provide advice on:

- the prudency and efficiency 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; and
- whether costs are attributed appropriately to the regulated services (i.e., adequate ring fencing).

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

Generally, Icon Water's approach to forecasting operating expenditure is reasonable and consistent with base step trend approach. Our review and recommendations have focused on the key assumptions and inputs used to develop Icon Water's proposed operating expenditure forecasts. Based on our review of Icon Water's proposed operating expenditure forecasts, key recommendations include:

- Adjustments to the base year controllable operating expenditure to reflect:
  - Updated 2021-22 actual operating expenditure
  - Non-recurring price submission costs
  - Shift in licence fees and royalties into non-controllable costs
  - Adjustment for abnormally low level of overhead capitalisation in 2021-22.
- Regarding output growth, we have accepted Icon Water's proposed approach to calculating output growth, provided that the productivity growth factor incorporates factors that are not just scale related but includes other drivers of productivity. Demand assumptions included in the forecast of output growth have been updated to reflect the ICRC's updated water and sewerage forecasts.
- An adjustment to productivity growth from 0.5% to 1.4%. Our overall assessment is that further research and independent analysis should be undertaken before applying the approach used by Quantonomics. Additionally, we have identified issues with the modelling, which warrants some further

analysis by Quantonomics to provide confidence that the analysis is producing statistically robust and unbiased results. Using the Quantonomics results as they stand, our assessment of the modelling indicates that productivity growth rate should be 1.4 per cent per annum allowing for a 10-year adjustment period.

- A downward adjustment to real cost increases for electricity relating to wholesale and network electricity forecasts.
- A downward adjustment to the step change in insurance costs to reflect the expected increase from 2021-22 to 2022-23 in insurance costs only.
- A small downward adjustment to the SOCI step change costs.

Based on our assessment of Icon Water's proposed controllable operating costs for the 2023-28 regulatory period, Table 1 provides a breakdown of our adjustments and recommendations for forecast total operating costs for the 2023-28 regulatory period. The recommended adjustments result in a 5.8% reduction in total forecast operating costs over the 2023-28 regulatory period, compared with Icon Water's proposal.

Table 1: Recommended total operating costs for the 2023-28 regulatory period, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28
Base year					
Proposed	150.17	150.17	150.17	150.17	150.17
Adjustments					
Updated 2021-22 actual controllable opex	-1.90	-1.90	-1.90	-1.90	-1.90
Labour capitalisation	-1.87	-1.87	-1.87	-1.87	-1.87
ICRC licence fees	-1.34	-1.34	-1.34	-1.34	-1.34
Other Licence fees	-0.55	-0.55	-0.55	-0.55	-0.55
Royalties	-0.10	-0.10	-0.10	-0.10	-0.10
Price submission costs	-1.25	-1.25	-1.25	-1.25	-1.25
Recommended	143.16	143.16	143.16	143.16	143.16
Trend					
Proposed	2.08	4.56	7.62	9.85	11.85
Adjustments					
Electricity	-0.09	-0.25	-0.58	-1.20	-1.79
Output and Productivity growth	-1.79	-3.56	-5.28	-6.67	-8.01
Recommended	0.20	0.74	1.76	1.99	2.05

	2023-24	2024-25	2025-26	2026-27	2027-28
Step changes					
Proposed	1.98	2.30	2.66	2.90	3.07
Adjustments					
Insurance	-0.79	-1.20	-1.56	-1.80	-1.97
SOCI	0.00	-0.16	-0.16	-0.16	-0.16
Price submission costs				0.90	
Cotter Pump station			-0.14	-0.28	-0.28
Recommended	1.19	0.94	0.80	1.56	0.66
Non-controllable costs					
Proposed	46.83	47.33	47.96	48.65	49.33
Adjustments					
ICRC licence fees	1.34	1.34	1.34	1.64	2.34
Other licence fees	0.54	0.54	0.54	0.54	0.54
Royalties	0.15	0.15	0.15	0.15	0.15
Water Abstraction Charge	0.20	0.11	-0.01	-0.12	-0.23
Recommended	49.06	49.47	49.99	50.86	52.13
Total operating costs					
Proposed	201.06	204.35	208.41	211.57	214.41
Adjustments	-7.56	-9.90	-11.98	-12.41	-14.12
Recommended	193.61	194.31	195.71	197.56	197.99

Note: The 2022-23 inflation index has been updated from Icon Water's proposal to incorporate June 2022 actual CPI figures and an updated forecast CPI for 2022-23 of 3.0%.

Capital expenditure review

Consistent with recent benchmarking of Icon Water's asset management processes, we have found Icon Water to have the basis of sound processes for capital planning and governance. However, as noted in detail through the capital expenditure section of the report, the benefits of the established process are undermined by a lack of data and timely progress of business case development to support the expenditure proposal.

Much of the Icon Water capital plan that we reviewed (refer to sections on the samples of 2023-2028 expenditure reviewed), were early in their development, often lacking a defined scope and estimate, and robust options and risk analysis.

Cost discrepancies have also been encountered for the review of the 2018-23 and 2023-28 projects and programs reviewed which has made it difficult to confidently make efficiency assessments. We understand escalating various costs for submission purposes can create discrepancies, but this needs to be managed through systems and processes in future, to avoid any uncertainty or data quality issues.

Based upon the early stages of projects' development, where we have not been able to confirm with a level of certainty the efficient cost estimates, we have included a conservative cost estimate to allow upfront cost recovery. Noting that actual prudent and efficient capital expenditure will be rolled into its asset base at the end of the regulatory period.

The level of project development and the lack of certainty regarding the costs and timing of projects has helped inform our recommended catch up and continuing efficiencies.

We are of the view that reasonable efficiencies can be gained in Icon Water's capital plan for 2023-2028 by revising the way it progresses capital planning, and ensuring projects and programs are fully scoped, assessed and costed before moving ahead with investments.

The level of certainty of the timing and phasing of expenditure has been undermined as a result of the early development of the proposed expenditure. This indicated to us that at both a forecast level, and at an individual project and program level, there was a systemic issue that warranted addressing. We have addressed this at the capital forecast level (see the Ability to deliver section below) and at individual project and program level across the top 10 projects and programs reviewed, in the adjustments recommended (see below and individual review sections at the end of this document).

We have used the information provided by Icon Water, and additional information requested by us, to inform our recommendations on prudence and efficiency.

These observations are reflected in the adjustments we have made, although we have recommended the allowance of some expenditure not because it was well justified or well-planned but because it is required to meet regulator obligations or to maintain customer service levels. In these cases, we have used our experience in water and sewerage service delivery to set a level of prudent and efficient expenditure.

A summary of our recommendations is set out below (Table 2).

Table 2: Summary of recommended adjustments to Icon Water's 2023-2028 capital forecast, $million, $2022-23

Capital expenditure adjustment	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water proposal	**147.31**	**118.73**	**129.22**	**136.52**	**141.72**	**673.51**
Adjustments						
LMWQCC Secondary Treatment Bioreactors Capacity Upgrade	-	-	-	-	-	0.00

Capital expenditure adjustment	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
LMWQCC Biosolids Management Renewal	4.52	2.22	16.67	(3.16)	(16.36)	3.89
Sewer Mains Renewal Program	-	-	-	-	-	0.00
Water Meter Renewals	1.25	1.25	1.25	1.25	1.25	6.24
Cotter Pump Station Upgrade	(0.91)	(0.09)	-	-	-	(1.00)
Vehicle Lease Renewals for Heavy Vehicle Fleet	0.21	(0.12)	0.48	0.29	-	0.86
Asset Management Information System	-	-	-	-	-	0.00
Water Main renewals (structural failures)	-	-	-	-	-	0.00
Office Expansion Space Utilisation	6.18	4.32	-	-	-	10.50
Lower Red Hill Reservoir Tank B (East)	1.41	2.11	-	-	-	3.51
Reprofiled capital expenditure (Excluding top ten projects)	33.09	29.42	5.11	(19.02)	(24.32)	24.29
Subtotal of adjustments	*45.75*	*39.11*	*23.50*	*(20.64)*	*(39.43)*	*48.29*
Revised total	**101.56**	**79.62**	**105.72**	**157.16**	**181.15**	**625.21**
Catch up Efficiency target - 1% pa (Excluding top 10 projects)	0.31	0.71	1.37	2.39	3.15	7.94
Continuing efficiency target - fixed 2%	2.03	1.58	2.09	3.10	3.56	12.35
Total of adjustments	*48.08*	*41.40*	*26.96*	*(15.15)*	*(32.72)*	*68.58*
Revised total inc. efficiency targets	**99.23**	**77.33**	**102.26**	**151.67**	**174.44**	**604.93**

1. Introduction

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

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 Territory also have 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 Territory 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 Territory will review Icon Water's capital and operating expenditures to ensure they are prudent and efficient.

This review includes an assessment of operating expenditure, capital expenditure, asset management practices, and ring-fencing arrangements for costs of Icon Water's water and sewerage services. The focus of the assessment has been to review and provide advice on:

- the prudency and efficiency 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; and
- whether costs are attributed appropriately to the regulated services (i.e., adequate ring fencing).

1.1 Approach and report structure

The next sections of our report include:

- Section 2 provides a review of Icon Water's business systems and governance structure used to develop its capital plans,
- Section 3 outlines our assessment of Icon Water's proposed operating expenditure forecasts for the 2023-28 regulatory period, and
- Section 4 details our assessment of Icon Water's proposed capital expenditure forecasts for 2023-28 regulatory period.

2. Governance, planning and asset management frameworks

2.1 Governance, planning and asset management frameworks

Overview

This section of the report provides an overview of Icon Water's business systems and governance structure used to develop its capital plans. The review addresses:

- Asset management,
- Capital planning and delivery,
- Investment prioritisation, and
- Risk management.

Asset management framework

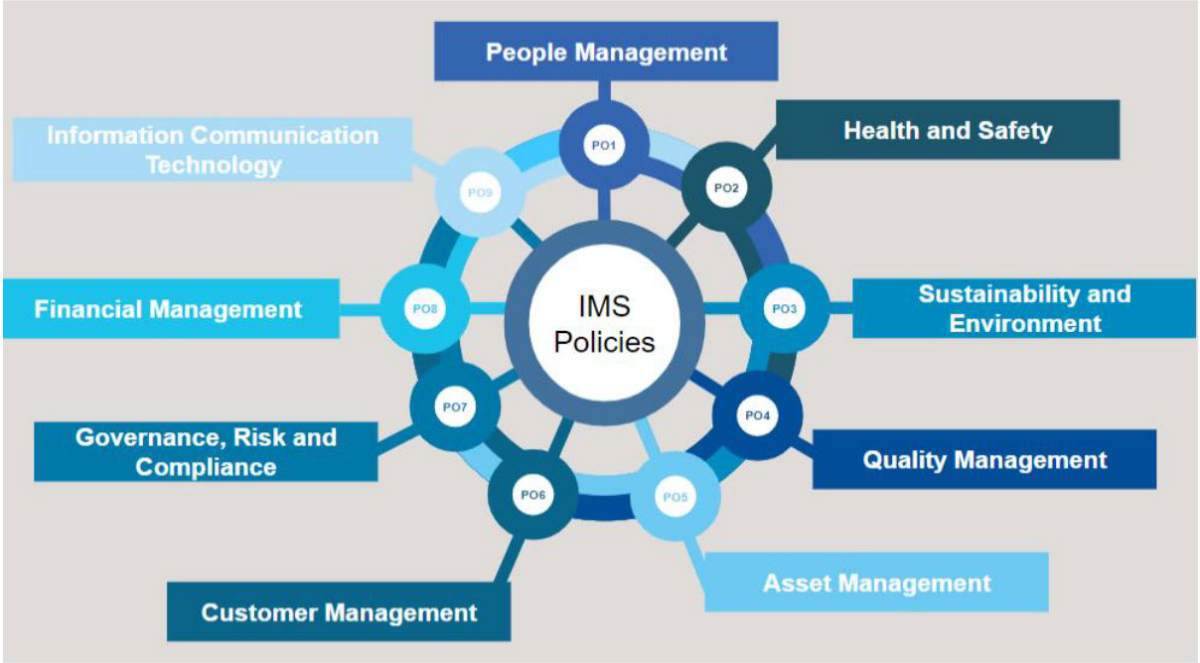
Icon Water have adapted the Institute of Asset Management (IAM) model to align its systems and processes to International Organization for Standardization (ISO) 55001. Icon Water's asset management system (AMS) is set out diagrammatically in Figure 1 below.

Figure 1: Icon Water Asset Management System (AMS)

This approach is common among the majority of major water utilities in Australia.

The AMS forms part of Icon Water's integrated management system (IMS) set out in Figure 2 below.

Figure 2: Icon Water's Integrated Management System (IMS) governance framework



The IMS aims to provide a structured approach to the processes and artefacts that support asset management objectives and decision-making throughout the asset lifecycle.

The key elements of the AMS are:

- The Asset Management Policy,
- Strategic Asset Management Plan, and
- Asset Management Plans.

The Asset Management Policy sets out the purpose of asset management and Icon Water's approach to asset management, in line with ISO 55001.

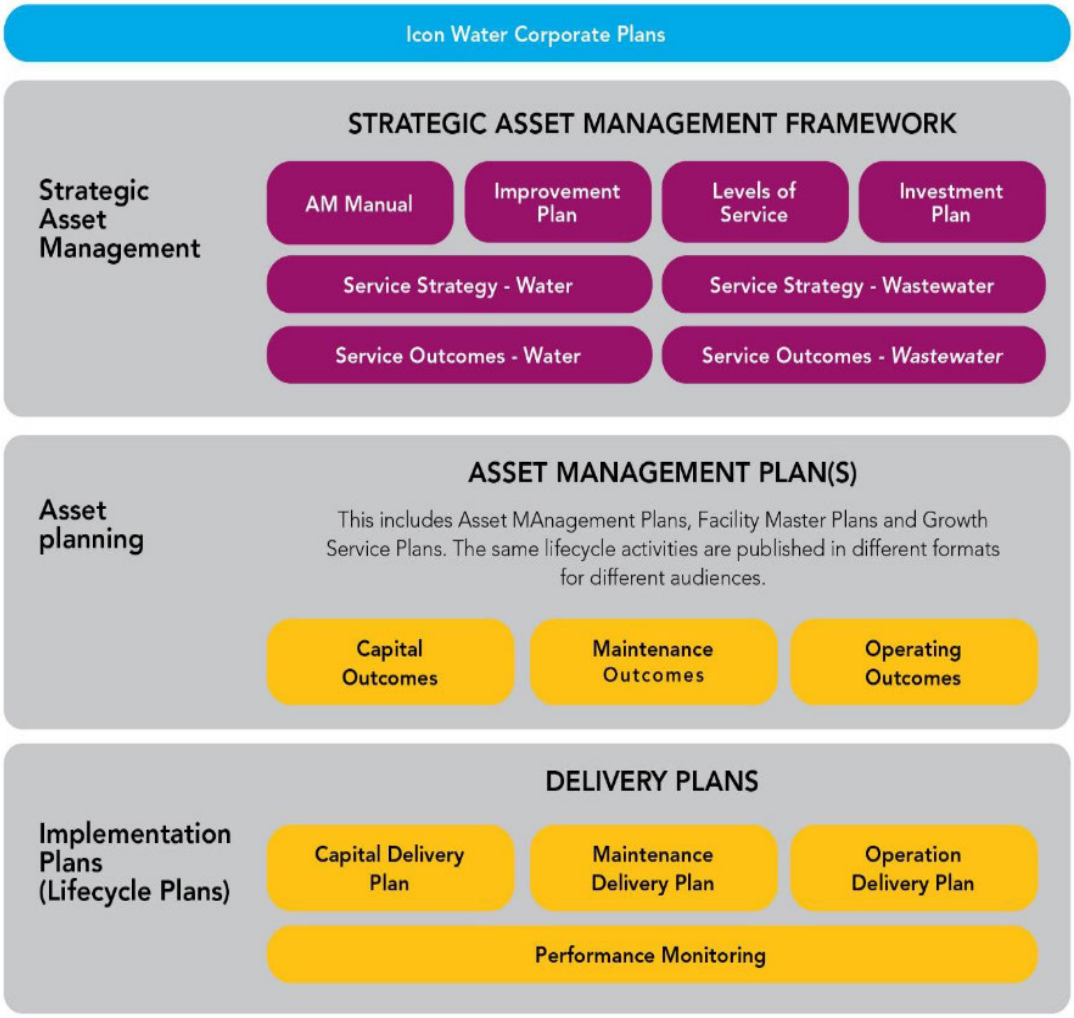
The Strategic Asset Management Plan (SAMP) provides the overarching strategy for asset management including objectives and high-level performance criteria for the asset base. It is the link to the corporate objectives and balances meeting customer and regulatory expectations, managing risk and effective cost. The SAMP also guides the development of asset and implementation planning documents to ensure consistency across asset classes.

Asset Management Plans (AMPs), support the delivery of service and management of assets at an asset class level and outline the 20-year investment, and improvement plan for each asset class.

Asset Planning

In addition to the key elements of the AMS, Icon Water has developed an asset management planning approach with linked processes that generate asset management artefacts to support and document asset management objectives and decision-making, as shown in Figure 3 below.

Figure 3: Icon Water's strategic asset planning app



Asset management improvements

Aligned with improvements recommended in the 2018 determination, Icon Water has progressively implemented improvements focussed on a shift to a customer/service-centric approach. These reforms are improving asset management capability and contributing to the continued alignment of Icon Water's asset management approach to both the ISO 55000 and the IAM Asset Management Maturity Framework.

A number of improvements have been implemented during the 2018–23 regulatory period and these are summarised in Table 3.

Table 3: Summary of asset management improvement initiatives from 2018–23 (Extract from Icon Water Pricing Submission, Chapter 5)

Improvement initiative	Progress
Leadership	
The Asset Owner (Icon Water Executive) will have improved data to enable more informed asset management decision.	During the 2018–23 regulatory period we developed and continuously improved our asset management dashboard for the system and each main service area. This has provided our business with a single source of truth. This allows asset management decision making to be driven from the same source of truth aggregated appropriately for the particular level of decision maker. This system is currently manual but ongoing improvements will see this become an automated process. Many of the supplementary improvements in people, process and technology have improved asset management leadership through improved access to data supporting the decisions. In 2019 critical assets were identified at Lower Molonglo Water Quality Control Centre (LMWQCC), Stromlo and Googong Dam. This has allowed us to design and implement effective maintenance programs and also helped the Maintenance and Reliability Teams focus efforts where they are most needed. Our condition assessments are now stronger and more systematic, which has increased the availability of asset data for decision making. We continue to make improvements where the condition assessment information based on 'asset health' is embedded in the Works and Asset Management (WAM) System.
People	
Continue to invest in our people to refine our capabilities and provide a culture that supports our target state asset management maturity.	During the 2018–23 regulatory period our focus altered from assessing against the six asset management subjects to identifying competencies required to perform the role by Branch Managers and then providing the necessary training on an as-needs, individual basis. We participate in the 4-yearly Water Services Association of Australia (WSAA) asset management benchmarking activity which allows us to compare our asset management maturity against other utilities, providing us with an insight into the areas of the business which require further improvement. Our engagement with industry bodies such as WSAA and the Australian Water Association (AWA) ensure that we are aware of industry trends and changes to best practice. This also provides opportunities for networking and connection with peers enabling capability improvements for our people.
Processes	
Refine our processes and operating models to enable compliance with ISO 55001 and IAM asset management subject target maturity levels.	During the 2018–23 regulatory period good progress has been made in developing and implementing our business activity model. The business activity model has enabled us to understand the gaps and overlap between activities. Work instructions for most of the activities have been updated or developed. Further to this improvement, we have documented our business value chain which has given us a clear view of our business processes and where efficiencies may lie.

Improvement initiative	Progress
Continue to work with our customers to understand and adjust our services to respond to their stated preferences with prudent consideration of the balance between cost and sustainable levels of service.	In 2021 Icon Water launched our customer engagement program using the platform Let's Talk Water and Wastewater. The engagement program featured face-to-face and online community discussion as well as quantitative surveys, where people provide feedback on a range of Icon Water strategic decisions and investments. It was designed to guide Icon Water's strategic planning and to directly inform the 2018–23 price proposal. We have made significant improvements to our standards and rules to ensure they are documented in a clear, customer-friendly format manner.
Technology	
Refine and integrate our asset data and information systems, including through renewal of the asset and works management system.	In 2019, we completed a significant multi-year project to replace one of our core systems that has led to asset related information improvements and given us valuable insight into the performance of our works and asset management activities. Improvements include: • Improved maintenance regimes, scheduling, and allocation of work orders • Optimisation of the use of maintenance crews and their ability to respond to both reactive maintenance issues and planned maintenance works • Better reporting functionality, replacing paper-based processes and work crews able to create follow-on work requests from the field • The ability to execute work directly from the map on a mobile device An automated scheduling tool and cost centre algorithm. We will also undertake upgrades to the underlying software before the end of the 2018–23 regulatory period. We have also undertaken upgrades to our Operational Technology (OT) including: • Time Series Data with the new Data Historian Platform to capture real-time and historical data from smart devices and OT systems • Our Operational Technology networks including Supervisory Control and Data Acquisition (SCADA)and Telemetry.
Enhance our data analytics capability to provide deeper insights into our asset data to optimise our asset planning decisions.	During the 2018–23 regulatory period we have undertaken several projects to provide insights into our asset data. • Portal for geographical information system (GIS), ArcGIS, has been developed to publish web-based maps and enable the building of tailored solutions including identification of water meters, and valve status display. This industry-leading, intuitive interface integrates with other asset management systems, and is improving customer experience and productivity, and making life easier for our people. • Refresh of our water and wastewater modelling software systems including integrations to our GIS. This included reviewing the software architecture and bringing some modelling capabilities previously outsourced within the organisation allowing for models to be rebuilt and recalibrated.

Improvement initiative	Progress
	• Development of a Data Management and Governance Strategy, including a Data Strategy (2021–24), with implementation underway. • Enhancement of our cyber security posture. We have introduced new security monitoring capability across our OT domain; we have improved the segregation between out IT and OT networks; and we have introduced improved cyber security management. Implementation of our Cyber Security Strategy and Cyber Security Roadmap is now underway.
Develop systems to enhance our interaction and service with our customers.	During the 2018–23 regulatory period we have undertaken several projects to enhance our interaction and service with our customers. These include: • Real-time network outage management tools to identify critical customers who will be affected • Enhanced reporting to support proactive compliance with consumer protection code changes (July 2020), so we can proactively pay rebates where guaranteed service levels are not me • Continued upgrade of our Geographical Information Systems (GIS) into a privately managed Cloud environment. We have established the foundational platform to make maps of Icon Water assets available to developers and builders in the future, and further upgrades and enhancements are planned for the last year of the period.

Icon Water has also identified future improvements to its asset management practices and the need to move to a service delivery model. It is in the process of transitioning its asset management approach and the future stages are detailed in Table 4.

Table 4: Icon Water Current and Future approach to asset management *(extract from the Icon Water Strategic Asset Management plan)*

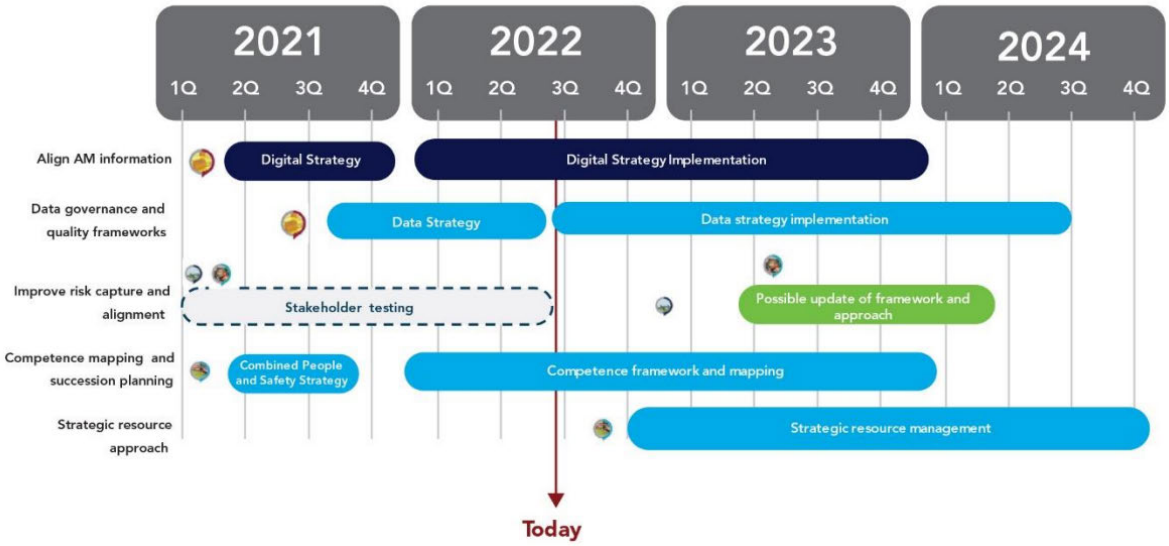
Engaging with customers	Monitoring and maintaining assets	Managing and delivering customer expectations	Use of technology and innovations for AM	Competence and culture
Current state view				
▪ Common engagement approach ▪ No customer definitions ▪ Similar approach to peers	▪ Regulatory driven approach ▪ More reactive than predictive ▪ Reliance on others	▪ We comply with our regulations ▪ Use traditional approach ▪ We meet expectations	▪ Current technology is hard to use and access ▪ Cautious adopters using pilot studies	▪ Knowledgeable workforce but not documented ▪ Hard to retain knowledge ▪ People stuck in the same role
Future state view				
▪ Match services to customers ▪ Streamline engagement with centralised message ▪ Supported by digital resources	▪ Our own data driving decisions ▪ Simplified processes ▪ Digital focus	▪ Work with Regulators to go beyond compliance ▪ Simplified processes ▪ Individualised support to customers	▪ Tools that work better for us ▪ Move to digital, real-time, shared, owned data ▪ Hub of innovation working with industry	▪ Good knowledge retention / transfer ▪ More development opportunities ▪ Understand and capture our future

Icon Water is also looking to improve its underlying asset management capability through continuous improvement to processes and systems. These improvements will be informed by assessing the applicability of external best practice developments, as well as through feedback on existing processes and systems enabled through performance monitoring, including:

- Aligning the AM information requirements with its Digital Strategy
- Data governance and quality frameworks
- Improved risk capture and alignment with corporate frameworks
- Competence mapping and succession planning, and
- Developing strategic resourcing management approach.

These improvements, which are already underway, are scheduled to be completed during the 2023–28 regulatory period and a high-level timeline is shown in Figure 4.

Figure 4: Timeline for Icon Water's proposed asset management improvement



Conclusion

Icon Water's asset management framework is aligned, or aligning, to ISO 55001 and as a general approach and framework is reasonably well developed. Some issues with the practices and the quality of the data to support the processes were identified and these are discussed later in this section of the report.

AMCV report findings

As part of improving its asset management capability Icon Water has benchmarked its maturity against its peer utilities using Water Services Association of Australia's (WSAA) Asset Management Customer Value (AMCV) benchmarking project. This assessment is conducted every four years.

The 2020 benchmarking exercise consisted of 19 water sector utility participants from across Australia, inclusive of a range of utilities, providing opportunity for benchmarking, knowledge share, objective learning and setting new standards for asset management systems across the sector. The AMCV benchmarking report provides details of the overall benchmarking themes, comparisons, and industry-wide findings.

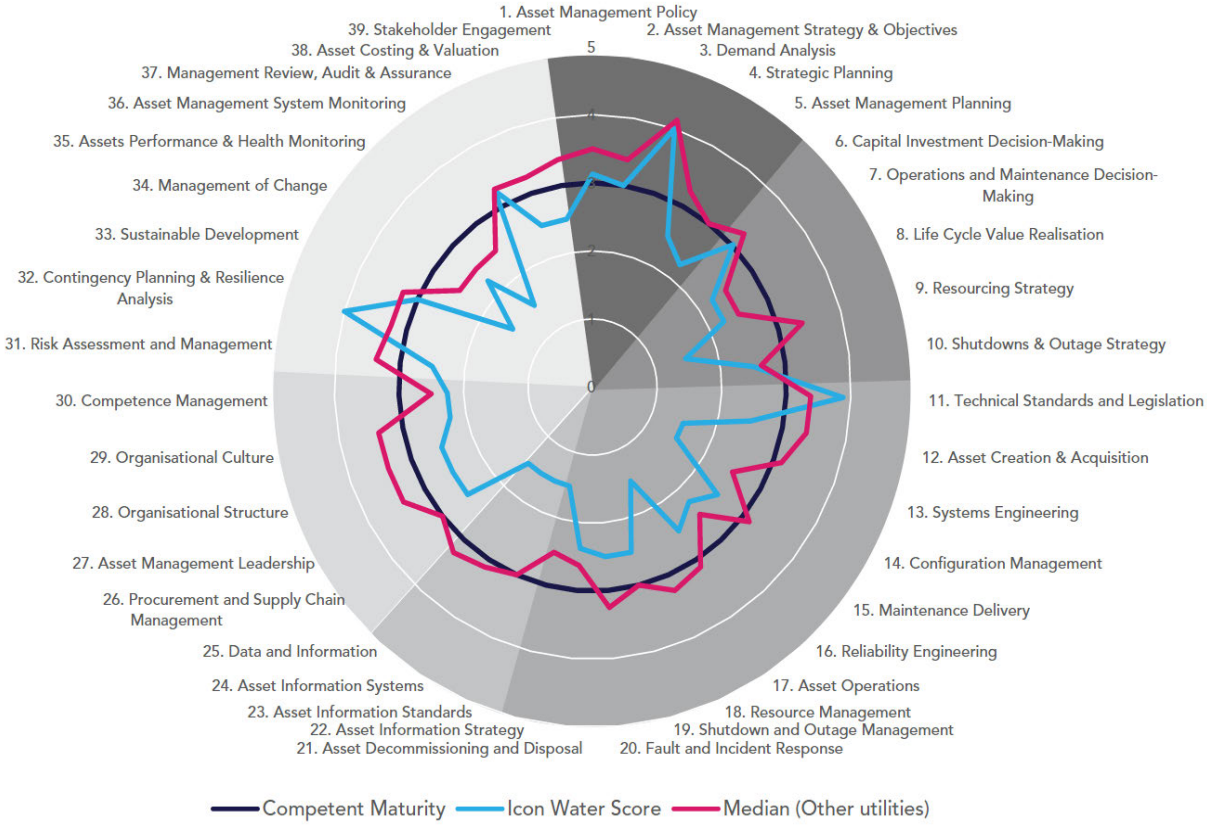
A summary of findings for the 2020 benchmarking exercise are set out below:

- Icon Water has set reasonable target levels for the Global Forum on Maintenance and Asset Management (GFMAM) subjects, aligning with a majority of the industry median target levels, and has met or exceeded assigned Target Levels in 5 of the 39 subjects
- The highest performing GFMAM Subject Group was Asset Management Strategy & Planning, demonstrating, in general, a strategic asset management foundation within the organisation
- The lowest performing GFMAM Subject Group was Asset Knowledge Enablers, which scored a median Asset Management level of 1.5. Data and information gaps and challenges were noted consistently across multiple subjects verified and is a key area for asset management system improvement

- Asset management level scores of Competent (Level 3) or higher have been achieved for approximately 20% of GFMAM subjects, with the balance in varying stages of development.

The assessment of Icon Water's maturity against all the benchmarking criteria, along with the median of all participant utilities is provided in Figure 5.

Figure 5: WSAA Asset Management Customer Value Benchmarking 2020 *(Extract from Icon Water's SAMP)*



The benchmark review identified five asset management improvement initiatives for Icon Water:

1. **Align asset management information requirements within Digital Strategy** - A broader and more strategic consideration and alignment of Icon Water's asset management information system requirements are needed to both inform development of Icon Water's Digital Strategy, and to set a consolidated pathway to meet current and future system requirements and asset management capabilities.

2. **Data governance and quality frameworks** - A broader program of data governance and quality assurance is required to support asset management information management within existing and future asset management information systems.

3. **Improved risk capture and alignment with corporate frameworks** - Improved organisational clarity surrounding risk management procedures is required in terms of how risks are captured and translated to Corporate Risks, including monitoring for changes over time.

4. **Asset management process mapping and succession planning** - An asset management process mapping exercise is required to identify resource/process challenges in meeting asset management

objectives, including identification of key stakeholders requiring development of formal succession planning activities in order to transition key functions to formal business processes.

5. **Develop strategic resource management approach** - A consolidated strategic approach to resource management is required that is aligned with, enables, and manages current and future capabilities within Icon Water's asset management system.

These improvement areas align with Icon Water's own assessment of reviewed improvements and its planned asset management improvements, particularly addressing data and information gaps and system improvements.

The planned capital project, CX11366 Asset Management Information System, will support these improvements.

In addition to the comparison with peer utilities, the study also benchmarked asset management maturity across periods. In comparison to the 2016 findings, the report noted:

- Icon Water's asset management maturity level has generally reduced across four of the six subject groups, with significant reductions in level against Asset Knowledge Enablers
- Icon Water has made significant improvements against Asset Management Strategy & Planning
- There appears to have been some delays in developing a Digital Strategy, noting that new management had re-commenced Icon Water's Digital Strategy journey.

Icon Water has acknowledged this status of its asset management maturity and as noted above, has put in place a four-year action plan to address these issues.

Conclusion

Icon Water's asset management maturity has declined from 2016 to 2020 and this may be in part due to the embedding of changes in its approach to asset management, with a more customer driven approach.

Icon Water has acknowledged that improvements are required in some elements of its asset management practice and has in place an improvement program to address these lower maturity areas.

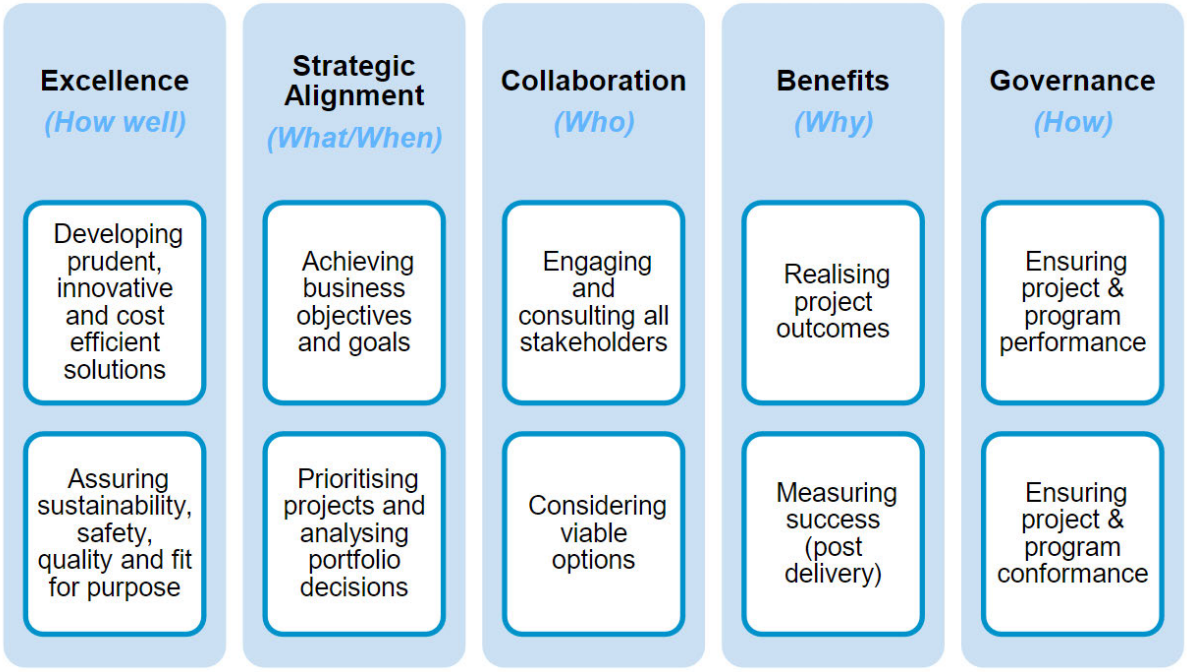
Icon Water needs to improve it data management to support asset management decisions. Steps are already underway to address this data issue.

Capital planning and governance

As part of its capital planning and governance Icon Water has established its Investment Planning and Delivery (IPAD) Framework for the initiation and approval of all significant investment projects. These governance processes are aimed to ensure that only projects that are efficient, prudent, and benefit the community and stakeholders are approved.

This framework is based on five guiding principles applied across the organisation for decision making and project planning, as shown in Figure 6 (Excellence, Strategic Alignment, Collaboration, Benefits, and Governance).

Figure 6: IPAD Guiding Principles *(Extract from Icon Water Investment Planning and Delivery Guide)*



The IPAD process is largely a governance framework and forms part of Icon Water's Integrated Management System policies. It is also aligned with Icon Water's financial delegation policy.

Linked to this intent, the IPAD Framework aims to provide project governance for the project lifecycle and consists of three main initial phases (Initiate, Implement and Integrate) and six main delivery stages (Envisage, Evaluate, Plan, Develop, Execute, and Monitor). This includes a gated process with criteria required to pass each gate.

Each type of investment will flow through the lifecycle in a gated way that is appropriate for the size, complexity and risk profile of the project as described in the 'Project Type' and 'Project Tier' sections of this document.

All stage changes in IPAD are governed by the relevant stage gate authority and the project cannot proceed to the next stage until its approved by the relevant authority. Figure 7 provides an overview of the phase and stage process of IPAD.

Figure 7: IPAD phases and stages *(Extract from Icon Water Investment Planning and Delivery Guide)*

Each stage of the IPAD process has planned activities and an acceptable range for the cost estimate at that stage. These are set out in Table 5.

Table 5: IPAD Stages, activities, and cost estimate range

Stage	Activity	Cost Estimate range
Identify	Long-term planning, high level analysis, no project defined	No estimate
Envisage	Develop the problem statement for the Concept Development Statement	+/-75%
Evaluate	Develop options, assess the options against multiple criteria	+/- 30%
Plan	Develop and endorse the Project Scope Statement	+/- 15%
Develop	Execute detailed design, procurement activities for the Execute Stage	+/- 10%
Execute	Execute contract(s) to complete the implementation of project deliverables	-
Monitor	Defects monitoring and rectification, benefits realisation, financial closure	-

An issue identified during the review process was that this staging of project development is aligned to the project lifecycle but does not consider the timeframes and the need for information to support regulatory determinations.

The assessment of efficiency of proposed capital expenditure for the 2023 determination has been hindered by the low maturity of the projects and programs linked to the expenditure, with the majority not having yet reached the Plan stage, meaning they do not have a developed option or detailed costing. This is addressed in more detail in Section 4.4.3 of this report.

Conclusion

Icon Water has a well-developed capital planning and governance framework. However, the low maturity of the projects and programs for the 2023-28 capital expenditure proposal is:

- Providing insufficient information to fully assess the efficiency of the proposed capital expenditure, and
- Impacting on Icon Water's ability to deliver the planned works in the proposed timeframe.

Risk management framework

Icon Water has developed a Risk Management Policy and a Risk Management Framework that complies with AS/NZ ISO 31000:2009 Risk Management – Principles and Guidelines. Linked to its Risk Policy and as part of its Risk Procedure, Icon Water has developed a risk appetite that relates to the amount of risk the Icon Water Limited Board (Icon Water Board) is willing to accept in order to deliver its core services. The risk framework states, the Icon Water Board:

1. Has no appetite for health and safety risks to its workers or the community
2. Has no appetite for risk events that damage the environment
3. Has no appetite for fraudulent, corrupt, or unethical behaviour

4. Has a low appetite for risks that disrupt water and sewerage service supply to meet customer's needs
5. Has a low appetite for legal/compliance risks
6. Is willing to consider accepting a higher degree of strategic and financial risk in order to achieve longer term business objectives.

These risk tolerances guide the risk assessment and mitigation process for all Icon Water's risk.

Risk assessments are undertaken for projects and a Risk Management Plan prepared for major projects.

As noted in the AMCV Benchmarking review, there is the opportunity to improve organisational clarity surrounding risk management procedures and how risks are captured and translated to Corporate Risks.

Conclusion

Icon Water has a well-developed risk management framework aligned to good industry practice and the ISO standards.

Improvements can be made for clarity surrounding risk management procedures and how risks are captured and translated to Corporate Risks.

Estimate and level of contingency

Icon Water adopt estimates and project contingency based upon which stage of development each project is at within the IPAD process. This is discussed in more detail in Section 4.3.3 of this report. The project estimates are discussed in more detail as part of the individual review of the top ten projects.

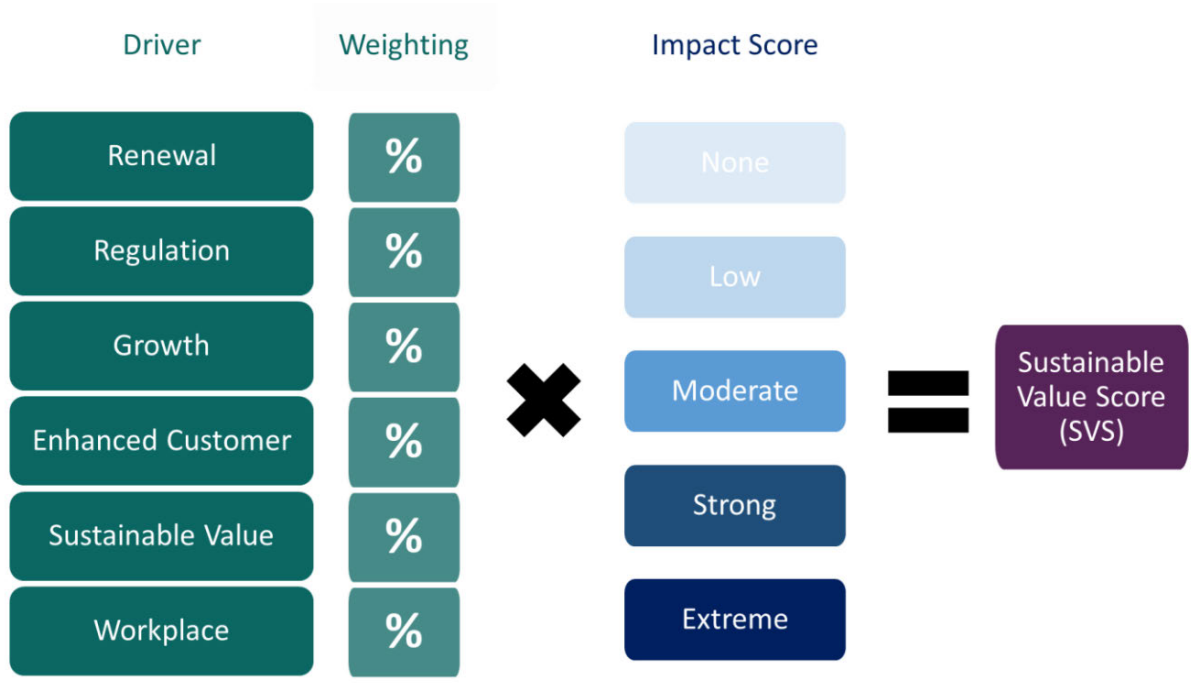
Prioritisation process

Icon Water has developed an investment prioritisation methodology tool as part of developing AMPs and setting annual budgets. This prioritisation tool is based on Icon Water's Risk Management framework and links to customer service levels and shareholder benefits.

Each capital expenditure project is assigned an individual strategic value score based on the degree of alignment with Icon Water's strategic driver, with an impact and weighting applied to get a sustainable impact score, refer to Figure 8.

The drivers, weightings and impact are endorsed annually by Icon Water's Investment Review Committee (IRC).

Figure 8: Icon Water Prioritisation process *(Extract from Icon Water Portfolio Analyser Tool)*



In applying the prioritisation process Icon Water follows the below steps:

- A priority score is calculated when a project is first initiated
- Project priority scores are validated by the program prioritisation team
- Project priority scores are used by the IRC in prioritising investments
- The priority score of a project is reassessed at each IPAD stage gate
- Deferred projects are reconsidered by IRC to ensure that the project priority has not changed.

This prioritisation process is well-developed and meets the organisational requirement, however there are question marks regarding the quality of the data that is used in the prioritisation process. As noted in Section 3.1.4, the early stage of the development of projects limits the quality of the information and undermines the prioritisation process.

Conclusion

Icon Water has a well-developed prioritisation process and tool. The quality of the data that is used in the prioritisation process is undermining the effectiveness of the prioritisation process.

Conclusion and recommendations

The conclusion and recommendations for governance, planning and asset management frameworks are set out in Table 6.

Table 6: Summary of conclusion and recommendations for Icon Water's governance, planning and asset management frameworks

Element	Conclusion and recommendations
Asset Management Framework	1. Icon Water's asset management framework is aligned to ISO 55001 and as a general approach and framework is reasonably well developed 2. Some issues with the practices and the quality of the data to support the processes were identified
Asset Management benchmarking	3. Icon Water's AMVC benchmarking maturity has declined from 2016 to 2020 and this may be in part due to the embedding of changes in its approach to asset management, with a more customer driven approach 4. Icon Water has acknowledged that improvements are required in some elements of its asset management practice and has in place an improvement program to address these lower maturity areas 5. Icon Water needs to improve it data management to support asset management decisions. Steps are already underway to address this data issue
Capital planning and governance	Icon Water has a well-developed capital planning and governance framework. However, the low maturity of the projects and programs linked to the 2023-28 capital expenditure is: • Providing insufficient information to fully assess the efficiency of the proposed capital expenditure, and • Impacting on Icon Water's ability to deliver the planned works in the proposed timeframe
Risk management framework	1. Icon Water has a well-developed risk management framework aligned to good industry practice and the ISO standards 2. Improvements can be made for clarity surrounding risk management procedures and how risks are captured and translated to Corporate Risks
Prioritisation process	Icon Water has a well-developed prioritisation process and tool. The quality of the data that is used in the prioritisation process is undermining the effectiveness of the prioritisation process.

3. Operating expenditure

3.1 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 steps:

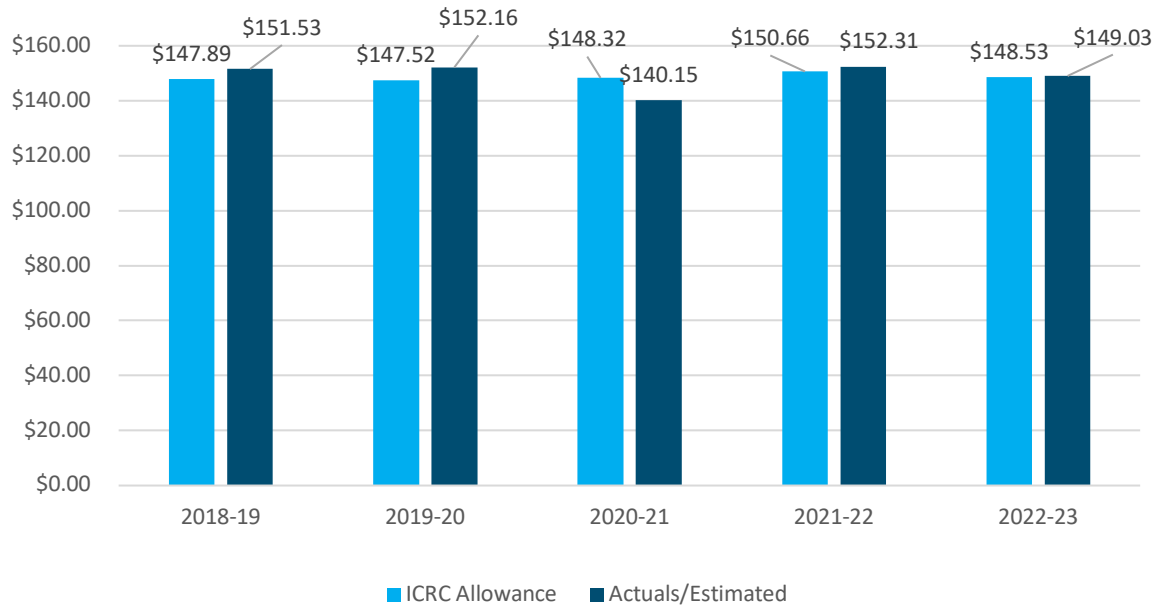
- Assessment of the prudency and efficiency of operating expenditure focus areas over the regulatory period compared with baseline expenditure. This has included an extensive review of key categories of expenditure (and associated drivers).
- Assessment of Icon Water's actual 2021-22 base year expenditure. 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 proposed output growth and cost efficiency against productivity benchmarking and compared against publicly available data to compare against other water suppliers – allowing for discernible differences in circumstances, service, and activities.
- Detailed prudency and efficiency assessment of Icon Water's proposed step changes in expenditure from the baseline operating expenditure, that result in increases in Icon Water's proposed operating expenditure forecasts.

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. We also note that 2022-23 inflation index has been updated from Icon Water's proposal to incorporate June 2022 actual CPI figures and an updated forecast CPI for 2022-23 of 3.0%.

3.2 Historical operating expenditure 2018-23

Figure 9 compares Icon Water's actual and forecast controllable operating expenditure with the ICRC allowance for the 2018-23 regulatory period.

Figure 9: Comparison of current period expenditure with ICRC allowance, $million, $2022-23



We note the actual expenditure increases in 2018-19 and 2019-20 compared with the allowance. Icon Water has stated that higher electricity usage was driven by dry conditions, which resulted in higher water sales and therefore required increased water pumping. We have reviewed the breakdown of Icon Water's actual expenditure and have verified the increase in electricity costs has largely driven the increases in those years.

We also note the decrease in controllable operating costs in 2020-21 was largely driven by a temporary reduction in labour and contractor costs, as well as a reduction in energy costs, during the COVID-19 pandemic.

As shown above there was a $12.2 million or 8.7 per cent increase in 2021-22 forecast controllable costs from 2020-21. We note that costs in 2021-22 have increased to levels consistent with 2018-19 and 2019-20. We sought further information from Icon Water on the key driver of the increase in 2021-22 estimated operating costs included in the price submission:

- Labour costs of $4.01 million. Icon Water have stated that this was due to short-term vacancy levels in 2020-21. We note that labour costs have returned to levels consistent with 2018-19 and 2019-20 and therefore we consider the increase is reasonable.
- Overhead capitalisation reduction of $0.62 million. Icon Water noted that this was lower than average with the COVID-19 construction freezes limiting its ability to allocate existing internal resources to capital work.
- ICT costs increase of $2.94 million – Icon Water stated that this was due to [redacted] and the 2020-21 ICT costs, which meant 2020-21 IT costs should have been recorded as $2.0 million higher in 2020-21. While the 2021-22 IT increased by $0.9 million costs, it is consistent with 2019-20 IT expenditure levels, and therefore we consider is a reasonable level of recurring IT expenditure.

- Non-cash items including asset write-offs were included in 2020-21 , though there was no occurrence of them in the 2021-22 base year, which resulted in a $0.7 million increase from 2020-21 to 2021-22. We consider any non-cash items should not be included in the calculation of actual and forecast controllable operating costs. This is discussed further below.
- Insurance cost increases of $1.28 million, which included increases across a number of insurance categories including General Liability, Directors' liability, Property insurance and workers compensation.
- Facilities management – increase of $0.6 million due to non-recurring land rebates and a reallocation of other costs.

Overall, we consider the reasons for the key variations across the operating expenditure categories to be reasonable. However, we explore in more detail the approach to using 2021-22 as the base year opex in Section 3.4.

3.3 Overview of 2023-28 operating expenditure forecasts

Icon Water has proposed the following controllable operating expenditure forecasts for the 2023-28 regulatory period. Major categories of controllable expenditure across water and sewerage include:

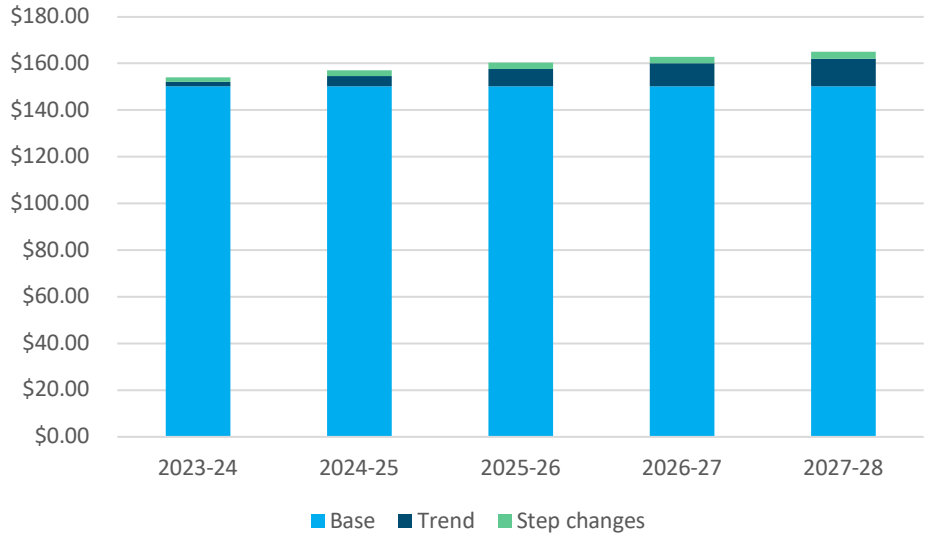
- Maintenance
- Operations
- Planning and Strategic Management
- Corporate Services.

Using 2021-22 as the base year it has applied a trend which includes:

- Output growth
- Real cost changes
- Productivity growth.

Icon Water has also adjusted its base-line controllable operating costs from 2022-23 onwards by the difference between Icon Water's 2021-22 and 2022-23 controllable operating costs allowance. Icon Water also included step changes to the baseline controllable operating costs related to new requirements under the Security of Critical Infrastructure Act and proposed changes in insurance costs. Figure 10 provides a breakdown of the proposed controllable operating costs by base, step, and trend for the 2023-28 regulatory period.

Figure 10: Proposed controllable operating expenditure forecasts, $million, $2022-23



In the next sections we review the key elements that make up Icon Water's proposed controllable operating expenditure forecasts for the 2023-28 regulatory period.

3.4 Setting the base year expenditure

3.4.1 Overview of Icon Water proposal

Icon Water in its regulatory proposal set its forecast controllable operating expenditure using a base step trend approach.

In setting the base year it developed a forecast for 2021-22, based on actuals up to February 2022, and then used a forecast derived on expectations for the remaining four months of 2021-22.

Figure 11 provides a breakdown of the proposed controllable operating costs by major activity.

Figure 11: Current period controllable operating expenditure forecasts by activity, $million, $2022-23

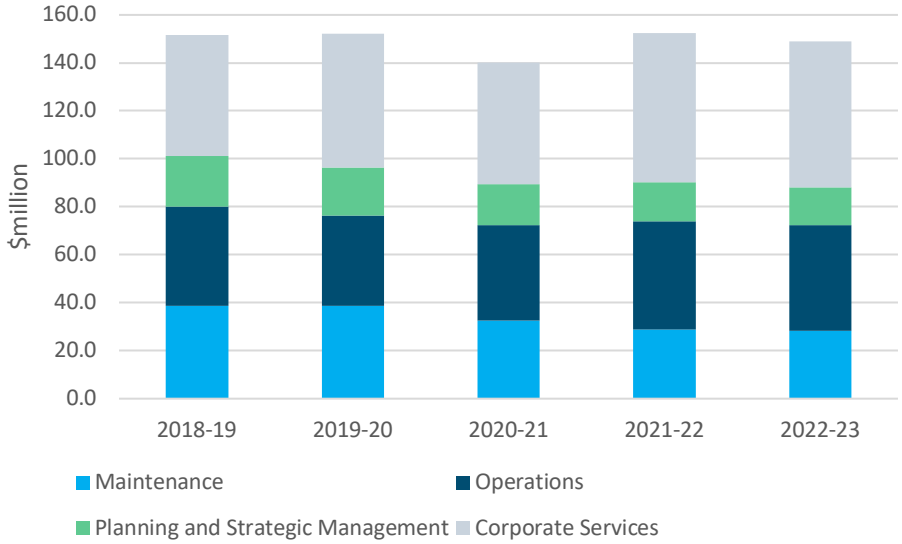


Table 7 provides a further breakdown of current period controllable operating expenditure by cost category and the proposed base year in 2021-22 of $152.3 million. These current period figures are net of the non-recurring costs that Icon Water removed, which are detailed further below (Table 8).

Table 7: Breakdown of current period controllable expenditure, $million, $2022-23

	2018/19	2019/20	2020/21	2021/22	2022/23
Net Labour Costs	58.23	60.53	57.82	61.80	61.54
Other Employment Costs	4.89	5.60	3.92	6.47	5.25
Service Contracts	51.51	45.55	46.02	51.11	50.11
Operational Costs	36.10	33.46	26.43	25.14	24.95
Marketing	0.87	0.74	0.97	0.70	1.02
Administration	6.97	13.33	12.29	13.77	13.39
Overhead capitalisation	(7.02)	(7.05)	(7.29)	(6.67)	(7.23)
Total controllable operating expenditure	151.53	152.16	140.15	152.31	149.03

In reviewing its baseline year, Icon Water has proposed to remove one-off expenses relating to the implementation of Program Nova [redacted]. It has also removed unregulated business costs [redacted].

Table 8: Non-recurring operating costs for 2021-22, $million, $2022-23

	Proposed non-recurring costs
Program Nova	[redacted]
Unregulated costs	[redacted]
Total	[redacted]

Source: *Icon Water*

3.4.2 Our assessment

We have undertaken a detailed assessment of Icon Water's proposed baseline controllable operating expenditure for 2021-22, to ensure it provides a prudent and efficient base year for setting the forecast for the 2023-28 regulatory period.

As part of this assessment, we have reviewed the key trends in actual operating expenditure during the current period. We note in undertaking this assessment, the lowest level of detail provided was by account level, which are a sum of all transactions that occur in each account. This made it challenging to fully understand the activities that were driving changes in operating costs over the current period and required Icon Water to generate responses to explain the key changes.

We recommend that over the next regulatory period Icon Water continues to improve its processes to provide a more transparent review of activities to ensure it can demonstrate a baseline of prudent and efficient operating expenditure, including the key activities that drive changes in operating costs.

During the review process Icon Water provided an update to its 2021-22 actual controllable operating costs, which were $1.90 million lower than the forecast included in its regulatory submission. We have included the actual operating costs in our recommended adjustments to the base year operating costs. We note that 2021-22 actual operating costs provided will be subject to an external audit, which may result in some changes to the final actual 2021-22 operating costs.

Table 9: Comparison of forecast operating costs with actual cost for 2021-22 period controllable expenditure, $million, $2022-23

	2021-22 forecast	2021-22 actual	Difference
Net Labour Costs	61.80	62.23	0.44
Other Employment Costs	6.47	2.71	-3.76
Service Contracts	51.11	49.48	-1.63
Operational Costs	25.14	24.90	-0.24
Marketing	0.70	0.71	0.01

	2021-22 forecast	2021-22 actual	Difference
Administration	13.77	16.56	2.79
Overhead capitalisation	-6.67	-6.19	0.48
Total controllable operating expenditure	152.31	150.41	-1.90

Source: Icon Water response to information request, July 2022.

Based on our assessment (of 2021-22 actual operating costs) the following key issues were identified with the proposed base year opex:

- **Non-controllable costs** – Some non-controllable costs were included in controllable costs. This included regulatory and compliance costs to various agencies including the ICRC, which includes the utility licence fee and additional price review costs, and royalty payments to the ACT government. This approach is consistent with the approach to other non-controllable costs, including the Utilities Network Facilities Tax and Water Abstraction charge. We recommend shifting these from controllable costs into non-controllable costs. These costs are included as a bottom-up forecast, rather than base-step-trend approach. We have also included additional ICRC fees of $0.31 million in 2026-27 and $1.0 million 2027-28 for the 2028 price review process under non-controllable costs.
- **Non-cash operating costs** – We found that non-cash operating expenses were included in current period actuals and forecast data. During the review process Icon Water provided a reconciliation of all non-cash items included in the current period costs, which included impairments, write-offs, and provisions. While there were a number of non-cash items included in Icon Water's price submission controllable operating costs in the current period, the impact on the 2021-22 base year was minimal. We have therefore not adjusted the base year for any non-cash items. Icon Water should consider removing non-cash items from its actual and forecast controllable operating costs before including in future regulatory submissions.
- **Overhead capitalisation** – Icon Water annually capitalises a share of overhead costs, for costs related to capital projects. As shown above, this is an offset to controllable operating costs. In 2021-22, the overhead capitalisation was lower than historical level of capitalisation at $6.19 million. Icon Water noted that the level of capitalisation was lower than average with the COVID-19 construction freezes limiting its ability to allocate existing internal resources to capital work. Icon Water provided a separate forecast for the 2023-28 regulatory period for overhead capitalisation, which averaged $8.1 million per annum. This forecast was based on an internal long-term forecast. We consider it prudent to adjust the base year opex to include the updated forecast capitalisation expected over the 2023-28 regulatory period. This results in an increase in overhead capitalisation of $1.87 million in the base year.
- **Price review costs** – Icon Water has stated that it has incurred $0.93 million controllable price review operating costs in 2021-22, which is made up of external consulting costs. We consider that these costs will not be ongoing and should be removed from the base year. To account for additional price review costs for 2028, we have included $0.93 million as a step change in external consulting costs in 2026-27.

We note that Icon Water has followed a cost allocation methodology in identifying its regulated operating costs and separating out any unregulated costs. As noted above, Icon Water has removed

[redacted] unregulated costs that are associated with the management of joint ventures (JV) in ActewAGL Distribution and ActewAGL Retail. They are calculated as a portion of salary costs for resources who contribute time to management of the JV investment, largely the Managing Director and Chief Financial Officer. We have reviewed Icon Water's cost allocation methodology and approach to separating unregulated costs and are satisfied that it is reasonable.

3.4.3 Recommended adjustments to the base year

As outlined above, our recommended adjustments to the base year controllable operating cost forecasts include:

- Update for 2021-22 actual operating expenditure
- Shifted regulatory, compliance and royalty payments from controllable costs and included within non-controllable costs
- Increase in the labour capitalisation of $1.87 million
- Removal of non-recurring price submission costs of $0.9 million.

We have retained Icon Water's proposed adjustment to the controllable operating expenditure base year to align with the change between 2021-22 and 2022-23 in the ICRC's allowance for the 2018-23 regulatory period. This results in a $2.13 million downward adjustment to the forecast base year operating costs from 2022-23 onwards.

Table 10: Recommended adjustments to the 2021-22 base year controllable operating costs, $million, $2022-23

	Recommended 2021-22 base year adjustments
Proposed base controllable operating costs	152.31
Updated actual 2021-22 base year controllable operating costs	150.41
Adjustments	
Overhead capitalisation	-1.87
ICRC Licence fees (included in non-controllable costs)	-1.66
Other Licence fees (included in non-controllable costs)	-0.55
Royalties (included in non-controllable costs)	-0.10
Price review costs	-0.94
Adjusted 2021-22 base year controllable operating costs	145.29
Controllable operating costs base year from 2022-23 onwards, including Icon Water's proposed trend adjustment	143.16

3.5 Overview of our growth and productivity assessment

Icon Water's operating expenditure forecasts for the years 2023-24 to 2027-28 are based on a rate of change, which accounts for the following factors:

- Price change
- Output change or growth
- Productivity change or growth.

The rate of change formula used by Icon Water is defined as:

Rate of change in Opex = (1 + price change)(1 + output growth)(1 – productivity growth) – 1 ***Equation 1***

The Quantonomics report has been used to develop an estimate of output growth and productivity growth. Both these are discussed below (in Sections 3.6 and 3.7, respectively).

Icon Water has estimated its operating expenditure growth rate for the years 2023-24 to 2027-28 through a rate of change formula that considers the future growth rate of outputs and a productivity growth rate.

Icon Water has applied values for these two growth rates using information from a report by Quantonomics. Using National Performance Report data (from the Bureau of Meteorology), this report applies a complex econometric model, called a stochastic frontier model, to provide inputs to estimate the output growth rate and to estimate a productivity growth rate. This econometric model has been complemented by estimates for total and partial factor productivity indices using the same data to provide additional insights into a relevant productivity growth rate. The approach used in the Quantonomics report is similar to the approach used in the electricity sector, but it has rarely been applied in the water sector.

Our overall assessment is that further research and independent analysis should be undertaken before applying the sophisticated approach used by Quantonomics. The Quantonomics approach is complex, in particular the stochastic frontier model. Marsden Jacob notes that we have not examined the underlying model or attempted to replicate the results using the same data applied by Quantonomics. Therefore, we are not able to verify whether the model is producing reliable and accurate results. Marsden Jacob notes that we have not examined the underlying model or attempted to replicate the results using the same data applied by Quantonomics. Further research could be undertaken to provide independent verification but preferably outside of the current regulatory review given complexities in the modelling approach. We also understand that the National Performance Report data metrics are being reviewed and could change, which means this approach may not be replicable.

Additionally, we have identified issues with the modelling which warrants some further analysis by Quantonomics to provide confidence that the analysis is producing statistically robust and unbiased results. While these could be addressed in the short term within this regulatory review by Icon Water and Quantonomics, further independent research should still be undertaken to provide confidence in the results before the modelling approach is accepted.

Regarding output growth, our analysis indicates that scaling the output weightings to sum to unity is appropriate provided that the productivity growth factor (currently 0.5 per cent proposed in Icon Water's price submission) incorporates factors that are not just scale related but includes other drivers of productivity. This provides some evidence that the value of the productivity growth factor is above 0.5 per cent per annum.

In relation to productivity growth, using the Quantonomics results as they stand, our assessment of the Quantonomics modelling indicates that productivity growth rate should be 1.4 per cent per annum allowing for a 10-year adjustment period. A higher value (2.4 per cent) could be used assuming a shorter adjustment period. However, it is unclear whether this is achievable within the 5-year forecast period.

A value of 1.4 per cent is higher than Icon Water's proposed productivity growth rate of 0.5 per cent and reflects our view that the use of the Quantonomics analysis should focus more heavily on recent years of historical productivity performance data while also more closely aligning to the benchmark efficiency target applied in the electricity sector. Moreover, a productivity growth rate of around 1.4 per cent is closer to, but below, what was set in the last regulatory review and is consistent with the minimum expectations for Victorian water business set by the Essential Services Commission for their 2023-28 operating expenditure forecasts.

The detail of our review of opex output and productivity growth is outlined in the next sections. In preparing this section of the report, Marsden Jacob received technical advice from Professor Chris O'Donnell, University of Queensland[1].

3.6 Output growth

3.6.1 Output growth – explanation of approach taken by Icon Water

In calculating its controllable operating expenditure forecasts, Icon Water has applied a growth rate to the forecast in each year of the next regulatory period. The output growth is based on a weighted average of growth in forecast water customer numbers, water usage volumes, and sewerage volumes (Table 11).

Table 11: Output growth weights applied to each measure

Output measure	Weights
Customer numbers	70.4%
Water volumes	13.4%
Wastewater volumes	16.3%

Source: Icon Water proposal, Quantonomics report

These weights applied to each output measure are sourced from the Quantonomics analysis and represent the weights associated with the elasticities of customer numbers, water supply and

[1] https://economics.uq.edu.au/profile/2201/christopher-odonnell

wastewater collected with respect to real operating cost, to generate the forecast output growth for the 2023-28 regulatory period (Table 12).

Table 12: Icon Water's proposed forecast output growth

	2023-24	2024-25	2025-26	2026-27	2027-28
Forecast Output growth	1.64%	1.68%	1.79%	1.82%	1.81%

This is a change from the approach used in the current period, which used asset growth as a basis for growth in controllable operating expenditure forecasts. The proposed approach results in higher output growth levels compared with that used in the current period.

Quantonomics has developed a variable cost function for water businesses using stochastic frontier analysis of Bureau of Meteorology National Performance Report (NPR) data. The variable cost function includes three types of variables as cost drivers; output variables (customer numbers, water supplied, and wastewater collected); a capital measure (using two alternative approaches); and environment variables.

The functional form of the Quantonomics stochastic fronter model is:

$$\ln VC_{it} = \beta_0 + \beta_1 \ln x_{k(i,t)} + \sum_{m=1}^{M} \emptyset_m \ln q_{m(i,t)} + \sum_{n=1}^{N} \gamma_n z_{n(i,t)} + \lambda t + u_{(i,t)} + v_{(i,t)} \qquad \textbf{Equation 2}$$

Where: VC is real variable costs; $x_{k(i,t)}$ represents the quantity of the capital input by firm *i* in period *t*; *q* is the quantity of the three output variables; z are environmental variables that reflect operating environment factors; *u* is a one-sided stochastic term with a half normal distribution which reflects a variable cost inefficiency effect; and *v* is a is a normally distributed random disturbance or statistical noise. The variable cost inefficiency effect (*u)* results from businesses not minimising their costs.

As the functional form of this equation is linear in logs, the coefficients of log variables in the stochastic frontier model are elasticities, with the elasticities for the output (*q*) variables shown in Table 13. Icon Water has converted these elasticities to weightings such that the weightings sum to unity (Table 13). These weightings are then used to estimate the overall output growth in *Equation 1* using the formula in *Equation 3*.

$$Output\ growth = w_1\ g_{q1} + w_2\ g_{q2} + w_3\ g_{q3} \qquad \textbf{Equation 3}$$

Where: *w* are the weights for each output, noting the weights sum to unity; and *g* are the forecast growth in quantities for each of the three output variables (*q*).

Table 13: Coefficients and weightings associated with the output variables (q) in the stochastic frontier model

Output measure	Coefficient/Elasticity	Weighing
Customers	0.5339	70.4%
Water supplied	0.1014	13.4%
Wastewater collected	0.1234	16.3%

This approach implies constant returns to scale as it results in a 1 per cent increase in overall output quantities increasing variable costs by 1 per cent. The approach is consistent with the approach taken by the Australian Energy Regulator (AER) who justify not allowing for increasing or decreasing returns to scale to be used to estimate the output growth factor by stating that:

> *"Under our rate of change approach, a proportional change in output results in the same proportional change in expenditure. For example, if the only output measure is maximum demand, a 10 per cent increase in maximum demand results in a 10 per cent increase in expenditure. Any subsequent adjustment for economies of scale is considered as a part of productivity."*[2]
>
> *… "a service provider may allocate economies of scale to the output change component of the rate of change, whereas we consider this to be a productivity"*[3]
>
> *… "if we were to the adjust output to take into account economies of scale, we must ensure that economies of scale have not already been accounted for in our productivity change forecast. Otherwise, this will double count the effect of economies of scale."*[4]

3.6.2 Output growth – MJA assessment

The use of a stochastic frontier model is a useful tool to better understand the drivers of variable costs. In applying this approach, Quantonomics has included a range of environmental variables in the cost function that appear to be logical and also include both water and wastewater variables. This provides some confidence that the functional specification is appropriate, noting that Marsden Jacob has not reviewed the underlying workings of the modelling.

However, one limitation of the Quantonomics approach is that cost functions should not be log-linear in outputs. If cost functions are log-linear in outputs, then the associated output sets are unbounded, meaning there is no limit to the amount of output that can be produced using a given amount of inputs (e.g., O'Donnell, 2018, p.287)[5]. This functional form error means that the estimated coefficients of the log-outputs cannot strictly be interpreted as cost elasticities, although we will continue to use this terminology in the following discussion. However, notwithstanding this limitation, we believe that the results of the stochastic frontier analysis in *Equation 2* still provides some useful quantitative insights into the drivers of costs. However, it may mean that the noise component in *Equation 2* ($v_{(i,t)}$) accounts for this functional form issue.

Another functional form that we have considered is whether it would be beneficial for two separate stochastic frontier models to be developed, one for water and one for wastewater. This is a relevant issue since the output growth estimated using *Equation 3* is used to calculate rate of change in Opex

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[2] Australian Energy Regulatory (2014), Draft decision Ausgrid distribution determination 2014–19, Attachment 7: Operating expenditure, page 191

[3] Australian Energy Regulatory (2014), Draft decision Ausgrid distribution determination 2014–19, Attachment 7: Operating expenditure, page 190

[4] Australian Energy Regulatory (2014), Draft decision Ausgrid distribution determination 2014–19, Attachment 7: Operating expenditure, page 191

[5] O'Donnell, Christopher J. (2018). Productivity and efficiency analysis: an economic approach to measuring and explaining managerial performance, Singapore, Springer.

for both water and wastewater. While two separate models may provide two separate output growths that can be applied to forecast Opex growth, a concern would be whether operating costs have been split by the water businesses between water and wastewater in the Bureau of Meteorology National Performance Report (NPR) data in an appropriate and consistent matter. In our view, evolving the model with two separate models would need to first examine how water businesses are allocating costs in the NPR data between water and wastewater to provide confidence about the robustness of this approach.

A more significant concern is the application of the output weights in Table 13 to generate an overall output growth figure which is used to calculate the rate of change in *Equation 1*. A straight application of the results of the stochastic frontier analysis would be to place forecasts for each of the variables (x, q, z and λ) into *Equation 2* to forecast future variable costs. If x (capital expenditure), z (operating environment) and λ (technical progress) are held constant, then *Equation 2* simplifies to just consider the output variables (q).

Using these simplifying assumptions, the stochastic frontier model indicates that the sum of the q coefficients or elasticities is 0.76 (Table 13). This indicates increasing returns to scale as a 1 per cent increase in output quantities increases variable costs by 0.76 per cent. This straight application approach is not used by Icon Water in setting output growth. Rather, the elasticities have been used to create weightings that sum to unity, thereby ensuring a constant return to scale assumption (i.e., a 1 per cent increase in output quantities increases variable costs by 1 per cent).

Under the straight application approach using elasticities combined with Icon Water's price and productivity growth assumptions in their price submission, the rate of change is estimated to be much lower than under Icon Water's proposed approach (using weights that sum to unity). The difference between the two approaches varies from 0.39 per cent to 0.44 per cent (Table 14).

Table 14: Rate of change using alternative approaches

Approach	Jun-24	Jun-25	Jun-26	Jun-27	Jun-28
Rate of change as proposed by Icon Water (using weights that sum to unity)	1.39%	1.65%	2.10%	1.74%	1.55%
Rate of change (using elasticities)	0.99%	1.24%	1.67%	1.30%	1.12%
Difference	0.39%	0.41%	0.43%	0.44%	0.43%

As previously discussed, the Australian Energy Regulator (AER) does not apply the straight application approach as it would result in the productivity growth adjustment in *Equation 1* duplicating the output growth calculation. However, while returns to scale appears not to be a significant issue for electricity distribution companies[6], increasing returns to scale with respect to outputs does appear to

[6] The sum of output variable elasticities estimated for electricity distribution companies has been shown in past benchmarking studies to be close to unity. For example, the sum of output variable elasticities in the AER Economic Insights 2015 benchmarking study of electricity distribution companies using a stochastic frontier model is 0.99 and varies between

be significant for water businesses. Therefore, we must be cognisant that the productivity adjustment must incorporate this scale efficiency.

The productivity adjustment proposed by Icon Water is 0.5 per cent. This is similar to the 0.39 to 0.44 per cent impact of increasing returns to scale which would imply that most of the productivity change in the rate of change formula proposed by Icon Water is due to scale efficiencies and not much else. This could be considered unreasonable as it does not leave scope for productivity improvements from technical change, technical efficiency or mix of inputs.

3.6.3 Output growth – overall assessment of industry wide and firm specific

Our analysis indicates that scaling the output weightings to sum to unity is appropriate provided that the productivity growth factor (currently 0.5 per cent proposed in Icon Water's price submission) incorporates factors that are not just scale related but includes other drivers of productivity. This provides some evidence that the value of the productivity growth factor is above 0.5 per cent per annum.[7]

Additionally, the elasticity values from the stochastic frontier model may not be correctly estimated because of issues with the stochastic frontier model (i.e., the time invariant inefficiency and time decay aspects of the model) as the estimates of inefficiency may be biased and inconsistent. This issue is discussed in section 3.7.3.

We note that the demand assumptions included in the forecast of output growth have been updated to reflect the ICRC's updated water and sewerage forecasts.

3.7 Productivity growth

3.7.1 Overview of Icon Water's proposed approach

Icon Water has proposed a productivity growth of 0.5 percent per annum and has applied to total controllable operating expenditure over the 2023-28 regulatory period. It is materially less than the productivity growth adjustment applied in the current regulatory period of 1.75 per cent.

Icon Water's proposed productivity rate is based on an assessment undertaken by Quantonomics, as well as an internal assessment of what it considers to be an achievable level of cost efficiency.

Quantonomics has developed a range for a productivity adjustment that it believes is feasible based on the addition of two factors:

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0.97 and 0.98 for four different stochastic fronter models in their 2021 benchmarking study. In contrast, the sum of elasticities from the stochastic frontier model of water companies (equation 2) is 0.76.

[7] Note that the productivity growth factor estimated by Quantonomics is based on the assumption that productivity is the addition of industry wide and firm specific factors. This does not directly address scale but may include aspects of scale efficiencies depending on the way that these two components are estimated (e.g., the multilateral productivity indices used to estimate industry wide productivity growth may contain a component that reflects movement in scale efficiencies over time across all water businesses).

- industry-wide factors (i.e., a frontier shift); and
- firm specific factors (i.e., to allow for Icon to 'catch-up' to other efficient companies).

Combining industry-wide and firm-specific factors, Quantonomics indicates that:

- a reasonable range for the first factor (industry wide) is between zero per cent and -0.9 per cent based on the industry wide Opex PFP of -0.9 per cent per annum and that a productivity trend of zero per cent would be optimistic.
- The cost efficiency factor analysis indicates a catchup productivity growth rate of 0.8 per cent per annum.

The addition of these two components produces a reasonable overall range for productivity growth of between -0.1 per cent and 0.8 per cent. This approach is summarised in Table 15.

Table 15: Quantonomics recommended productivity adjustment

Component	Lower bound	Upper bound
Industry wide factors	-0.9%	0%
Firm specific factors	0.8%	0.8%
Total	-0.1%	0.8%

Source: *Marsden Jacob analysis of the* Quantonomics report

In its price submission, Icon Water has set its productivity growth factor at 0.5 per cent. This is within the range recommended by Quantonomics.

Industry wide factor

Quantonomics has used two alternate approaches to estimate industry-wide factors. The first approach involves estimating historical Multilateral Factor Productivity indexes – including developing a partial productivity index that just relates to operating expenditure (i.e., Opex PFP). The output variables used to develop the Opex PFP are the same as those in the stochastic frontier model (customer numbers, water supplied, and wastewater collected). The inputs for the Opex PFP are a real index of operating (opex) cost inputs.

Using this approach, Opex PFP across all water businesses has been estimated by Quantonomics at an average growth rate of -0.9 per cent per annum over the period 2006 to 2020. Note that is different to the figure in the original Quantonomics report of -0.4 per cent as it was revised during the review process. Using historical productivity in this way provides some indication of a reasonable expectation of what can be achieved for future periods.

Through the use of *Equation 4* in the Quantonomics report, Quantonomics has also used an alternative approach which uses the SFA analysis and future estimated growth rates of the outputs and capital input to estimate Opex PFP. This approach also generates a result of -0.9 per cent per annum over the same period (Quantonomics report, page 25). The composition of this -0.9 per cent is shown in Table 16.

Table 16: Opex PFP using stochastic frontier analysis - composition

Component	Value
Output	0.39%
Capital input	-0.1%
Frontier shift	-1.23%
Total	-0.94%

Source: *Quantonomics report, page 45*

Firm specific factors

With respect to the catch-up component, Quantonomics has used the stochastic frontier analysis to create cost efficiency scores for all water businesses (including Icon Water). Cost efficiency scores have been averaged over the 15-year period 2006 to 2020 to produce a single figure for each water business. The averaged figure is also the average across the two capital measure approaches. Using this approach, the efficiency score of Icon Water is 0.66.

Quantonomics has suggested that a medium-term efficiency target would be to improve cost efficiency so that they are at the 67th percentile, which has an efficiency score of 0.715. Therefore, Quantonomics have estimated that the annual 'catch-up' productivity adjustment required to move from Icon Water's efficiency level to the 67th percentile is ln (0.715⁄0.66)⁄10 = 0.8% per annum. Note that this is different to the figure in the original Quantonomics report of 0.7 per cent as it was revised during the review process.

3.7.2 MJA assessment of industry wide component

In examining the industry wide productivity component, Quantonomics has used two analyses to inform its conclusions: a multilateral Opex PFP; and Opex PFP using the stochastic frontier analysis.

Industry wide component: multilateral Opex PFP

The multilateral Opex PFP is essentially a Törnqvist index in which the index values are generated through output (q) revenue shares that adjust over time based on the revenue shares for each consecutive time periods (Equations 5.1 to 5.3 in the Quantonomics report).

However, one concern is whether the Törnqvist indices are proper indices which means that they meet the axioms listed in O'Donnell (2018, Ch. 3)[8]. The implication is that the multilateral indices will provide a misleading picture of productivity unless the output or input weighting shares are constant over time (which is what would be required for a proper index). From the Quantonomics report, it appears that this concern is relevant to the multilateral total factor productivity index (MTFP) but not the two partial indices (Opex PFP and Capital PFP)[9]. This is because, although outputs appear to be

[8] O'Donnell, Christopher J. (2018). *Productivity and efficiency analysis: an economic approach to measuring and explaining managerial performance,* Singapore, Springer.

[9] Given the Opex PFP and Capital PFP use the weightings in Table B.2 of the Quantonomics report, it appears that Quantonomics are computing a multiplicative index (which is a proper index).

weighted by constant values over all periods[10], it appears that the inputs for the MTFP are based on a weighting of inputs that changes over time which is not consistent with a proper index[11].

Another concern is that the use of a partial productivity index, which only uses one of the inputs (i.e., operating expenditure), is not a holistic examination of productivity since it provides insights into historical movements in Opex PFP which may have been influenced by changes in historical capital expenditure. This is relevant as the interrelationship between these two variables is not considered in setting a productivity adjustment for operating expenditure and highlights the limitation of using Opex PFP to provide guidance on setting a future productivity adjustment for operating expenditure.

Additionally, a further limitation of the analysis is that estimating the productivity growth factor using the methods applied by Quantonomics is a backward-looking approach since it assumes that historical productivity growth provides insights into future productivity growth. This is especially relevant for the industry wide component as calculated by Quantonomics – for example their analysis uses historical productivity growth of the multilateral Opex PFP to provide insights into future productivity growth for the industry wide component.

A further concern is that the growth rate of -0.9 per cent per annum used by Quantonomics for the industry wide component appears to be too low when considering the movement in the index in recent years (Table 17). Much of the negative growth rate appears to have been driven by large falls in productivity in the first half of the total modelled period and the cumulative average annual growth rate for the second half of this period (i.e., 2012 to 2020) is 0.3 per cent per annum. This suggests that a more relevant productivity figure may well be 0.3 per cent per annum than -0.9 per cent per annum.

Table 17: Cumulative average growth rates for Multilateral Opex PFP

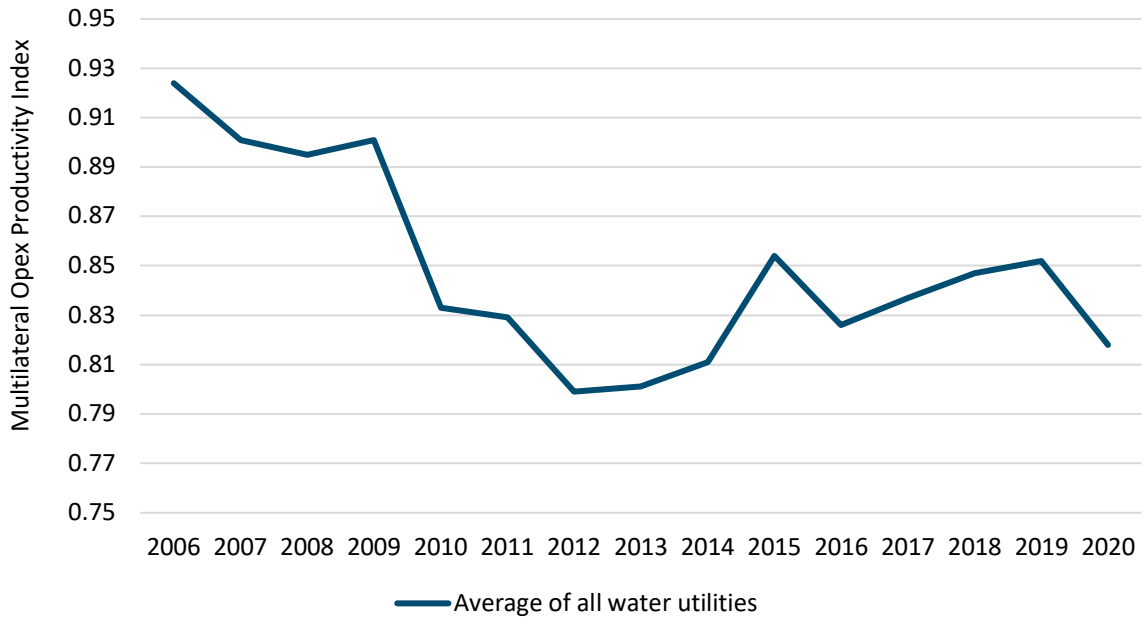
Component	Cumulative average growth rate
2006 to 2020 growth rate	-0.9%
2006 to 2013 growth rate	-2.0%
2013 to 2020 growth rate	0.3%

Source: *MJA analysis of* data within the Quantonomics report

[10] This is explained on page 61 of the Quantonomics report which indicates that the weightings in Table B.2 of the Quantonomics report are used to set the weightings for outputs in the Törnqvist index.

[11] This is explained on page 37 of the Quantonomics report which states that: "The weights used for the two inputs are: (i) the share of nominal opex in nominal total cost; and (ii) the remainder share is for capital inputs."

Figure 12: Multilateral Opex PFP (2006 to 2020)



Source: MJA analysis of Quantonomics data

Industry wide component: Opex PFP using the stochastic frontier analysis

While the stochastic frontier approach delivers the same result as the multilateral Opex PFP (-0.9 per cent per annum), this approach highlights in Table 16 that most of the change in Opex PFP under this approach is due to a frontier shift. Given that most of the decline in productivity over the period 2006 to 2020 appears to have been driven by large declines in the first half of this period (Figure 12), it is possible that the impact of the frontier shift on Opex PFP over the period 2006 to 2020 has occurred because of shifts in the frontier in the first half of this period. This conclusion could be validated by placing two-time variables for two different time periods into the stochastic frontier model (e.g., 2006 to 2012 and 2013 to 2020). However, it is noted that this addition may not be necessary if the time invariant inefficiency and time decay restrictions are removed from the model.

Assuming that this conclusion is correct, if the frontier shift is excluded from the calculation in Table 24 as this may be impacting mostly the first half of the period, the Opex PFP reduces to 0.29 per cent. This is similar to the value of 0.3 per cent estimated for the multilateral Opex PFP for the period 2013 to 2020. This suggests that Opex PFP for the second half of the modelled period may be somewhere around 0.3 per cent per annum.

3.7.3 MJA assessment of firm specific component

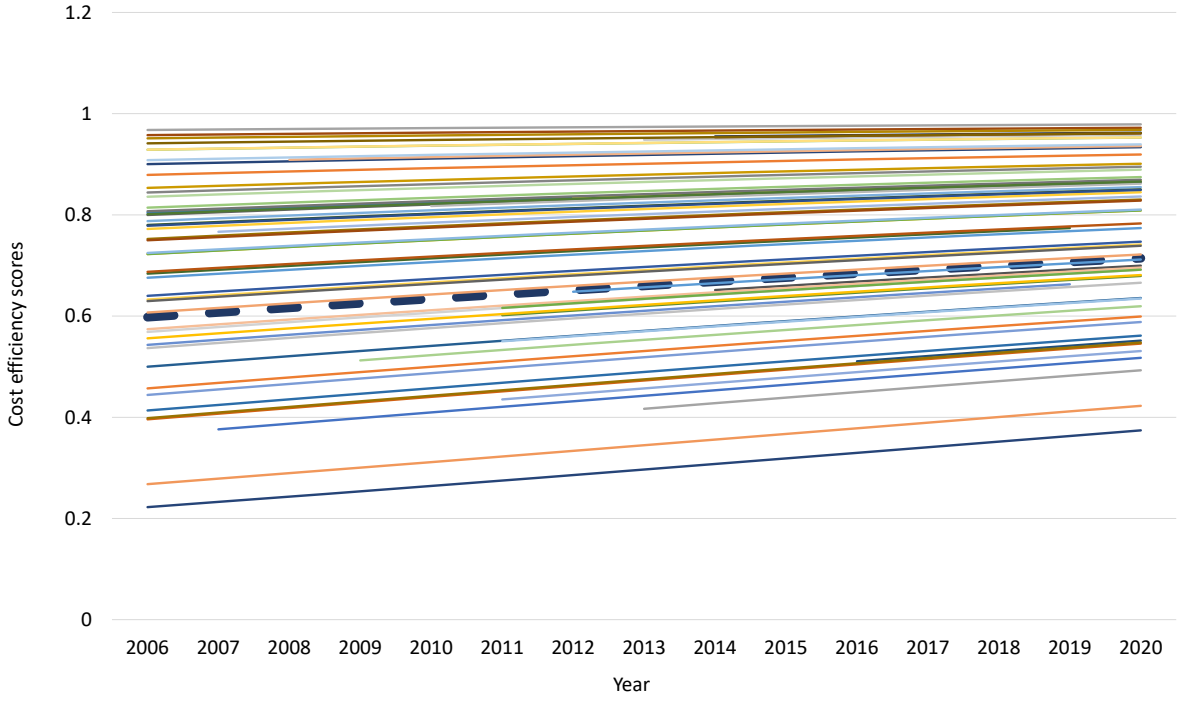
Quantonomics has developed cost efficiency scores under the assumption that the inefficiency effects (the *u* variable in *Equation 2*) are either time-invariant or they decay over time. The effect of this approach is shown in Figure 13 which shows the cost efficiency scores over time across the water businesses. There does not appear to be a theoretical rationale for this restrictive assumption, and it potentially has the effect of leading to biased and inconsistent estimates of efficiency if these restrictive assumptions are not correct. Moreover, this approach implies that firms do not learn from

their mistakes, and the time-decay model says that if water business A is the k-th most efficient business in the sample in period 1, then it will be the k-th most efficient business in every period.

Importantly, the approach does not allow us to understand how variable cost inefficiency is changing over time for different water businesses and, therefore, make judgments about relative technical efficiency among water businesses over different periods or at different periods in time. For example, similar to our comments on the multilateral PFP indices, it would be useful to understand cost efficiency for the second half of the modelled period (i.e., 2013 to 2020) rather than for the whole period.

Our overall assessment is that the firm specific analysis may not be useful for providing insights into Icon Water's variable cost inefficiency (or input-oriented technical efficiency as discussed in O'Donnell, 2018[12]) relative to other water businesses unless the inefficiency effects are allowed to vary in the stochastic frontier model over time by firm.

Figure 13: Cost efficiency scores over time for all water businesses



Note: the dotted line in the graph represents Icon, with the other lines representing other water businesses.

Source: MJA analysis of Quantonomics data

A further issue with the approach of Quantonomics is the choice of the 67th percentile to set the target for future efficiency gains. As an arbitrary target, the choice of percentile could be set at a higher level. For example, the AER has previously used the 75th percentile to define an efficient benchmark for electricity distribution companies.[13] Applying the 75th percentile results in a

[12] O'Donnell, Christopher J. (2018). *Productivity and efficiency analysis: an economic approach to measuring and explaining managerial performance,* Singapore, Springer, page 182.

[13] AER, Annual Benchmarking Report – Electricity distribution network service providers, November 2021

productivity catchup rate of 1.1 per cent per annum, noting the caveats with the time invariant specification of the stochastic frontier model.

Additionally, Quantonomics allow Icon Water ten years to reach the benchmark 67th percentile. An alternative would be for the benchmark to be achieved by the end of the next regulatory period (i.e., five years). Table 18 shows a five-year period results in catchup growth rates between 1.6 and 2.1 per cent for the 67th and 75th percentile, respectively.

Table 18: Quantonomics recommended productivity adjustment

Efficient benchmark target	Catch up productivity growth per annum (5-year transition)	Catch up productivity growth per annum (10-year transition)
67th percentile	1.6%	0.8%
75th percentile	2.1%	1.1%

3.7.4 Productivity growth – overall assessment of industry wide and firm specific

Our overall assessment is that the productivity growth adjustment should be higher than the 0.5 per cent value in Icon Water's submission and that a more reasonable value would be 1.4 per cent per annum allowing for a 10-year adjustment period. A higher value (2.4 per cent) could be used assuming an adjustment period of 5 years (which would be consistent with the length of the regulatory pricing period. However, it is unclear whether this is achievable within the 5-year forecast period.

The recommended adjustment using a 5-year or 10-year transition period is shown in Table 19, which has revised the values from Table 15. However, this conclusion is made with the following caveats:

- the industry and firm specific factors should be re-estimated by Quantonomics with a stochastic frontier model that removes restrictions on time decay and time invariant inefficiency to provide insights into the validity of this result, noting that this will also have implications for the output growth weightings; and
- the stochastic frontier model should be tested with two-time variables to reflect the structural change that may be present for the first and last half of the total time period. However, it is noted that this addition may not to be necessary if the time invariant and time decay restrictions are removed from the model.

Table 19: Quantonomics recommended productivity adjustment

Component	Value (5-year transition)	Value (10-year transition)
Industry wide factors	0.3%	0.3%
Firm specific factors*	2.1%	1.1%
Total	**2.4%**	**1.4%**

*Note: * Marsden Jacob recommends that the results of the time invariant model be examined prior to accepting this figure*

Source: *Marsden Jacob* analysis of the Quantonomics report

This conclusion is reached on the basis that:

- Scale efficiencies associated with increasing outputs are alone likely to result in productivity increases close to the proposed 0.5 per cent per annum (as discussed in section 3.6.2).
- There is evidence that industry wide productivity growth for the period 2013 to 2022 appears to be growing at around 0.3 per cent per annum (as discussed in section 3.7.2). This reflects Marsden Jacob's review of the Quantonomics analysis of multilateral Opex PFP and their use of the stochastic frontier model to estimate industry wide productivity growth.
- The firm specific value set at 1.1 per cent per annum to be consistent with a similar level of efficient benchmarking to the AER for electricity distribution companies (as discussed in section 3.7.3), noting that we have recommended a time variant model be undertaken to validate whether this is an appropriate conclusion. This also assumes a 10-year transition to the efficient benchmark level.
- An overall productivity growth of 1.4% is consistent with the minimum expectations for Victorian water business set by the Essential Services Commission for their 2023-28 operating expenditure forecasts[14]. It is also comparable to the Office of the Tasmanian Economic Regulator's recent decision for TasWater which applied an annual productivity growth rate of 1.5% to its operating expenditure forecasts[15].

Marden Jacob also observes that the current regulatory approach to estimating growth in operating expenditure is essentially "the *product* of *efficiency change* and *technical change"*[16]*,* which forms the basis for decomposing productivity into industry wide factors and firm specific factors. An alternative approach would be to use the results of the stochastic frontier model in *Equation 2* to forecast future variable costs by forecasting each of the variables in the equation. This could be considered as an alternative approach to help validate the results of the current regulatory approach.

Additionally, given the complexity of the modelling and that Marsden Jacob has not examined the inner workings of Quantonomics modelling beyond the report and some simple data requests, we recommend that in future reviews the ICRC either undertakes its own productivity modelling or provides for a process to review the inner workings of modelling involving stochastic frontier and productivity indices using the NPR data. Furthermore, as is the case with the AER, productivity modelling may benefit from additional functional specifications to test the sensitivity of the results to different types of models.

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[14] https://www.esc.vic.gov.au/sites/default/files/documents/2023%20water%20price%20review%20guidance%20paper%20-%20August%202022%20amendment.pdf.

[15] https://www.economicregulator.tas.gov.au/Documents/22%20618%5bv4%5d%20%202022%20Water%20and%20Sewerage%20Price%20Determination%20Investigation%20-%20Final%20Report%20v4%20%281%20June%202022%29.pdf

[16] Fare, R., Grosskopf, S., Norris, M. and Z. Zhang (1994) Productivity growth, technical progress, and efficiency change in industrialized countries. The American Economic Review, 84(1):66–83.

3.8 Real price changes - Electricity

3.8.1 Icon Water 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). BISOE's recommended real cost increases averaged 1.3 per cent in real terms over the 2023-28 regulatory period.

Table 20 outlines Icon Water's proposed real cost changes which it has applied to electricity costs included.

Table 20: Icon Water's proposed real cost change – electricity

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed real cost change	-0.09%	-0.41%	4.55%	1.67%	1.00%

Source: Icon Water, 2023-28 Price submission – Attachment 6, Operating expenditure.

BISOE's forecasts take into account a range of factors including:

- Wholesale electricity costs – generators entering or exiting the market
- Network costs – latest AER network decisions
- Green schemes
- Other costs.

3.8.2 Our assessment

We have reviewed the material provided by Icon Water and BISOE's methodology for the basis for the proposed real cost changes over the period.

We have also reviewed actual costs, current contracts, and projected energy volumes over the next regulatory period.

The following provides a further breakdown of the basis for the proposed real cost change for electricity.

Table 21: Breakdown of Icon Water's proposed nominal costs - $ per MWH

	2023-24	2024-25	2025-26	2026-27	2027-28
Wholesale electricity costs	$91	$92	$101	$106	$110
Network	$106	$109	$117	$122	$127
Green schemes	$17	$16	$16	$16	$16
Other	$8	$8	$9	$9	$9
Total	$222	$225	$237	$233	$228

Source: Icon Water response to information request, July 2022.

Given the green schemes and other category of costs are forecast to remain relatively flat in nominal terms, and that they make up a small component of total energy costs, the focus of our assessment was on wholesale electricity costs and network costs. The following provides our assessment of wholesale and network costs.

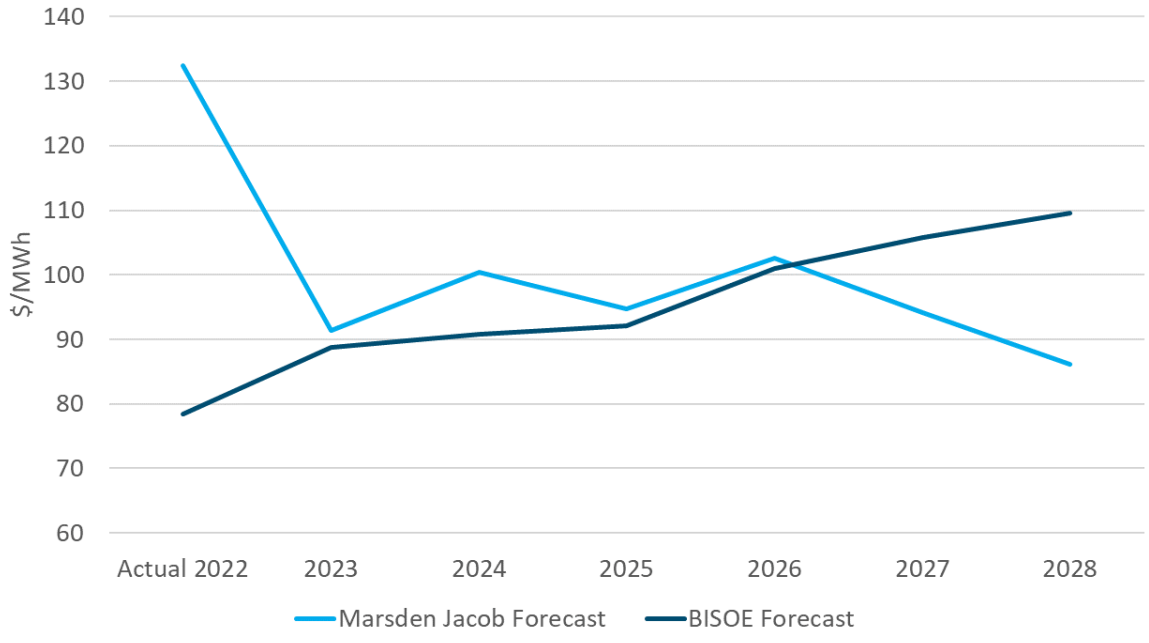
Wholesale electricity costs

We note that the wholesale electricity market forecast is not necessarily translatable to electricity contract prices that Icon Water is subjected to. However, it is still a robust assumption to use and the closest estimate to what future energy costs might be.

While it has not been provided to Marsden Jacob as part of this review, it is assumed that Icon Water has some level of information on the load profiles of its past and future electricity energy usage. This information is then used to determine which electricity energy contracts work best for cost savings purposes. For example, it is more prudent to have contract prices in time sectors and capture cheaper prices during the middle of the day for sites that use more energy during those periods.

As part of the review, we have undertaken an independent assessment of wholesale electricity costs for the NSW electricity market to compare against the BISOE wholesale electricity market forecasts. Our results found similar forecasts for the first three years of the regulatory period; however they vary in the final two years of the regulatory period (Figure 14).

Figure 14: Wholesale Time-Weighted Average Yearly Energy Price Comparisons, Nominal[17]



Source: *Marsden Jacob Base Case June 2022 and Icon Water, 2023-28 Price submission – Electricity Forecast - Breakdown of cost components.*

At a high level we note the following key differences between our forecast and BISOE's forecasts:

[17] Actual 2022 is only for Marsden Jacob's forecast. The value for BISOE forecast is from the file provided "Electricity Forecast - Breakdown of cost components". CPI assumed 2.5% annually where applicable

- For 2022, Marsden Jacob used actual wholesale electricity time weighted average spot price value (BISOE indicated that the value is forecast);
- The wholesale electricity price for 2023 to 2026 are consistent, with slight difference in 2024. Marsden Jacob assumes Liddell close entirely by April 2023, causing majority of the uplift to be in 2023-24;
- For periods post 2026, key factors that are potentially driving the differences between the forecasts are:
  - Eraring closure dates where Marsden Jacob assumes 2-units will remain in operation until August 2028
  - Marsden Jacob forecast modelled the NSW Electricity Infrastructure Roadmap (the Roadmap) closely
  - Interregional and intraregional transmission links upgrade are similar to AEMO ISP 2022 Final outcome.

From a modelling method perspective, Marsden Jacob has also employed market simulation modelling rather than least-cost linear optimisation.

These observations above are further discussed below.

Observations of NSW wholesale spot price modelling comparisons

Marsden Jacob noted that the differences in forecast can be divided into two sections:

- Underlying assumptions
- Forecast methods.

These are discussed in turn below.

Underlying assumptions

Key drivers to the wholesale electricity spot price in NSW are based on the most recent available information on:

- Coal generator retirements
- Investment and renewable penetration expectations
- New transmission links between National Electricity Market (NEM) regions connecting to NSW (interregional)
- Upgrades or new transmission links within NSW (intraregional).

Table 22 provide a comparison of the key assumptions adopted by Marsden Jacob and BISOE. All other factors used by BISOE are not reproduced here as the assumptions are similar to Marsden Jacob's.

Table 22: Comparison of key assumptions – Marsden Jacob and BISOE

Factors	Marsden Jacob	BISOE	Comment
Coal generator retirements	• Decommissioning of Liddell power station by 2022/23 • Decommissioning of Eraring power station in stages: – 2 units by 1 August 2025	• Decommissioning of Liddell power station by 2022/23 • Decommissioning of Eraring power station by 2024/25 • Planned commissioning of wind and gas generators	Marsden Jacob assumption: • Mt Piper closure would push back 2 units until Humelink completed

Factors	Marsden Jacob	BISOE	Comment
	– 2 units by 1 August 2028	throughout the forecast period	• Mt Piper close by 2025, based on lack of coal supply.
Investment and renewable penetration expectations	Follow closely the New South Wales Government's Electricity Infrastructure Roadmap (the Roadmap)18	Investment and retirement forecasts are informed by the last available AEMO generation information and ESOO forecasts. We assume penetration of renewables into the system as a response to significant plant retirements as the short-term price increase will incentivise market entrants.	
New transmission links between National Electricity Market (NEM) regions connecting to NSW (interregional)	• Project EnergyConnect from July 2025[19] (SA – NSW)	No information available	The date is based on modelling iterations, with guidance from AEMO's ISP Final 2022 outcome
Upgrades or new transmission links within NSW (intraregional).	• Humelink from July 2027[20] • Sydney Ring (Reinforcing Sydney, Newcastle and Wollongong Supply) from July 2027 • New England REZ Transmission Link from July 2027	No information available	The date for Humelink entry is based on the modelling iterations, with guidance from AEMO's ISP Final 2022 outcome

With the completion of interregional and intraregional links, together with the implementation of The Roadmap, it is expected that wholesale electricity spot price to trend downwards as seen in Marsden Jacob's forecast from 2026-27 onwards. The combination of relatively cheaper renewable energy against lower gas usage will be the main contributor for this trend for 2026-27.

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[18] NSW Government's Roadmap IIOs require at a minimum the construction by 31 December 2029 of generation infrastructure that generates approximately 33,600-gigawatt hours (GWh) of eligible renewable energy in New South Wales, as well as 2 gigawatts (GW) of long-duration (eight-hour) storage. See NSW Development Pathways Report https://aemo.com.au/-/media/files/about_aemo/aemo-services/nsw-development-pathways-report.pdf?la=en

[19] AEMO Final ISP 2022 latest date online with full capacity is July 2026: https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en

[20] AEMO Final ISP 2022 latest date online with full capacity is July 2026

Forecast Method

BISOE's forecast is based on 'simplified least-cost linear optimisation for the market, providing a total cost optimisation which includes annual wholesale market prices'. This indicates the use of shadow pricing[21]. However, for the forecast used in this analysis, the method employed by Marsden Jacob is market simulation based. Marsden Jacob uses Prophet model, which is used by multiple parties in Australia.

Table 23 specifies the models and reasoning for the use of market simulation modelling.

Table 23: Marsden Jacob Electricity Model comparison

Model / Tool	Description
Electricity market simulation	PROPHET is an advanced electricity market model used by many parties in Australia (NEM and WEM) including AEMO, TNSP's government, portfolio generators and retailers. The simulation side of the model uses the same database as the linear program module (noting that there are inputs particular to the linear program and simulation modules). This provides for simulation to be readily undertaken using the assumptions and output solutions of the long term linear program module. This can be important as the LP module understates electricity prices as the model assumes SRMC energy prices when there is sufficient capacity in the market (i.e., doesn't capture competitive market dynamics).
Electricity least cost linear program	The least cost linear program module provides for the long-term development of electricity markets under various policy options (such as emission trading, clean energy targets and the LRET) to be modelled. Outputs include all the usual items such as the shadow prices of constraints (including energy, capacity, emissions, RET etc.), generator entry and retirement (and their location), plant type and operating regimes. The flows on transmission lines and additional transmission requirements can also be established.

With significant amounts of renewable penetration, Marsden Jacob expects some level of market reactions in NSW. Such reactions are modelled appropriately using market simulation modelling[22]. In contrast to BISOE's forecast, the market reactions are limited based on past year historical behaviour[23]. On this basis we recommend adopting Marsden Jacob's wholesale market forecast for 2026-27 and 2027-28.

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 due to increases with customer growth from 2024-25 onwards.

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[21] In the material provided, Marsden Jacob is unable to determine the components of shadow pricing used

[22] An example of this will be that The Roadmap will have the renewable generators coming in based on multiple other factors, other than economics such as the levelised cost of energy

[23] See 'Portfolio incentives and bidding behaviour' and 'Benchmarking results' sections of Icon Water_BISOE_Information request document

We note that 2023-24 real increase of 0.5% is consistent with the AER's decision for EvoEnergy on distribution charges. BISOE then argue that network charges will increase with CPI plus population growth post 2023-24. However, Icon Water receive a separate output growth allowance that gets applied to total opex, including electricity costs.

We therefore consider there is no basis for any further real price increases applied to network costs beyond 2023-24.

3.8.3 Our recommendation

Table 24 outlines our recommended real cost change to be applied to electricity costs which takes into account adjustments for wholesale and network electricity costs over the regulatory period.

Table 24: Recommended real cost change – electricity

	2023-24	2024-25	2025-26	2026-27	2027-28
Recommended real cost change – electricity	-0.1%	-0.9%	2.3%	-4.2%	-4.5%

3.9 Real price changes – Labour

3.9.1 Icon Water proposal

Icon Water has proposed a real price change to its labour operating costs over the 2023-28 regulatory period. Its proposed approach is based on advice from BIS-Oxford Economics (BISOE). BISOE's recommended real cost increases averaged 0.94 per cent in real terms over the 2023-28 regulatory period.

Table 25 outlines Icon Water's proposed real cost changes which it has applied to electricity costs included.

Table 25: Icon Water's proposed real cost change – labour

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed real cost change	1.05%	1.25%	1.27%	0.64%	0.56%

Source: *Icon Water, 2023-28 Price submission – Attachment 6, Operating expenditure.*

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

3.9.2 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. The main pay setting categories and their key determinants include:

- Employees under awards have their pay determined by Fair Work Australia (FWA) in the annual National Wage case. BISOE expected this would increase above CPI ranging from 3-3.5%
- Employees under collective agreements – BISOE assumed a slow increase in collective agreements up 3.5% over the regulatory period
- Pay set by individual arrangements – BISOE's has assumed with the end of wage freezes and tightening labour market, plus accelerating inflation, it expects to see a marked increase in wage rises in for individual arrangements.[24]

Overall, BISOE expects that the next round of EBAs negotiated in the sector to rise over the next two years due CPI remaining above 3%, strong demand for skilled labour and recent high enterprise agreement outcome in the construction sector.

We have reviewed BISOE's forecasting methodology for labour cost changes and consider the approach to be reasonable for forecasting WPI for the ACT. We note that when we sought detailed on the inputs of the forecasts, which were generated in February 2022, they were unable to be provided due to them being developed within BISOE's live forecasting model. We suggest for future updates when using figures for forecasts that are to be reviewed by a regulator at a future date, keeping a snapshot of key inputs of the model that was used to generate the forecast that is used for the regulatory submission.

We have compared the proposed real cost increases with the nominal wage increases included in Icon Water's draft Enterprise Agreement (EA). The EA covers 96 per cent of Icon Water staff, therefore provides the good indicator of changes in Icon Water's labour costs. We consider that the proposed labour real cost increase is broadly consistent with the real cost increase included in the draft EA, noting that the agreement on the EA is still to be resolved. We therefore consider the proposed approach to be acceptable as a basis for adjusting labour costs over the 2023-28 period.

We also accept that the superannuation guarantee increase is not included in the base costs or within the real costs increases and it is reasonable to include a 0.5% real cost increase from 2023-24 to 2025-26.

3.9.3 Our recommendation

Based on our assessment we accept Icon Water's proposed real price changes in labour costs over the 2023-28 regulatory period.

3.10 Real price changes – Chemicals

Icon Water has proposed a real price change to its chemical operating costs over the 2023-28 regulatory period. Its proposed approach is based on advice from BIS-Oxford Economics (BISOE). BISOE's recommended real cost increases averaged -0.35 per cent over the 2023-28 regulatory period.

[24] BIS Oxford Economics, Response to Information request – Wage price index forecasting methodology, p.1-3, August 2022.

Table 26 outlines Icon Water's proposed real cost changes which it has applied to chemical costs included.

Table 26: Icon Water's proposed real cost change – chemicals

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed real cost change	-3.96%	-0.22%	1.33%	1.78%	-0.64%

Source: Icon Water, 2023-28 Price submission – Attachment 6, 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.

3.10.1 Our assessment

We have undertaken a detailed assessment of BISOE's approach to forecasting chemical costs over the next regulatory period. In developing the forecast BISOE has chosen the producer price index – basic chemical manufacturing to best represent the chemical price movements faced by Icon Water. BISOE found a strong correlation between Icon Water's weighted average chemical prices and the ABS producer price index. On this basis BISOE decided that forecasts of the PPI would provide the most accurate indication of future price changes in chemicals utilised by Icon Water.

BISOE has developed a forecast change in the basic chemical manufacturing PPI based on its views of chemical costs over the next regulatory period. It has developed a forecast using an error correction model, which includes inputs into the manufacturing process which have shown to have a strong impact on historical price movements in the PPI. This includes manufacturing wages, oil prices, electricity and gas prices, exchange rate movements and the ABS PPI 'Non-metallic Mineral Quarrying'.

Based on our assessment of BISOE's approach to chemical real cost changes, we consider that the approach provides a reasonable methodology for forecasting the Basic Chemicals Manufacturing PPI as a proxy for Icon Water's chemical costs.

Key input assumptions input assumptions included in the next regulatory period BISOE factored in the following key assumptions:

- Easing of oil prices in 2022-23 and 2023-24
- Ongoing increases in manufacturing costs peaking in 2026-27
- Expected fall in the exchange rate in 2026-27.

We note that BISOE had undertaken the assessment in February which informed Icon Water's proposal. However, BISOE has not retained the forecast inputs drivers that generated the outputs used in the price submission, due to them being developed within a live model. We note as with the real cost changes for labour, that we would expect to assess the input drivers that impact the real cost changes generated by the model which are used to inform Icon Water's proposed chemical cost changes.

3.10.2 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, noting we have not verified the input drivers of the proposed model outputs generated by BISOE. However, we consider that the overall approach is reasonable.

3.11 Step change to the baseline - Insurance

3.11.1 Overview of Icon Water proposal

Icon Water has proposed a step change to its baseline operating costs for insurance expenditure. Icon Water stated in its pricing proposal that it is not able to manage costs associated within its baseline operating costs. Its proposed step change of insurance results in an increase in insurance costs of 46 per cent by 2028 (Table 27).

Table 27: Proposed step change – insurance costs, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed step change – insurance costs	1.20	1.60	1.97	2.21	2.37

In developing its forecast step change operating costs, Icon Water used growth projections across each insurance category as recommended by Marsh[25]. Table 28 includes the proposed nominal growth rates applied to each category of insurance as recommended by Marsh. It then applied these growth rates to its forecast insurance costs for 2021-22, to develop forecasts from 2022-23 onwards.

Table 28: Breakdown of proposed annual increases insurance costs - nominal

	2023-24	2024-25	2025-26	2026-27	2027-28
General Liability & Professional Indemnity	17%	12%	10.0%	5%	2.5%
Directors & Officers Liability	20%	20%	20%	20%	20%
Industrial Special Risk/Property	15%	10%	7.5%	5%	2.5%
Workers' Compensation	7%	6%	7%	6%	6%
Motor Vehicle	5%	5%	2.5%	2.5%	2.5%
Corporate Travel	5%	2.5%	2.5%	2.5%	2.5%
Employment Practices Liability	10%	10%	10%	10%	10%
Statutory Liability	10%	10%	10%	10%	10%
Voluntary Workers	5%	2.5%	2.5%	2.5%	2.5%
Group Personal Accident	7%	7%	7%	6%	6%

Source: *Icon Water, Appendix 6.6 opex model*

[25] Marsh, Icon Water ICRC Report 2023-28 – Premium Projections and Insurance Market Update, April 2022.

3.11.2 Our assessment

We have undertaken a detailed assessment of each insurance component and the basis for the proposed nominal increases across each insurance component. Key reasons identified by Marsh for the proposed increases across each category included:

- Property insurance – growth is based on growth in Icon Water's assets and increases in capital costs expected over the regulatory period of an additional 5% per annum
- General Liability insurance – general liability insurance will be driven by growth in revenue, Icon Water's historic claim performance and current claim cost increases
- Directors and Officers premiums – 20% per annum increase is proposed is based on expected volatile and due to the small market for this product
- Workers' compensation – this is largely driven by expected wage growth, current trending in markets, and the potential for Icon Water to incur claims
- Other premiums – including motor vehicle insurance, corporate travel and statutory liability are largely based on historical trends.[26]

During our review process, Icon Water also provided an updated estimate for 2022-23 insurance costs. This updated forecast was based on a large portion of costs already invoiced for the 2022-23 financial year. Given Icon Water has already incurred these costs upfront it is reasonable to incorporate these Icon Water's latest estimates for 2022-23 into our assessment. The 2022-23 revised forecasts showed an increase of $0.41 million from 2021-22 actual costs, though this was a $0.19 million or a 32% reduction in the forecast increase incorporated into the insurance step change estimate for the 2023-28 regulatory period.

We note that part of Icon Water's justification for increases over the next regulatory period was due to revenue and asset growth. This includes an additional asset growth adjustment to property insurance. However, as part of the base step trend approach, as with all base year controllable operating costs, Icon Water's insurance costs will be adjusted for output growth through the output growth adjustment. The growth adjustment to baseline insurance costs equates to approximately $1.4 million over the 2023-28 regulatory period. Icon Water has not factored this output growth adjustment, when estimating the step change in costs for insurance. Additionally, we do not consider adequate justification has been provided of the methodology used to develop the proposed forecast real cost changes across each insurance category, as in most cases they appear to be based on indicative estimates.

As noted by Icon Water in its submission there is also considerable uncertainty in forecasting prudent and efficient insurance costs for a five-year regulatory period. Therefore, including ongoing forecast cost increases shifts all insurance cost risk onto Icon Water's customers by increasing prices, when the insurance cost increases may not eventuate. As noted above, the 2022-23 updated estimated insurance costs figures are already lower than the forecast that was included in Icon Water's

[26] Marsh, Icon Water ICRC Report 2023-28 – Premium Projections and Insurance Market Update, April 2022.

submission, which reflects the uncertainty in predicting insurance premium price movements for 1 year, not just for the next 5-year period.

We also note that Marsh expects an easing of the insurance market over the regulatory period in a number of insurance markets. This is reflected by smaller increases Marsh has included in its forecast over the regulatory period.

Due to the uncertainty in forecasting insurance costs over the next regulatory period, and that a growth adjustment will be factored into the baseline insurance costs, we consider it is reasonable to only include a step change adjustment to the baseline to account for the increase in 2022-23 insurance costs of $0.41 million. We consider Icon Water can manage any further movements in insurance costs over the regulatory period within its growth-adjusted baseline operating costs.

3.11.3 Our recommendation

Based on this assessment we recommend that only the increase in insurance costs from 2021-22 to 2022-23, an increase of $0.41 million per annum, be accepted as a step change for the 2023-28 regulatory period (Table 29).

Table 29: Recommended step change – Insurance, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed step change	1.20	1.60	1.97	2.21	2.37
MJA recommended step change	0.41	0.41	0.41	0.41	0.41
Adjustment	-0.79	-1.20	-1.56	-1.80	-1.97

3.12 Step change to the baseline - Critical infrastructure

3.12.1 Overview of Icon Water proposal

Icon Water has proposed a step change in its operating costs due to new requirements resulting from Amendments to the Security of Critical Infrastructure (SOCI) Act. The Act has been amended in December 2021 and April 2022.

Table 30 below provides the proposed step change in costs, which relate to costs associated with amendments in December 2021 only.

Table 30: Proposed step change – SOCI, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed step change – SOCI	$0.78	$0.69	$0.69	$0.69	$0.69

Part 2A, Section 30 AA of the Act establishes an obligation for Icon Water to develop; maintain; and comply with a critical infrastructure risk management program.

The Act amendments from December 2021 require the following key elements to be delivered by owners of critical infrastructure:

- Security assessment
- Security assessment and response testing hardware
- Supplier assurance exchange subscription
- Cyber security exercises.

3.12.2 Our assessment

As part of our assessment, we sought more detail on the key activities Icon Water proposes to undertake to meet the obligations relating to the April 2022 SOCI Act amendments. The draft rules have been prepared that will require Icon Water to manage risks arising from cyber-security; personnel security; supply chain security; physical security; and natural hazards.

Icon Water's regulatory submission included costs related to comply with cyber and information security hazard rules, which are based on draft positive security obligations. Icon Water is expecting that following a consultation process, these rules will be in place by the end of 2022. Table 31 provides a breakdown of the proposed key activities included in the submission to meet SOCI requirements.

Table 31: SOCI requirements – Cyber and information security

SOCI	Compliance requirement	Icon Water's response	Opex costs $million
Speed and Accuracy	24 hr reporting	[redacted]	[redacted]
	Accurate reporting to the Australian Cyber Security Centre (ACSC) within reporting timeframe	[redacted]	[redacted]
Cyber risk management incorporated with enterprise risk	To know and manage appropriately the material enterprise risk to a cyber event.	[redacted]	[redacted]
Cyber Maturity Assessments	To measure ourselves against an industry best-	[redacted]	[redacted]

SOCI	Compliance requirement	Icon Water's response	Opex costs $million
	practice cyber maturity framework.	[redacted]	
Board Level Assurance package	Annual reporting to the Minister of Home Affairs.	[redacted]	[redacted]

Source: Icon Water, Presentation on SOCI obligation requirements, July 2022

We have reviewed the material provided by Icon Water to determine the proposed new obligation. Based on our assessment of the Act requirements, we consider that it is prudent for Icon Water to undertake the tasks proposed to meet the SOCI requirements by July 2023. This is based on the requirements outlined in the Act and the positive security obligations and expectation that the Minister for Home Affairs will enforce the rules by the end of 2022.

In reviewing the efficiency of Icon Water proposed costs Icon Water has provided a breakdown of the proposed increase in expenditure over the period as required to deliver on the key requirements. This included a detailed breakdown for the ongoing operating costs.

Based on the information on the bottom-up assessment of costs we consider them to be reasonable with the exception of an FTE rate of $0.3 million per annum for an internal IT application specialist as an ongoing cost from 2024-25 onwards. This appears to be based on external consultant rates rather than internal Icon Water wages. We have therefore made an adjustment to the forecast SOCI costs to reflect an average Icon Water labour cost of $0.154 million per annum for 2021-22[27].

We note that Icon Water is planning to provide further information in its response to the draft report on proposed SOCI to fully meet all aspects of the positive security obligations. We recommend that Icon Water provide clear documentation outlining the basis for any proposed cost changes and how they support the business in meeting the new obligations. Forecasts internal labour costs included in the updated SOCI costs should also reflect internal Icon Water labour rates.

3.12.3 Our recommendation

We accept the proposed SOCI costs as prudent, with a small adjustment for labour costs that have been used in the forecast.

[27] This has been calculated using the 2021-22 actual net labour costs of $62.2 million ($2022-23) divided by 2021-22 FTEs of 405.

Table 32: Proposed step change – SOCI, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28
Proposed step change – SOCI	0.78	0.69	0.69	0.69	0.69
Recommended SOCI operating costs	0.78	0.53	0.53	0.53	0.53
Adjustment	0.00	-0.16	-0.16	-0.16	-0.16

3.13 Operating expenditure forecast savings from capital expenditure projects

Icon Water did not include any operating expenditure savings from capital projects in its proposed operating expenditure forecasts. However, through our expenditure review process we noted that Icon Water has identified operating expenditure savings from the Cotter Pump Station Upgrade capital project. The project is forecast to result in operating expenditure savings of $2.8 million over 10 years – refer to Section 4.8. The savings are mainly pump efficiency and electricity savings as well as reduced maintenance. As the project is due to be completed by June 2025, savings are expected to commence from 2025-26.

We therefore recommend including operating cost savings of $0.28 million per annum from the Cotter Pump Station upgrade. We have assumed only 50% savings from 2025-26, to allow for potential delay to project delivery and potential commissioning issues, with 100% of the savings from 2026-27 onwards. These savings have been included as a step change to the baseline forecast operating costs.

3.14 Recommended Operating Expenditure forecast 2023-28

Based on our assessment of Icon Water's proposed controllable operating costs for the 2023-28 regulatory period, Table 33 provides a breakdown of our adjustments and recommendations for forecast total operating costs for the 2023-28 regulatory period. The recommended adjustments result in a 5.8% reduction in total forecast operating costs over the 2023-28 regulatory period, compared with Icon Water's proposal.

Table 33: Recommended total operating costs for the 2023-28 regulatory period, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28
Base year					
Proposed	150.17	150.17	150.17	150.17	150.17
Adjustments					
Updated 2021-22 actual controllable opex	-1.90	-1.90	-1.90	-1.90	-1.90
Overhead capitalisation	-1.87	-1.87	-1.87	-1.87	-1.87

	2023-24	2024-25	2025-26	2026-27	2027-28
ICRC licence fees	-1.34	-1.34	-1.34	-1.34	-1.34
Licence fees	-0.55	-0.55	-0.55	-0.55	-0.55
Royalties	-0.10	-0.10	-0.10	-0.10	-0.10
Price review costs	-1.25	-1.25	-1.25	-1.25	-1.25
Recommended	143.16	143.16	143.16	143.16	143.16
Trend					
Proposed	2.08	4.56	7.62	9.85	11.85
Adjustments					
Electricity	-0.09	-0.25	-0.58	-1.20	-1.79
Output and Productivity growth	-1.79	-3.56	-5.28	-6.67	-8.01
Recommended	0.20	0.74	1.76	1.99	2.05
Step changes					
Proposed	1.98	2.30	2.66	2.90	3.07
Adjustments					
Insurance	-0.79	-1.20	-1.56	-1.80	-1.97
SOCI	0.00	-0.16	-0.16	-0.16	-0.16
Price submission costs				0.90	
Cotter Pump Station			-0.14	-0.28	-0.28
Recommended	1.19	0.94	0.80	1.56	0.66
Non-controllable costs					
Proposed	46.83	47.33	47.96	48.65	49.33
Adjustments					
ICRC licence fees	1.34	1.34	1.34	1.64	2.34
Other licence fees	0.54	0.54	0.54	0.54	0.54
Royalties	0.15	0.15	0.15	0.15	0.15
Water Abstraction charge	0.20	0.11	-0.01	-0.12	-0.23
Recommended	49.06	49.47	49.99	50.86	52.13
Total operating costs					
Proposed	201.06	204.35	208.41	211.57	214.41
Adjustments	-7.56	-9.90	-11.98	-12.41	-14.12
Recommended	193.61	194.31	195.71	197.56	197.99

Note: The adjustment to the Water Abstraction charge is based on the ICRC's revised bulk water forecasts.

Table 34 provides a breakdown of our recommendation total operating costs across water and sewerage.

Table 34: Recommended total operating costs for the 2023-28 regulatory period, $million, $2022-23

	2023-24	2024-25	2025-26	2026-27	2027-28
Water					
Controllable opex forecast - base	64.01	64.01	64.01	64.01	64.01
Opex trends	0.09	0.33	0.79	0.89	0.92
Opex step changes	0.55	0.43	0.29	0.60	0.15
Total controllable opex	64.65	64.77	65.09	65.50	65.08
Total non-controllable opex	42.63	42.97	43.41	44.05	44.89
Total water opex	107.28	107.74	108.50	109.55	109.97
Sewerage					
Controllable opex forecast - base	79.15	79.15	79.15	79.15	79.15
Opex trends	0.11	0.41	0.97	1.10	1.13
Opex step changes	0.64	0.50	0.50	0.95	0.50
Total controllable opex	79.90	80.07	80.63	81.20	80.79
Total non-controllable opex	6.42	6.50	6.57	6.80	7.23
Total sewerage opex	86.32	86.57	87.20	88.01	88.02
Total					
Controllable opex forecast - base	143.16	143.16	143.16	143.16	143.16
Opex trends	0.20	0.74	1.76	1.99	2.05
Opex step changes	1.19	0.94	0.80	1.56	0.66
Total controllable opex	144.55	144.84	145.72	146.71	145.87
Total non-controllable opex	49.06	49.47	49.99	50.86	52.13
Total opex	193.61	194.31	195.71	197.56	197.99

4. Capital Expenditure

4.1 Overview of approach

The assessment of Icon Water's capital expenditure was guided by the ICRC Issues Paper released in March 2022[28]. For capital expenditure this is the assessment of the prudency and efficiency of Icon Water's historical and proposed capital expenditure. Prudence being the assessment of the need for the project, including the assessment of the benefit, risk being addressed and the timing. Efficiency is the assessment of the method of the development and delivery of the capital expenditure to ensure it is delivered in a cost-effective manner.

The review included consideration of expenditure drivers such as legal or regulatory obligations, new growth, renewal of existing infrastructure or an increase in the reliability or quality of services for customers.

The assessment included the review of business cases and supporting documents provided by Icon Water to support its historical and proposed capital projects and programs, including internal reviews of project appropriateness, options analysis, cost estimates, capital prioritisation and risk assessments.

The Statement of Requirements for the review of Icon Water's Capital and Operating Expenditure for Water and Sewerage Services[29] states the criteria for the review of capital expenditure to include:

- assess and quantify the existing network infrastructure in terms of capacity, condition, renewal requirements and service standards
- assess the reasonableness of Icon Water's growth scenarios and the associated costs
- ascertain the prudency of the capital projects selected for individual review
- identify and segregate the capital works projects associated with assets for which developers will either contribute to the cost of provision, or will build and hand over to Icon Water
- identify and comment on the procedures for assessing capital expenditure including information disclosure and testing for non-network options and integration with pricing strategies
- identify industry best practice with respect to asset provision, asset utilisation and service standards, including capital versus operating expenditure trade-offs
- assess the rigour of Icon Water's approaches to managing its assets and developing its asset management plans
- assess the prudency and efficiency of actual capital expenditure from 1 July 2018 to 30 June 2023. The review will focus on variations in capital projects and programs that are material in terms of cost and/or

[28] ICRC, Issues Paper - Regulated water and sewerage services prices 2023–2028, March 2022
[29] GS3055663RFTAttachment 1 Statement of Requirements for the review of Icon Water's Capital and Operating Expenditure for Water and Sewerage Services, ACT Government.

scope.

Aligned with these requirements the prudence and efficiency of the capital expenditure was assessed using the criteria and questioning shown in Table 35.

Table 35: Capital expenditure assessment criteria

Requirements	Questions
Consequence	
Consequence in the project does not proceed	What is the impact if the project does not proceed? What is the impact if the project does not proceed in the stated timeframe? What is the change to the risk profile? Has an operational mitigation been considered?
Objective/Driver	
What is the reason/driver for the project?	Consideration of regulatory investment classes: Compliance/Regulatory - have there been changes in environmental, technical, safety standards or other regulatory performance standards, meaning the project is needed for compliance? Has there been a Ministerial direction? Maintain/ Renewal - have existing assets reached the end of their useful life and require replacement or refurbishment to maintain service levels? Growth - has demand increased, or is forecast to increase, which leads to a need for infrastructure upgrade/improvement? Provide evidence through demand forecasting, SAMP or document underpinning growth assumptions Improvement - do customers support requested the improvement, is it a priority and are they willing to pay for it? Efficiency - Does the capex investment lead to future opex or capex savings (NPV+)?
Objective/Driver - evidence	
Is there evidence and data to support the project driver?	Evidence provided of: 1. Compliance - evidence of regulatory obligation and a clear link to the required expenditure and timing 2. Maintain- evidence of asset condition or performance which is driving investment 3. Growth - demand forecasts and system planning to support the need and timing 4. Improvement - Customer engagement data, including WTP 5. Efficiency - Data to support the future cost avoidance
Objective/Driver - timing	
What is the timing of the project? What is the driver for the delivery timeframe?	Why it required to be delivered when it is planned to? What are the consequences of not delivering the project to the planned timeframe? Has the benefit of scheduling the project with other projects been considered to

Requirements	Questions
	deliver greater efficiency? Has a project start date, duration and completion date been provided?
Benefits	
What are the benefits that will be delivering the project?	What are the benefits associated with the project?
Cost	
What are the capital and operating cost impacts?	What is the capex by year? What is the opex cost by year (variance from base)? How is the project funded? Customers, developer charges, government grant or funding? Provide a breakdown.
Estimate	
What are the material assumptions underpinning the cost estimate?	How has the estimate been developed, quantities and unit rates? Where did they come from? Has the estimate been independently assessed? Where is the project in its lifecycle? What class of estimate has been applied? (P50?) What contingency has been included? What overheads or indirect costs have been allowed for? Is the class of cost estimate appropriate? Does the risk assessment support the level of contingency applied? What indexation has been included?
Scope	
What is in scope?	What is in scope? What is excluded? What are the assumptions? What are the constraints?
Options	
What options were assessed as part of the planning process? How were they assessed to determine the appropriate scope of work?	Have the options been adequately assessed (including cost, timing, benefits and risk)? Was a do-nothing option considered? Are there a sufficient number of options that are technically feasible? Was the appropriate option selected? What was the justification for selecting the preferred option?
Risk	
How has risk been considered?	Was the corporation risk framework followed to assess the risks? What risks were identified for the delivery of the project/program? What is the risk mitigation strategy for each of those risks?

Requirements	Questions
	Who owns the risk? Have the risks been factored into the cost and timing estimates?
Procurement	
What is the procurement / delivery strategy and why is it appropriate?	Has or will the corporation's procurement process be followed for this project/program? What procurement / delivery strategy was selected and why? Has project timeframe been considered and did this impact the selection of the procurement strategy? Risk sharing with contractors? Incentive or Penalty payments?
Approval process	
What is the approval process?	Is there an appropriate capital expenditure approval process? Was the approval process followed? What evidence is there of approval of the projects at each gate passed?
Stakeholders	
Who are the stakeholders, and have they been appropriately engaged?	Who are the appropriate stakeholders to assess the need and benefits of this project and program? Have the stakeholders been adequately consulted at the various stages of the project? What evidence is there of stakeholder consultation and support?
Interdependencies	
Is this project of program dependent on other projects?	Is this project or program dependent on other projects? Are other projects or programs dependent upon this project or program? What are the interdependencies? What is the impact if one of the projects is delayed, or does not proceed?
Delivery efficiency	
Delivery efficiency target	Has an overall capex efficiency target been set? If so, what is the %? Has it been applied to this project? If not, why not?
Documentation	
Is the document complete?	Are all documents final and signed? If not, is it appropriate? Do the documents clearly articulate the extent of planning for the project? Are there any errors or omissions in the documentation?

In addition to the individual assessment of project and programs, an overall assessment of Icon Water's proposed capital expenditure occurred focussing on:

1. The process used for developing the expenditure
2. The prioritisation process to select expenditure
3. The escalation of costs

4. The status and stage of development of projects and programs
5. Icon Water's ability to deliver the expenditure within the proposed timeframe, and
6. The governance process and evidence of compliance with this process.

4.2 Historic expenditure (2017-23)

4.2.1 Summary of findings

At the time of the 2018 Determination, the 2017-18 capital expenditure was yet to be finalised and deemed prudent and efficient based upon the forecast at the time. In order to complete the review of this expenditure the actual expenditure has now been assessed against the forecast from 2018. For both water and wastewater, the actual expenditure is lower than the forecast from 2018, $7.8 million and $10.1 million respectively. They are also below the determination allowance. Based upon the lower actual costs this is deemed as efficient.

Our ex-post review of Icon Water's expenditure in 2018-2023 resulted in very little adjustment to its expenditure to be rolled forward in the RAB.

Most notably, Icon Water experienced a significant overspend in Project Axle, which we recommend is allowed on the basis that Icon Water had limited experience in the design and delivery of large-scale ICT projects of this type and has demonstrated diligence in analysing its learnings and implementing systemic chance at Icon Water to prevent this type of overspend in the future. Learnings must occur somewhere and some allowance for this should be made, however, overspends of this type in the future are not expected based on Icon Water's demonstrated learnings and its commitment to systemising the changes.

We note Icon Water has proposed a similar project for 2023-2028 and we expect this to be carried out diligently and efficiently given its learnings from Project Axle.

Our findings and proposed adjustments are set out in Table 36 below.

Table 36: Ex-post review of Icon Water 20178-23 capital expenditure and proposed adjustments to the RAB, $million, $2022-23

Capital expenditure adjustment	2018-19	2019-20	2020-21	2021-22	2022-23	Total 2018-23
Icon Water actual/forecast	111.96	113.00	94.76	84.56	82.73	487.01
Adjustments						
LMWQCC High Voltage Asset Renewal	0.00	0.00	0.00	0.00	0.00	0.00
Water main renewals	0.00	0.00	0.00	0.00	0.00	0.00

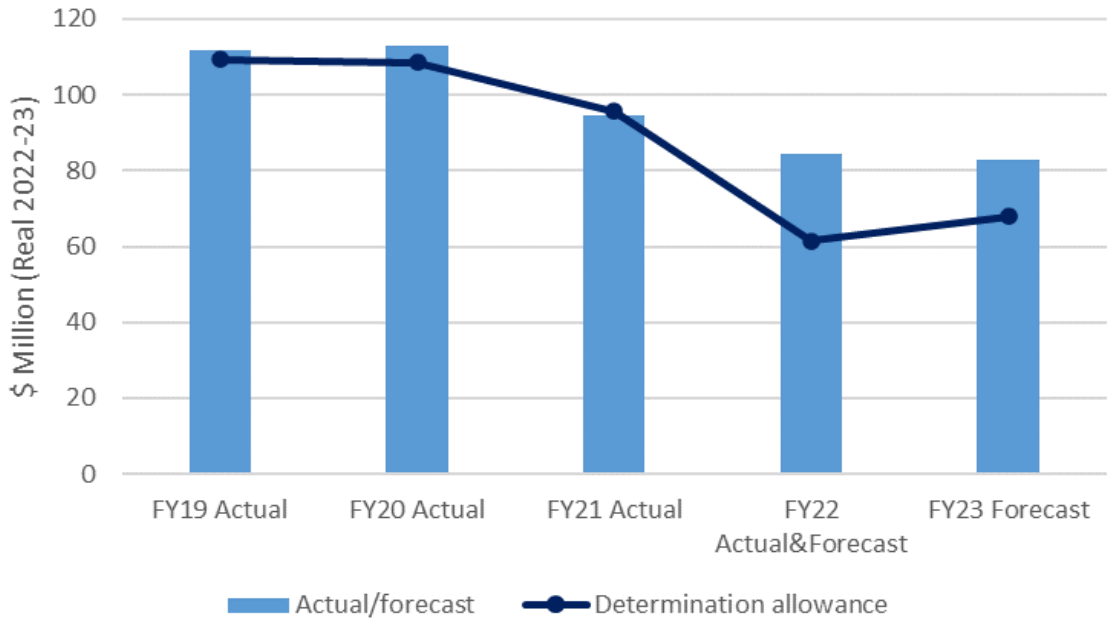
Capital expenditure adjustment	2018-19	2019-20	2020-21	2021-22	2022-23	Total 2018-23
(Hydraulic failures)						
LMWQCC Tertiary Filters and Disinfection System Upgrade	0.00	0.00	0.00	0.00	0.00	0.00
Minor Assets	0.94	0.00	0.00	0.00	0.00	0.94
AXLE-Asset Management and Maintenance Solution	6.63	0.00	0.00	0.00	0.00	6.63
Total of adjustment	7.57	0.00	0.00	0.00	0.00	*7.57*
Revised total	**104.39**	**113.00**	**94.76**	**84.56**	**82.73**	**479.4**

4.2.2 Overview

The capital expenditure for the 2018-2023 regulatory period (actuals for 2018-19 to 2021-22 and forecast for 2022-23), is forecast to be $487 million. This includes $187.8 million for water services and $299.2 million for wastewater services. This is in Real 2022-23 as provided in the Icon Water document (Updated 2018-23 5Y Reg Submission vs Current CAPEX variance - nominal to real expenditure). The nominal forecast expenditure for the 2018-2023 period is $459 million.

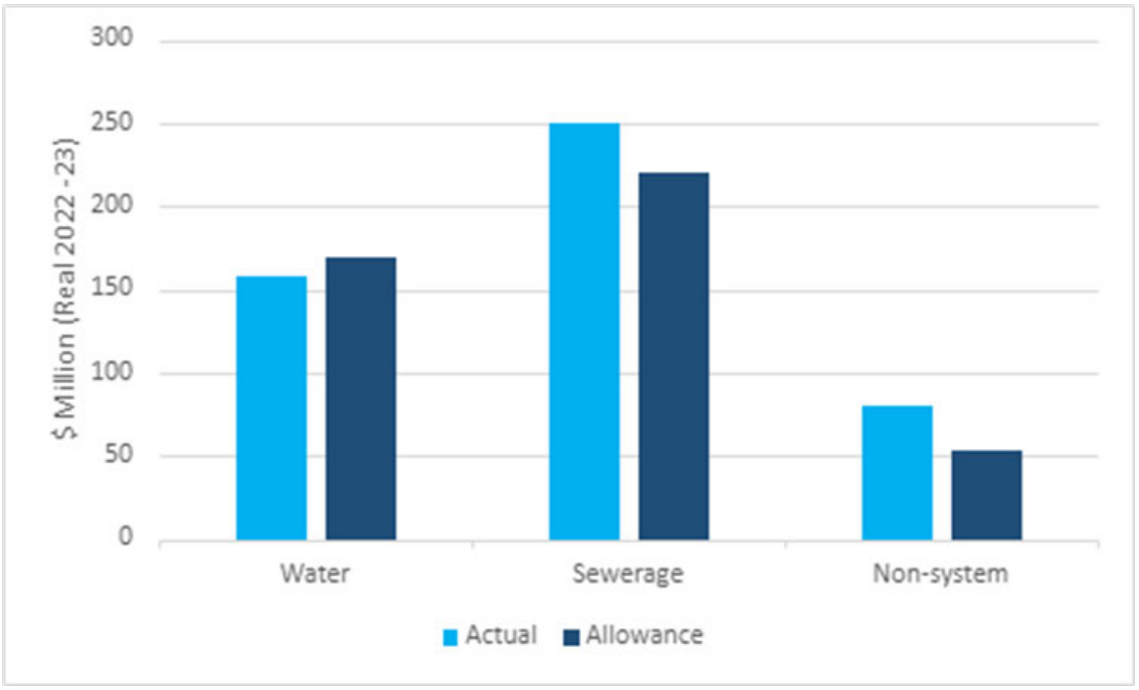
This forecast is $43.8 million (9.9 percent) above the allowance set by the Commission in the 2018 pricing determination.

Figure 15: Comparison of actual/forecast and determination 2018 -23, $million, $2022-23



The majority of this increased expenditure is in years 4 and 5 of the period. It should be noted that these are still forecast years and will need further assessment once final expenditure is available. The variance in expenditure was assessed by function (water, sewerage and non-system), set out in Figure 16.

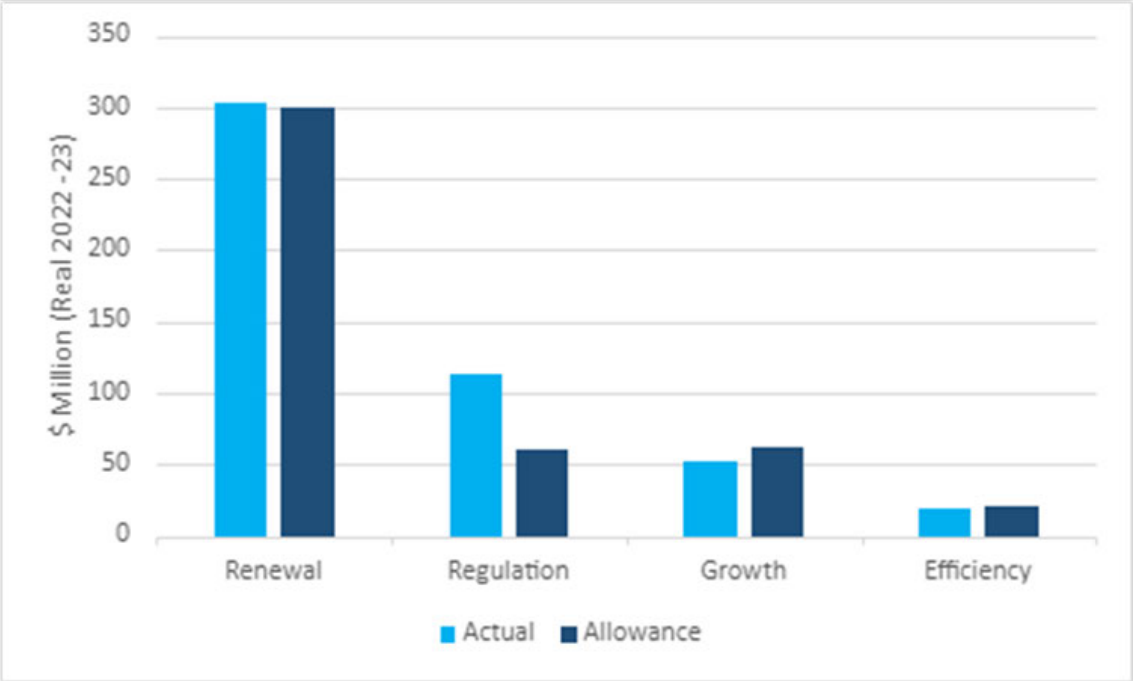
Figure 16: Comparison of actual/forecast and determination (2018 -23) by Asset Class ($million, $2022-23)



Icon Water is forecasting to spend $12 million less than the allowance in water, $30 million more sewerage and $26 million more for non-system (IT and corporate expenditure), respectively.

The variance in expenditure was also assessed by funding driver (renewal, regulation, growth, improve service and efficiency), as shown in Figure 17.

Figure 17: Comparison of actual/forecast and determination (2018-23) by funding driver ($million, 2022-23)



Icon Water is forecasting an increase of $4 million renewal expenditure than the 2018 allowance, and $53 million more on regulation. Icon Water is forecasting to spend $11 million less on growth and $2 million less on efficiency.

The variance by both asset class and driver is shown below in Table 37.

Table 37: 2018-23 capital expenditure variance by Asset Class and Driver, $2022-23

Expenditure class	Actual/ Forecast ($M)	Determination allowance ($M)	Variance($M)	Percentage variance (%)
Water	**157.3**	**169.1**	**-11.9**	**-8%**
Renewal	85.4	123.9	-38.5	-45%
Regulation	52.2	25.2	27.1	52%
Growth	13.9	7.7	6.2	44%
Efficiency	5.7	12.3	-6.6	-116%
Sewerage	**250.3**	**220.0**	**30.3**	**13%**
Renewal	152.4	132.0	20.4	13%
Regulation	51.1	31.1	20.0	39%
Growth	37.7	52.5	-14.8	-30%
Efficiency	9.0	4.4	4.7	52%
Non-system assets	**79.4**	**53.8**	**25.7**	**35%**

Expenditure class	Actual/ Forecast ($M)	Determination allowance ($M)	Variance($M)	Percentage variance (%)
Renewal	65.0	43.4	21.6	33%
Regulation	9.6	3.8	5.8	60%
Growth	-0.1	2.0	-2.2	163%
Efficiency	4.9	4.6	0.4	7%
Total	**487.0**	**442.9**	**44.1**	**10%**

From the breakdown above, expenditure in water renewal is $38.5 million lower than the determination due to the deferral of expenditure as part of re-prioritisation during the 2018-23 period. This expenditure will still need to be incurred and is now included in the 2023-28 capital expenditure proposal. Similarly, the underspend on Sewerage Growth will now be incurred in the 2023-28 period.

In total, $104 million of planned expenditure was deferred from the 2018-23 period and will be required to be spent at a future date. The key deferrals are provided in Table 38.

Table 38: Key projects with expenditure deferred beyond the 2018-23 period, $2022-23

Project Name	Project Title	Asset Category	Funding Driver	5-Year forecast (FY19-23) ($M)	5-Year Reg Submission (FY19-23) ($M)	5-Year Variance
($M)						
CX11063	North Canberra Sewer Augmentation	Sewerage	Growth	0.3	11.0	(10.8)
CX11060	Sewer Mains Renewal Program	Sewerage	Renewal	27.0	37.8	(10.7)
CX10846	Fyshwick SPS Augmentation	Sewerage	Growth	0.1	9.3	(9.2)
CX11020	Water Network EIMC	Water	Renewal	14.4	22.4	(7.9)
CX11064	Renewable Energy Program	Water	Efficiency	-	5.4	(5.4)

Project Name	Project Title	Asset Category	Funding Driver	5-Year forecast (FY19-23) ($M)	5-Year Reg Submission (FY19-23) ($M)	5-Year Variance
CX11187	Enterprise Warehouse and Analytics	Non-system assets	Renewal	-	5.3	(5.3)
CX10951	LMWQCC EIM&C Renewal 2018 to 2023	Sewerage	Renewal	-	4.3	(4.3)
CX11159	LMWQCC non potable water system upgrade	Sewerage	Regulation	0.1	4.4	(4.3)
CX11066	Sewerage System Ladders and steelwork Renewal	Sewerage	Renewal	0.8	4.3	(3.6)
CX10847	Constitution Ave Sewer Augmentation – WSCC	Sewerage	Growth	-	3.4	(3.4)

With the exception of CX11187 Enterprise Warehouse and Analytics, this deferred expenditure is included in the Icon Water 2023-28 capital proposal. Project CX11187 is now planned to be delivered as opex, as project OX11342 EDIP.

For the areas of increased spend, Non-System Asset is forecast to spend $25.7 million more than the determination allowance, an increase of 35 percent. For all asset categories, expenditure to meet the regulatory driver has increased, with a total variance of $53 million (88 percent).

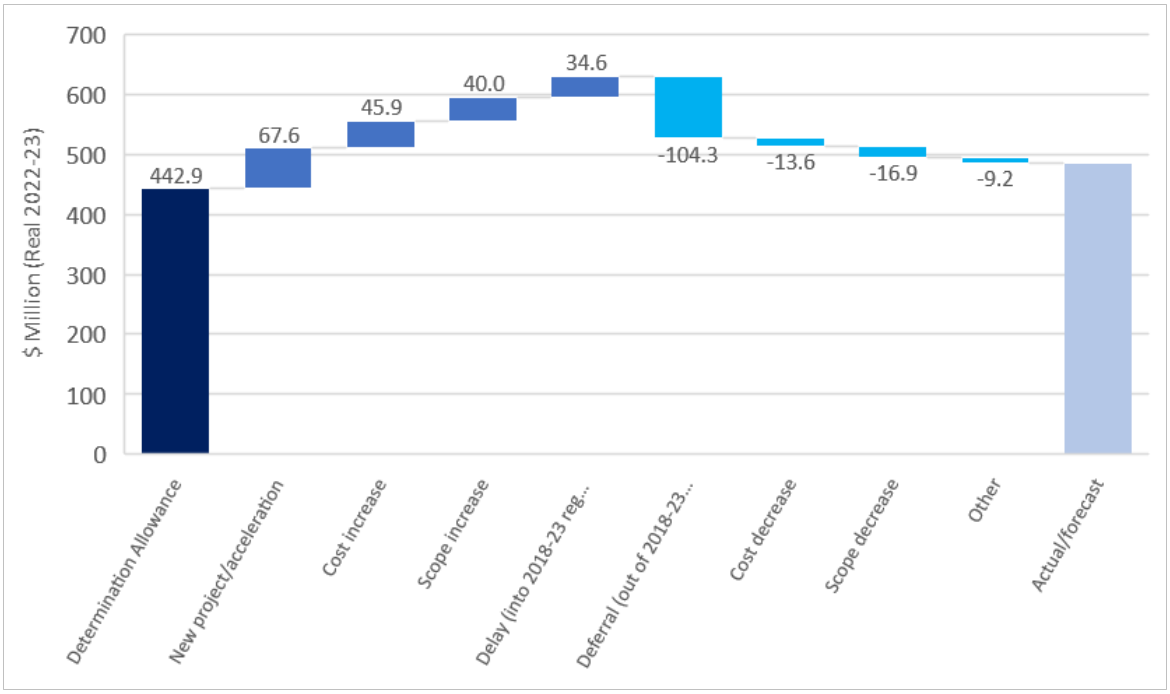
In Attachment 7 of its submission Icon Water explains the reasoning for the increase in expenditure:

1. The addition of unforeseen projects, including projects that were brought forward from the 2023-28 regulatory period. These were primarily projects on assets that were showing accelerated deterioration or prioritised ICT projects on which there are future dependencies
2. Increases in the scope of some projects during their development and implementation
3. Cost increase in some projects due to market conditions and limitations of early project estimates
4. Delays in the delivery of some projects that that were expected to occur prior to 2017–18

The increase in expenditure was partially offset by deferral of expenditure into the next regulatory period, and project scope and cost decreases.

Figure 18 shows the movement of these increases and offsets and the impact on overall expenditure.

Figure 18: Capital expenditure variance 2018-23 by driver



As these costs are increases from the expenditure approved as part of the 2018 Determination, they are required to be assessed to ensure they are assessed efficient, and in the case of new projects also if they are prudent.

We reviewed the 2018-23 overall capital expenditure and selected a sample of projects and programs, to assess whether:

- The bring forward of projects or program expenditure was prudent
- The increases in scope were to enable efficiencies as expenditure was incurred, due to misassumptions in early forecasts, or inefficient expenditure
- The market-based cost increases were reasonable, and
- The project delays were unavoidable.

Our assessment of the sample project/programs are listed in Table 39.

Table 39: 2018 -23 Projects and programs selected for ex-post review, $million, $2022-23

Project Ref.	Project/ program	Asset Category	5-Year Actual/forecast Total (FY19-23)	5-Year Reg Submission (FY19-23)	5-Year Reg Variance	Icon Water reason for Variance
CX10950-1	LMWQCC High Voltage Asset Renewal	Sewerage	44.4	22.5	21.9	Cost increase
CX11065	Water main renewals (Hydraulic failures)	Water	30.7	12.4	18.3	Scope increase
CX10534-2	LMWQCC Tertiary Filters and Disinfection System Upgrade	Sewerage	40.7	29.5	11.2	Scope increase
CX10888	Minor Assets	Water and Sewerage	10.3	0	10.3	New project/ acceleration
CX11026	AXLE-Asset Management and Maintenance Solution	IT	16.8	9.5	7.3	Cost increase

The review and assessment of these selected projects is documented below.

4.2.3 CX10950-1 LMWQCC High Voltage Asset Renewal

Project overview

The LMWQCC high voltage asset renewal was identified by Icon Water as a priority project based on the significant operational risk the system presented. The high voltage assets and system were originally constructed in the 1970's and prior to this project remained largely unchanged. The high voltage assets have been managed under a run to fail asset maintenance strategy. An assessment of the system identified a number of key issues including:

- A single point of failure associated with the configuration of the system
- The existing HV assets are approaching end of service life with notable deterioration, and
- The permanent backup generator is no longer fit for service and was disconnected in 2018. An interim solution was installed to maintain redundancy with associated operational costs.

Not having a sustainable high voltage solution in place could lead to disruption to treating wastewater, which could lead to significant impacts to the environment, public health, and related reputational damage. Ensuring the operational sustainability of the plant is essential to maintain licencing and compliance.

Documents reviewed

- Icon Water presentation 2023-28 Water & Wastewater Price Proposal CX10950-1 LMWQCC High Voltage Asset Renewal, July 2022
- Board Decision – Meeting 269, 16 Dec 2020, Item 11.
- Project Execution Stage Proposal - CX10950-1 LMWQCC High Voltage Asset Renewal
- RFI response C130 – explanation of variance and tabulated summary of budgets

Project status/variance

The determination allowance and expenditure are set out in Table 40.

Table 40: Determination allowance for CX10950-1 LMWQCC High Voltage Asset Renewal $million, $2022-23

Program Ref.	Program name	2018-19	2019-20	2020-21	2021-22	2022-23 (Forecast)	Total 2018-23
CX10950-1		1.85	4.40	5.60	5.71	4.99	22.55
Actual delivery - CX10950-1		2.59	2.97	6.47	19.73	12.68	44.44
Variance		**0.74**	**(1.43)**	**0.86**	**14.01**	**7.69**	**21.89**

Reviewing the documentation provided and information presented in the face-to-face interviews, the key drivers for the above variation to the pricing submission are summarised in Table 41, as provided by Icon Water.

Table 41: CX10950-1 LMWQCC High Voltage Asset Renewal variance from 2018-23 pricing submission $million, $2022-23

Date	Item	Total Project FY19-23 (FY22/23 basis)	Variance to reg-submission Budget (FY22/23 basis)	Notes
[redacted]	[redacted]	[redacted]	-	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Date	Item	Total Project FY19-23 (FY22/23 basis)	Variance to reg-submission Budget (FY22/23 basis)	Notes
[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]

Note: The above information has been provided by ICON Water. It is noted that there remains a discrepancy to the figures presented in the 2023-28 Water & Wastewater Price Proposal. In the assessment of the project, the figures provided in the above table have been used.

Driving the variation to the original submission are the following factors:

- The combination of two projects CX10950-1 and CX10950-2 which led to additional scope being added to the original project to include the refurbishment of the on-site backup generator
- Further investigation into the viability of the refurbishment of the existing backup generator identified that it was not feasible to pursue this course of action leading to additional scope to provide a new backup generator resulting in a variation of [redacted]
- The original estimates for the work were found to be inadequate on the basis of pricing received through a competitive tendering process leading to an additional [redacted] in the project budget.

The key increases in cost as outlined in the Execution Stage Proposal[30] to the estimate were:

- Trenching, pits, conduits and cabling - [redacted] – low estimate
- Civil, structural and mechanical - [redacted] – estimate
- Site acceptance testing and SCADA integration - [redacted] – brought about by a complex integration program
- Additional Overhead - [redacted] – longer than expected project duration
- Costs associated with a new connection to Evoenery (amount undisclosed)
- Additional internal overheads for project management, internal stakeholders and design - [redacted]

- The delay to the delivery of the program led to a less than expected spend in the FY 18-23 pricing period of approximately [redacted].

Efficiency

A review of the approach to the delivery of the project has highlighted an issue with the accuracy of the estimates used to evaluate the project at the earlier stages in the planning cycle. This is demonstrated by the significant variance in pricing from the estimate when a competitive tender process was undertaken with the market.

The competitive pricing for the work defined by the project confirms the cost for the project is reasonable.

Summary and Recommendation

The LMWQCC high voltage asset renewal project on review is considered prudent given the age of the asset and the organisational risks associated with reliability and exposure to potential environmental and public health risks.

The project encountered significant increases in cost for the final delivery. This has highlighted the concerns with respect to Icon Water's current approach to scope definition and cost estimates for projects. The current final cost forecast variance between the endorsed Project Development Stage proposal and the Execution Stage Proposal is >45%, which is outside Icon Water's guideline of +/- 10%.

4.2.4 CX11065 Water main renewals (Hydraulic failures)

Project overview

The CX11065 Water Main renewals (Hydraulic Failures) project is part of an ongoing program to manage the performance of the water main network, specifically with the focus of allocating capital expenditure to identified underperforming parts of the network. Icon Water's water network consists of over 3,300 kms of pipeline varying in pipe sizes and lengths, including major trunk mains that move bulk water for distribution to customers through the reticulation network.

[30] Project Execution Stage Proposal - CX10950-1 LMWQCC High Voltage Asset Renewal

The network itself has been established over an extended period to cater for the initial establishment of the city as well as growth. As a result, there are a number of characteristics of the network that vary due to different construction methods and materials used. Pipelines laid before 1930 can be characterised by the fact they were unlined, that is they do not have an internal cement liner that was typically included in pipelines post 1930. This feature leads to a pipe condition called Tuberculation, the development of mounds of rust on the inside of the pipe which increases the roughness and constricts the diameter and effectiveness of the pipe to transfer water. This in turn can have an effect on a pipelines ability to meet the hydraulic capacity required to be delivered by Icon Water to hydrants for use by the ACT Fire and Rescue in the management of this service. Problematic mains are identified using hydraulic modelling and testing which leads to targeted replacement of underperforming pipelines.

Performance of the network is also assessed through the analysis of data on water main bursts and leaks failures. Impacts on customer service are also recorded including number of service interruptions and the time taken to return the water supply to service. To address these failures, Icon Water has developed policies that enable the targeted replacement of underperforming water mains based on the material type, and experienced failures.

As described in the interviews and subsequent information provided through the RFI process, CX11065 Water Main renewals (Hydraulic Failures) has been altered since the 2018-23 pricing submission to include CX11062 water main renewal – structural failures into one program under CX11065.

Documents reviewed

- Icon Water presentation 2023-28 Water & Wastewater Price Proposal CX11065 Water Main renewals (Hydraulic Failures), July 2022
- Project Development Stage Proposal - CX11065 Water Main renewals (Hydraulic Failures)
- Execution Stage Report - CX11065 Water Main renewals
- Deed of Agreement - Water Supply for Firefighting Purposes, 19 Dec 2018
- Utilities Technical Regulation Annual compliance report, 2017-18

Project status/variance

The determination allowed $12.4 million (real $2022) for CX11065 Water Main renewals (Hydraulic Failures). The determination allowed $11.1 million (real $2022) for CX11062 Water main renewals (Structural failures).

A comparison of the 2018-23 allowance for these programs and the actual delivery is shown in Table 42.

Table 42: Determination allowance for Water main renewal programs 2018- 23, $million, $2022-23

Program Ref.	Program name	2018-19	2019-20	2020-21	2021-22	2022-23	Total 2018-23
CX11062	Water main renewal (Structural Failures)	2.29	2.32	2.35	2.37	2.39	11.72
CX11065	Water main renewal (Hydraulic Failures)	2.58	2.54	2.50	2.41	2.34	12.38
Total of determination allowance under the revised CX11065		4.87	4.86	4.86	4.78	4.73	24.10
Actual delivery - CX11065		6.22	16.00	8.46	-0.03	0.00	30.65
Variance		1.35	11.14	3.61	-4.81	-4.73	6.55

Driving the variation is the following factors:

- An increase in the scope of work driven by hydraulic failures resulting in an approval to increase the program from 16 to 23 kms of renewal. Approved in the Project Development Stage proposal[31].
- Higher than estimated costs to deliver the program driven by a change in ratio of delivery methods, i.e., the ratio of the use of different replacement methods between pipe bursting, directional drilling and open trenching.
- Acceleration of the program in order to realise efficiencies to offset the additional costs of the program.

The drivers for the program were to improve hydraulic performance to comply with minimum firefighting flows (including the additional 7 kms of main replaced) and the replacement of underperforming mains to meet customer service standards. Information provided as part of the RFI process provides evidence of the impact of the program on watermain failures which reduced from 477 in 2018-19 to 338 in 2021-22, equivalent to a 29% reduction. The program is deemed prudent based on the demonstrable reduction in watermain failures and decreased risk of hydraulic fire flow non-conformance.

Efficiency

The combination of the programs occurred as a result of a change of scope and the potential to deliver the program more effectively. The summary of the Execution Stage Report and explanations for variations is presented in Table 43.

Table 43: Variations to Water Main Renewal Programs, based on Icon Water Approvals ($ Nominal as supplied by Icon Water)

Item	Additional Cost $million	Reason
PS 2018-23 Submissions		

[31] PDSP – CX11065 Water Mains Renewal Program

Item	Additional Cost $million	Reason
CX11062	11.1	($ - 2018)
CX11065	11.7	
Combined value	*22.8*	
Development Stage Proposal	7.4	Additional scope including 7 kms of water main to satisfy the minimum firefighting flow requirements under the Water Supply and Sewerage Service Standards Code December 2000.
Higher than expected delivery costs	2.2	The execution stage report (ESR 1) identified a key change in the expected delivery costs associated with the external contractors. Caused by a change in ratio of pipe bursting to open trench (more expensive), and based on real cost experience, it was forecast that the contract costs would increase by 40%. The final forecast for the remaining work assumed a 30%.
Adoption of more aggressive delivery	-2.3	Savings realised in overheads including Project Management, Engineering and site Supervision, stakeholder involvement and contingency
ESR Total	30.0	($ - 2020)

Note: Numbers are as reported with no adjustments to current value

A review of the provided documentation highlighted that the delivery of the program encountered unexpected additional costs associated with the execution of the works. Namely, site conditions impacted the selection of appropriate renewal technologies which led to a difference in the ratio of the use of trenchless technologies and open cut construction and additional costs.

Icon Water altered the delivery approach of the program to offset the additional construction costs. This led to an acceleration of the original program from five years to three, enabling administrative and overhead savings. This decision enabled the program to be delivered within the budget set at the Execute Stage Proposal.

Summary and recommendation

The project is deemed prudent.

The combination of CX11062 and CX11065 at the execution stage was reasonable given the similarity of management and delivery activities and demonstrated efficiencies. The decision to accelerate the program in response to higher construction costs leading to savings in overheads was appropriate.

We therefore deem the expenditure efficient and make no recommendation for adjustment.

4.2.5 CX10534-2 LMWQCC Tertiary Filters and Disinfection System Upgrade

Project Overview

The LWWQCC Tertiary Filters and Disinfection System upgrade is a project that was conceived to bring the existing treatment capability to an acceptable level including improving the reliability of the tertiary filter operation through the upgrade and renewal of the existing filters. It was also designed to improve the operability and maintainability of the secondary and tertiary treatment processes at Lower Molonglo.

In addition to the above process and asset improvement, there were a number of elements identified that were needed to meet regulatory requirements. These included improving the monitoring and control of treatment processes, resolving risks associated with operating and maintaining the plant and the inclusion of additional bypass controls and chemical dosing to meet licence conditions during high low events and varying inflow conditions.

Documents reviewed

- Icon Water presentation 2023-28 Water & Wastewater Price Proposal CX10534 LMWQCC Tertiary Filter and Disinfection System Upgrade, July 2022
- Engineering Project Execution Stage Proposal – CX10534.2 Tertiary Filters Refurbishment Project.

Project status/variance

The budget submitted for the 2018-23 determination was $28.6 million based on the Development Stage Proposal. A number of variations and additional scope occurred after the determination resulting in a final estimate of $41.5 million in May 2018 ($2018).

Icon Water advised the key reasons for the cost increase were:

- Transfer of scope from the below projects due to efficiency in delivering under the same project
  - CX10978 – repair of leaking roof and walkways to filter building
  - CX10827 – Filter building analyser room renewal works
- Increase in scope
  - Secondary clarifier – installation of automated penstocks
  - Tertiary filters – concrete remediation complexity

The Evaluate Stage Proposal outlined the detail for the changes in scope and explanations. A summary of the changes and associated costs are provided in Table 44.

Table 44: LMWQCC Tertiary Filters and Disinfection System Upgrade. Summary of Variations to Scope from Development State to Execution Stage ($ Nominal as supplied by Icon Water)

Program Ref.	Date	Total Project Forecast $ million	Variation $ million	Reason
Development Stage Proposal	5 Sept 2016	[redacted]	[redacted]	[redacted]
PCR001	9 March 2017	[redacted]	[redacted]	[redacted]
PCR002	29 Sept 2017	[redacted]	[redacted]	[redacted]
PCR003	29 Oct 17	[redacted]	[redacted]	[redacted]
Execution Stage Proposal	17 May 2018		[redacted]	[redacted]
			[redacted]	[redacted]
			[redacted]	[redacted]
			[redacted]	[redacted]
			[redacted]	[redacted]
			[redacted]	[redacted]
			[redacted]	[redacted]
			[redacted]	[redacted]
		[redacted]	[redacted]	[redacted]

The additional scope and costs identified in the table above were verified by an independent estimator.

Efficiency

Since the Execution Stage Proposal approval for the delivery of the LMWQCC Tertiary Filters and Disinfection Upgrade, the project cost to complete has been subject to a number of revisions. Additional information was provided in interviews and RFI responses that explain the variance as below:

- Scope increase – additional works required for the overflow penstocks, filter building renewals and concrete repairs to filler structures, and
- Market conditions and project delays.

Table 45: LMWQCC Tertiary Filters and Disinfection System Upgrade Summary of Variations from Execution Stage to Total Outturn Cost (TOC) ($ Nominal as supplied by Icon Water)

Item	Additional Cost $ million	Reason
Execution Stage Proposal	41.5	
Structural Reinforcement	1.1	A structural assessment of the tertiary filter and disinfection building structure was undertaken. This review determined issues with the structural reinforcement that required immediate changes to improve the structural stability and durability. The change was part of PCR 04.
Air Compressors	0.2	The DAF air compressors that had reached end of life were originally intended to be replaced by Icon Water maintenance, however by merging this scope with the tertiary filters upgrade a "system approach" could be taken as well as efficiency of delivery realised. Increasing the compressed air storage system capacity would allow more efficient operation of the filters and increase the overall filter capacity. Approved as part of PCR 04.
Corrosion Repairs	0.1	Within the tertiary filter 3, it was identified that corrosion within the backwash water, backwash air and non-potable water pipelines supplying all 4 filters required repair or replacement to increase the life of the filter system. Approved as part of PCR04.
Lighting	0.1	The requirement for additional lighting and repairs to existing lighting at the top of filters was identified during the safety in design review process. Better lighting was required to enable safe inspections of the filters to be undertaken. Approved as part of PCR05.
Electrical	0.1	During commissioning of Filter 3, it was identified that the existing Inlet Penstock Actuator and Drain Penstock Actuator for filter 3 could not be commissioned due to electronic malfunction. To achieve maintainable actuator operation all the existing actuators would need to be removed,

Item	Additional Cost $ million	Reason
		new electrical cabling and trays and new actuators installed. Approved as part of PCR05.
Market Pricing – complexity of concrete repair	0.4	Additional concrete repair complexity to tertiary filter structures was identified during the design development, specifically relating to the time and cost challenges of undertaking the works with the other filters online. These challenges relate to the specialist concrete repair works that were not adequately identified during previous estimate preparation.
Delays - Covid	0.3	Delays were experienced due to process issues with the plant and high sludge inventory, as well as existing mechanical pump failures requiring maintenance teams to replace pumps. The cost of these delays resulted in an increase of $0.3m as part of PCR05.
Delays	0.6	The delays were a result of process constraints from existing pump failure at the bypass dam, the bypass storage levels preventing filter shutdowns and issues with other parts of the plant as well as Covid lockdowns preventing key interstate subcontractors from returning to the ACT. Approved as part of PCR07.
TOC Jun 22	44.2	

This represents a significant change in scope and cost to deliver the project.

On review of the Evaluate Stage Proposal, a number of elements were not accounted for in the initial stages of the project, namely the likely works required to integrate with existing assets, additional elements to reduce safety risks associated with operations and additional remedial works required to existing assets.

Included in the project changes were costs associated with delays caused by COVID-19 and the complexity of performing and coordinating upgrade works on operational assets.

The project was delivered under the Icon Water/Downer Program Alliance Agreement (PAA). The PAA was established by Icon Water as a delivery vehicle designed to provide an uplift in capital delivery capability. Specifically, it enables Icon Water to work in conjunction with Downer to scope projects, manage risk, improve certainty of project outcomes and delivery timeframes. Performance is based on the development of the Total Outturn Costs (TOC) budget and the final cost for delivery. The Alliance is incentivised the improve the cost and time performance of the project through an

agreed pain share/gain share agreement, determined at the completion of the capital works. The alliance model was chosen for the delivery of the project due to the expected variable nature of delivery caused by working on an operational asset and the complexities of integration activities.

The project forms part of a wider program at the site and was expected to enable delivery efficiencies associated with the effective use of resources across a broad program of works. The TOC was verified by an independent estimator and agreed to by both parties before the works commenced. The TOC includes the direct costs for the capital works as well as an [redacted] fee paid to Downer.

The PPA has incentives for driving efficiency through a 50% pain/gain share arrangement which is payable on the difference in total outturn cost of the project against the original estimate. At the time of writing, it is understood, based on the most recent performance reporting, that the project is forecast to be delivered at $1.8 million ($2022) under the TOC budget, as a result of efficiencies delivered during construction.

Summary and recommendation

The LWMQCC Tertiary Filter and Disinfection System Upgrade has been assessed as prudent based on the regulatory requirement to improve monitoring, control of the plant and its capacity meet licence conditions during high low events and varying inflow conditions.

Despite the increase in project spend, we consider the total project cost efficient: the project delivered additional scope than that considered in early estimates and delivered a $1.8 million efficiency from an independently verified cost estimate.

6.5% of the overspend is also attributable to minor variations in scope and delays caused by COVID.

However, it is recommended that a review of Icon Water's effectiveness of scope definition and estimates be undertaken at the Development Stage Proposal gate to identify opportunities to improve project estimates and forecast accuracies and in turn the effectiveness of capital investment decisions.

4.2.6 CX10888 Minor Assets

Project overview

CX10888 Minor Assets is a program line to capture capital expenditure related to minor projects (referred to as Minor Assets) which are <$100,000 in total project cost and are usually unplanned works.

The majority of the expenditure related to:

- Plant, machinery and equipment – primarily purchased as one-off and predominantly unplanned expenditure, and
- Computer equipment – primarily purchased through ActewAGL under the Corporate Services Agreement (CSA)

Documents reviewed

- Icon Water presentation 2023-28 Water & Wastewater Price Proposal Minor Assets (CX10888), July 2022.
- Icon Water memo in response to response to RFI C070 2018 -23 Expenditure

Project status/variance

CX10888 Minor Assets had actual expenditure for 2018-23 of $10.3 million but was not included in the 2018-23 determination allowance.

Further investigation has identified CX10888 is one of a number of minor asset program lines with expenditure. Also allocated expenditure is:

- CX11076 Sewerage Unplanned Minor Capex
- CX11077 Water Unplanned Minor Capex
- CX11085 Sewerage Minor Augmentation
- CX11205 Water Emergency Capex
- CX11206 Sewerage Emergency Capex

The 2018-23 determination allowances for these programs are shown in Table 46 below.

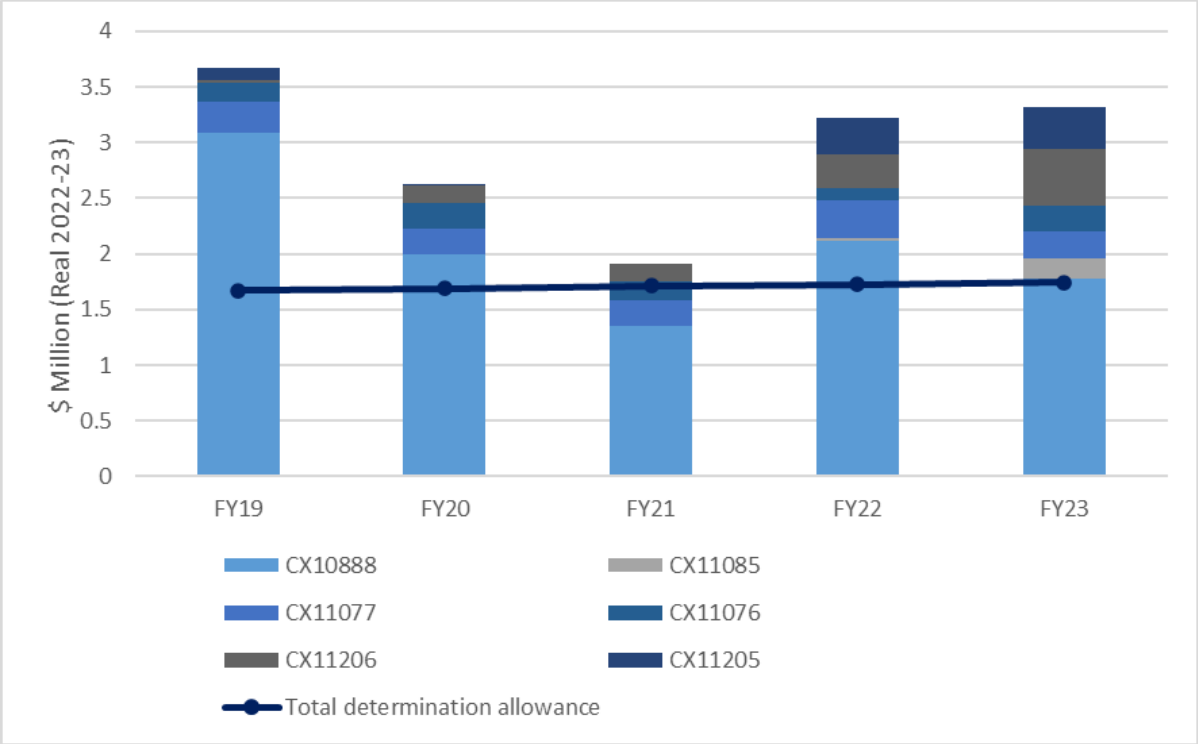
Table 46: Determination allowance minor asset programs 2018-23 $million, $2021-22

Program Ref.	Program name	FY19	FY20	FY21	FY22	FY23	Total 2018-23
CX11076	Sewerage Unplanned Minor Capex	0.26	0.27	0.27	0.27	0.27	1.34
CX11077	Water Unplanned Minor Capex	0.26	0.27	0.27	0.27	0.27	1.34
CX11085	Sewerage Minor Augmentation					0.20	0.20
CX11205	Water Emergency Capex	0.57	0.58	0.59	0.59	0.60	2.93
CX11206	Sewerage Emergency Capex	0.57	0.57	0.59	0.59	0.60	2.93
Total determination allowance		**1.67**	**1.69**	**1.72**	**1.73**	**1.740**	**8.55**

Icon Water advised that due to administrative and process issues the actual expenditure for each program line is not always allocated to the correct program, making it difficult to assess each program individually. For this reason, we have assessed the expenditure across the combined programs.

The total determination allowance compared to the actual expenditure for minor assets programs is shown below.

Figure 18: Actual/forecast minor asset expenditure in comparison the determination 2018-23



The majority of the actual/forecast capital expenditure is for CX10888 Minor Assets.

$10.3 million of a total $14.7 million across the period has been attributed to CX10888 Minor Assets. This is compared with a total determination allowance across the minor asset programs of $8.5 million.

Efficiency

During the expenditure review process, Icon Water advised $10.3 million of expenditure for CX10888 was the reallocation of other program lines, and not in addition to what was originally presented for determination.

The reallocations and variations against programs are set out in Table 47 below.

Table 47: Table set program variances 2018–23, $million, $2022-23

Program Ref.	Program name	FY19-23 Regulatory Submission	FY19-23 Actual & Forecast Spend	Variance
CX11077	Water Unplanned Minor Capex	1.34	1.311	0.031
CX11085	Sewerage Minor Augmentation	0.20	0.21	0.01
CX11205	Water Emergency Capex	2.93	0.83	(2.10)
CX11206	Sewerage Emergency Capex	2.93	1.12	(1.81)
CX10888	Minor Assets		10.33	10.33
Total		8.55	14.75	6.00

As shown above, the variance in total minor asset expenditure is $6 million across the various programs.

Icon Water provided subsequent information to explain the $6 million variance, including:

- Duplication of expenditure
- Response to bush fire
- IT equipment to support remote working (COVID19 response)
- Safety equipment
- Security improvements
- Sewer network monitoring, and
- Monitoring eMission Possible strategy

Full details and the costs of these items is set out in Table 48.

Table 48: Icon Water reasoning of minor asset capital expenditure variance

Category	Variance ($Million, $2022-23) 2018- 23	Reasoning
Duplication of transactions	0.94	The figures included in the capital investment plan for 2018 –2023 erroneously included ~$850k ($935k in $22/23 dollars) as both the transactions capitalised and allocated to the Capital in progress (CIP) account were included for 2018-19. This has the impact of overstating minor assets for 2018-19.
Fires in catchment	0.16	Bushfires in the Cotter catchment in the 2019-20 bushfire season led to increased monitoring and water quality management after the fires. This included the installation of additional instrumentation as well as silt curtains to minimise the water quality impacts from the runoff.
Increase in remote working and IT deployment	0.40	The Covid-19 pandemic and mandatory lockdown health directions, required the business to transition immediately towards remote work capability thereby increasing the deployment of laptops, virtual meeting room technology improvements, and other small computing peripherals. This was compounded with supply chain shortages which meant that some orders placed in 2020-21 were not filled (and therefore capitalised) until 2021-22
Improved tools and equipment (particularly safety)	0.40	As part of our safety strategy and business response to engagement surveys, there has been a focus on ensuring that staff members have access to the “materials and equipment they need to do the job right”. This has included additional purchases of safe lifting equipment.
Security improvements	0.44	There has been an increase in physical security (fences, gates and CCTV) at a number of sites in response to known security incidents, or risk assessments and reviews.
Gauging	0.18	To facilitate closer monitoring and operations of the sewer network we have installed additional gauges in several areas. This has been to improve the management of wet-weather events. Since 2020, there have been several high-intensity rainfall events associated with extended La Nina and negative IOD.
Net-Zero eMission Possible	~ 0.20	Some expenditure for monitoring and capture equipment was incurred for the eMission Possible strategy as part of planning transition to net zero emissions consistent with ACT Government policy announced in 2020.
Total	$2.7M	

This information explains $2.7 million out of a $6 million variance, with no further explanation provided for the remining $3.3 million variance.

Excluding the $935,000 of duplicated expenditure identified by Icon Water, the rest of the $2.7 million variance is due to unforeseen events like bushfire or COVID19 response or would have been reasonably incurred by Icon Water (for example, the purchase of equipment and investment in security).

Icon Water was unable to explain the balance of the $3.3 million overspend over the course of our review.

Icon Water acknowledged improvements are required to the financial governance processes around these programs and since the previous proposal have applied a greater scrutiny of purchases to ensure that the correct accounting policy is applied. Many of the items capitalised under this CX10888, may not have been budgeted for as capital but subsequently capitalised.

In acknowledging this issue, Icon Water has changed its approach to forecasting minor asset expenditure for the 2023-28 period. It intends to manage its forecast minor asset expenditure in the following ways:

- Identification of separate project codes for maintenance – to allow for plant and equipment captured under CX10888 to be automatically capitalised through the works and asset management system
- Inclusion of a separate line item for minor non-system assets, which was not included in the 2018–2023 submission
- ICT allocation has been expanded to cover all of the years of the period where the previous allocation only covered part of the period
- Improvement to forecasting and management of minor asset capital expenditure to improved forecasting, including training of managers and team leaders in accounting policies.

Icon Water's updated approach to forecasting minor asset expenditure results in the below 2023-28 forecast, across a range of programs, including the missing line items from the 2018-23 forecast that partly resulted in the variance discussed above.

Table 49: Icon Water minor asset programs forecast 2023-28, $million, $2022-23

Program Ref.	Program name	Asset category	Proposed capital expenditure (2023-28)
CX11314	Sewer unplanned minor projects	Sewer	1.27
CX11315	Water unplanned minor projects	Water	1.27
CX11318	Minor Assets	Non-system assets	2.48
CX11347	Maintenance delivered capex -sewer	Sewer	8.91

Program Ref.	Program name	Asset category	Proposed capital expenditure (2023-28)
CX11348	Maintenance delivered capex -water	Water	4.07
CX11350	Minor Capex – IT	Non-system assets	1.27
CX11356	Capital ICT Replacement	Non-system assets	2.49
Total			**21.79**

Summary and Recommendation

It is recommended that the $0.94 million of duplicated expenditure identified by Icon Water be disallowed and excluded from the RAB roll forward.

4.2.7 CX11026 AXLE-Asset Management and Maintenance Solution

Project Overview

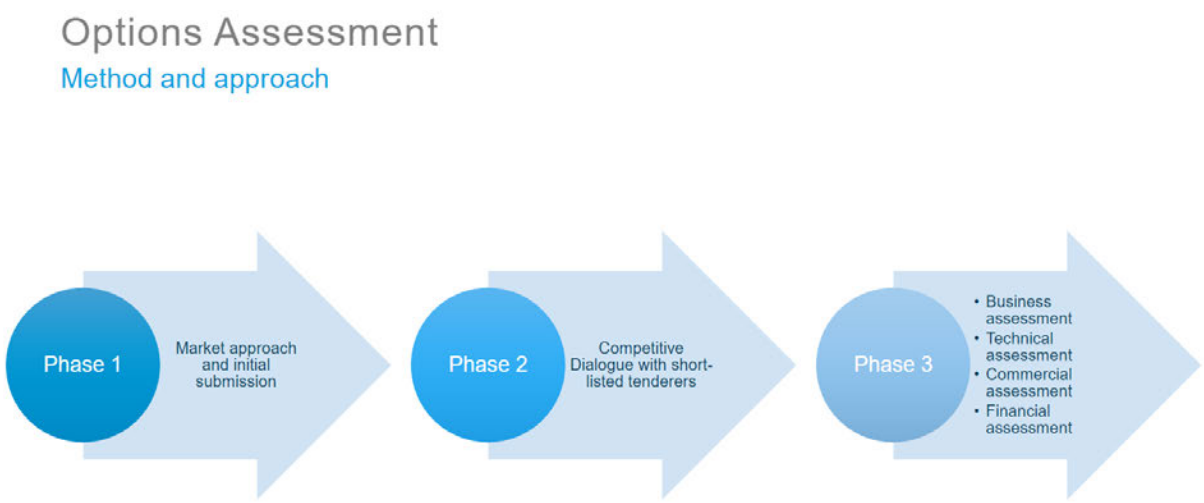
CX11026 AXLE-Asset Management and Maintenance Solution was a project designed to upgrade Icon Water's asset management and maintenance ICT solution that provides works management (planning and scheduling of planned and reactive work) and asset management (storing asset information and maintenance history) 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 approached the market for a commercial, off-the shelf solution in early 2016.

The options assessment approach is set out in below, showing a reasonable approach to assessing this type of technology for implementation.

Figure 19: Icon Water's options assessment approach for CX11026 AXLE-Asset Management and Maintenance Solution



After the options assessment process, 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 governed by a Steering Committee and had Board, Risk and Assurance Committee and Executive Committee – Business Transformation Program oversight.

Documents reviewed

- 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

Project status/variance

The project was closed in June 2019 following deployment to the Icon Water business, at a final cost of $35 million. Remaining incomplete scope items were transferred to a separate project, Hypercare, for close out.

This project spanned two regulatory periods and the approved spend for the 2018-23 regulatory period was $9.5 million. In its submission, Icon Water advised it had spent $16.8 million in the regulatory period, an additional $7.3 million against the allowance.

Icon Water advised it encountered numerous issues on this project ranging from:

- A lack of previous experience in designing and delivering large scale ICT projects of this nature within Icon Water, and passed learnings to inform this project
- Project delays including extended contract negotiation and resourcing delays throughout the life of the project, and
- Being the first organisation to deploy Oracle Works and Asset Management version 2 worldwide (meaning the integration expertise Icon Water thought it would be able to source from other organisations was not available when needed).

Icon Water's project closure report indicates these issues compromised the configuration of the Oracle product and resulted in an unsuccessful deployment of the solution to the business in January 2018.

At this point, changes to project management were made, the extent of the issues the project had faced were analysed and the project underwent a reset. The project recommenced with a targeted outcome of deploying a working system to Treatment Plant Operations as a second release by August 2018. This deployment was successful. During the second release phase, a new Project Director was appointment as well as a 'Scrum Master'. The overall governance structure of the project was redesigned with Project Axle extracted from the Business Transformation Program, reporting directly into the Managing Director in his role as Executive Project Sponsor.

According to Icon Water, the objectives of the Project Director during the initial recommencement of the project was to:

- achieve a successful release of a working product to Treatment Plant Operations
- establish and deliver the roadmap for the remain functions

- build project team momentum and restore a sense of optimism and engagement
- improve project productivity and delivery cadence
- address the outstanding items in the Corrective Action Master Plan
- ensure project reporting transparency, and
- renew faith in project governance

On 12 August 2018, Icon Water successfully deployed Oracle Works and Asset Management Version 2 to the Treatment Plant Operations teams at Lower Molonglo Water Quality Control Centre and the Stromlo Water Treatment Plant. In doing so, Icon Water became the first organisation worldwide to deploy and go live with this solution.

This solution provided additional functionality to the Treatment Plant Operations team that the previous solution did not, resulting in improved and standardised work practices and the capture of operation data for analysis. This led to more informed decision-making in relation to work management and resource allocation.

This gave the project management team the confidence that the solution could provide the foundations to replace the WASP and Water Works systems it was originally intended to replace, and they proceeded with rolling out the final releases of the solution (2.1 to 4.4).

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"[32] within the project lifespan.

Some 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)').

The project was officially closed in June 2019 at a final cost of $35 million, against an original Icon Water budget of $29.96 million.

The project closure report details the following significant learnings from Project Axle:

- Allow sufficient time for contract negotiations before on-boarding resources and incurring costs
- Establish a project delivery team that is incentivised to deliver outcomes, especially where quality aspects are critical
- Icon Water did not have the capacity or capability to internally deliver this project and used a delivery methodology that was inappropriate for this project and inherent culture and expertise (Agile). Projects of this nature have a much higher chance of success if delivered through a Systems Integrator
- The project did not document the current state operating model, therefore it had no means to assess the current issues, risks and constraints of the business and how they would be addressed by the solution and linked to the requirements specification. This would also have demonstrated the level of

[32] Project Axle closure report, Icon Water, 9 July 2019, p. 2

change needed across the business

- Establish clear and measurable strategic themes and objectives and build a cascading set of requirements from those objectives
- Ensure requirements are developed and maintained via a robust and transparent mechanism, and conform to best practice
- Plan changes around changes to the operating model and not just the technology components, consider the impacts these changes will have on people and the culture of the organisation
- Establish clarity on what change management activities are required to manage changes to the operating model
- Ensure changes to requirements undergo adequate change management process and sign-off
- Ensure planned approaches and decisions are followed up
- Ensure sufficient subject matter expertise is available to inform decision making at all levels of the project and into the Steering Committee
- Define reporting granularity upfront and ensure compliance
- Incentivise resources based on desired outcomes and consider warranty options from implementation resources and reflect that contractually
- Establish and execute quality management plans and seek independent technical assurance
- Establish a Steering Committee with sufficient level of expertise and experience (supplemented with external members if required).
- Establish clear delivery accountability at the Executive Level. This project would have benefited from having an independent governance partner with experience in implementing enterprise systems (KPMG, PWC, Deloitte) on the Steering Committee to challenge decisions and complete regular audits
- Implement subject matter working groups to support the Steering Committee
- Strengthen the level of tangible evidence on project progress that is presented to inform decision making, especially on go-live decisions and change requests
- Adhere to the project control framework established at project initiation
- Business owners are disconnected from the benefits of the project. Develop and implement a benefits realisation framework to guide complex programs and projects to ensure relevant capabilities are delivered and benefits can be measured. Have these benefits agreed to by the business owners and hand over the benefits realisation responsibilities and reporting to these business owners
- Develop Operational Support and Readiness documentation for system maintenance and ongoing development
- Understand ongoing OPEX and support requirements when moving into maintenance mode
- Establish continuous development funds to mature systems, process, people and information.

Summary and recommendation

Icon Water advised Project AXLE was its first large-scale IT project. It encountered internal and external issues in its delivery. Icon Water provided extensive analysis of the lessons learned from Project AXLE and evidence that systemic internal issues have been addressed and IT capital processes improved to ready the business to deliver these types of projects in the future, as digital needs increase.

Notably, Icon Water advised the following changes to have been made to the way Icon Water designs and delivers ICT projects as a result of Project Axle.

Restructure of the Digital Technology Group

Icon Water restructured its Digital Technology Group in September 2021 embedding additional internal expertise into its business in a permanent way. A new Digital Program Director position was created with a permanent business analyst and digital change specialist, 2 new senior project managers, an architecture team and an expanded ongoing applications and cyber support teams.

Icon Water advised this new structure provides continuity of resourcing, including in the BAU operations space to bridge the gap between ICT digital projects and the BAU requirements for key infrastructure.

Additional ICT project governance

Icon Water advised, as a result of the learnings from Project Axle, it has implemented additional project and program governance for ICT expenditure.

A Digital Design Authority has been created, responsible for all technology decision making across the business and the authority for technical decisions on projects and programs with an ICT component.

Steering Committees with Executive membership are in place to ensure appropriate ownership and direction of the programs and include subject matter working groups to support the Steering Committee.

Additional integration support for off-the-shelf ICT products

As a result of the learnings from Project Axle, Icon Water advised it now resources digital projects with a dedicated systems integrator rather than disparate contracted resources. It also advised seeking these skills from a single supplier with appropriate product knowledge when approaching the market for known solutions. Icon Water is of the belief that skilled and constant support in this space will provide additional assurance to smooth implementation and a fit-for-purpose final solution.

Icon Water evidenced this process change through the specialist program management skills it procured from Projects Assured, for Program Nova.

Additional time allowed for procurement

Icon Water advised that it now allows more time for contract negotiations before the onboarding of resources and incurring of cost.

It has also embedded specialist procurement skills in its business to support Icon Water when approaching the market for digital solutions. This specialist procurement adviser role works with corporate procurement and the Digital Technology Group to ensure appropriate processes occur to enable the selection of the right digital solution, with the right skills and support to deliver the solution effectively and efficiently.

Appropriate project delivery processes

Given its experience with an Agile approach initially, Icon Water has implemented the IPAD framework as its permanent approach to delivering ICT projects of this size and nature. It also advised all digital projects now undergo analysis through the Portfolio Prioritisation Team to review and agree the appropriate IPAD pathways to meet the individual needs of the project.

New change management skills and processes

Icon Water advised it has recently adopted a new corporate change management model to ensure ICT and engineering projects alike consider the operating impacts of the solutions they are implementing and plan for, and manage them, appropriately.

In addition to this corporate-wide change, the Digital Technology Group advised it recognised the need for specialist change management skills within its area given how critical integration of new digital systems is to business units. The Digital Technology Group has implemented a permanent Digital Change Specialist role and an additional contract Change Manager as a result. These roles are charged with working with project managers to ensure change impacts brought about by projects are addressed in line with the model. Icon Water advised all project schedules now include forecast and activities to action the change management model.

Institutionalising ICT lessons learned at Icon Water

As a result of the significant learnings from Project Axle, Icon Water advised the Digital Delivery Manager in the Digital Technology group is now responsible for a lesson learned register which is used to onboard new digital resources to Icon Water. New project management resources are debriefed on key ICT learnings as part of their introduction to Icon Water and to guide decision-making and project and program design and delivery into the future.

Despite the significant documented learnings from Project Axle (evidenced in the project closure report) and the learnings that have been systemically embedded through permanent change in the Icon Water business, we do not consider the expenditure incurred on Project Axle efficient in totality.

We requested Icon Water evaluate the project costs and identify the value related to the issues it identified with the way it designed and managed the project. Icon Water was unable to quantify the costs related to the issues it encountered in delivering this project but estimated approximately $6.03 million ($2018-19) could be attributed to:

- Delayed contract negotiations
- Being the first to deploy WAM v 2.0 in the world meaning there were limited skilled resources available, and

- Replacement of the project team and the project reset[33].

We consider these issues within the control of Icon Water and effective management could have controlled these costs.

For this reason, we recommend $6.03 million ($2018-19, equating to $6.63 million in 2021-22 dollars) of project Axle expenditure be excluded from the RAB.

We also requested Icon Water quantify the value of the elements removed from scope or pushed out to Project Hypercare. Icon Water provided the following advice on the outstanding project Axle scope transferred to project Hypercare.

Outstanding scope to be delivered

Under Tranche 2 of the Digital Program, the following deliverables are scheduled for completion by June 2023:

Category	Delivery	Budgeted cost
Stabilisation/upgrades	Upgrade Oracle WAM and Oracle Utilities Analytics to latest supported version.	BAU
Legacy application migration, decommissioning and/or development	CX11380 – WASP transition and decommissioning	$851k
	CX11375 – ODAMIT redevelopment	$381k
	CX11376 – Test results replacement and decommissioning	$447k
	CX11377 – Timesheets replacement and decommissioning	$300k
	CX11378 – Permits replacement and decommissioning	$464k
Migration of remaining network maintenance planned work (legacy to WAM/MWM)	• Large water meter replacements • Sewer cleans • Reservoir clean • Developer work packs	BAU

With the completion of Tranche 2, all outstanding and still required scope of the Axle and Hypercare projects will be complete.

The total value of scope not delivered within the original allowed budget is $2.4 million. The cost of project Hypercare is out of scope for this review, but it is suggested the ICRC review the efficient costs of project Hypercare, particularly in relation to scope not delivered by project Axle.

Conclusion/recommendations

We have reviewed a sample of ex-post projects from the 2018-23 regulatory period and make the below adjustments.

We recommend the total cost of Project Axle be adjusted to $6.63 million ($2022-23) accounting for the overspend Icon Water identified as related to its project design and management.

An adjustment of $0.94 million was also made for the duplication identified in the Minor Asset program of works.

[33] Axle PCR 4 – Board Paper, Response to RFI C131

Table 50: Summary of ex-post capital expenditure adjustments 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	***106.34***	***101.82***	***86.01***	***82.96***	***82.43***	***459.55***
Adjustments						
LMWQCC High Voltage Asset Renewal	0.00	0.00	0.00	0.00	0.00	0.00
Water main renewals (Hydraulic failures)	0.00	0.00	0.00	0.00	0.00	0.00
LMWQCC Tertiary Filters and Disinfection System Upgrade	0.00	0.00	0.00	0.00	0.00	0.00
Minor Assets	0.94	0.00	0.00	0.00	0.00	0.94
AXLE-Asset Management and Maintenance Solution	6.63	0.00	0.00	0.00	0.00	6.63
Total of adjustment	***7.57***	0.00	0.00	0.00	0.00	***7.57***
Revised total inc. efficiency targets	***98.77***	***101.82***	***86.01***	***82.96***	***82.43***	***451.98***

4.3 Proposed expenditure (2023-28)

4.3.1 Overall capital expenditure

Icon Water's expenditure forecast for its planned capital program over the 2023–28 regulatory period is $674 million ($2021-22) excluding $30 million of developer co-contributions but including customer contributions. This comprises $176 million in water services assets, $407 million for sewerage investment and $91 million for non-system assets.

This expenditure is set out below by asset category and driver of the expenditure.

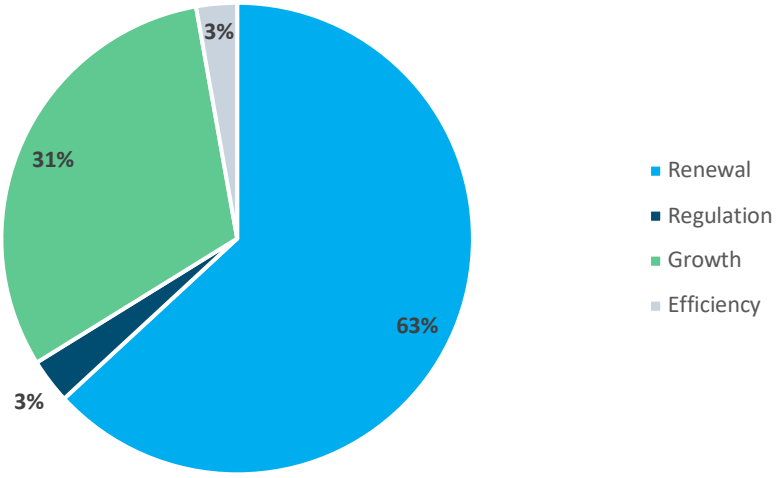
Table 51: Icon Water proposed capital expenditure 2023-28 ($million, $2021-22)

	2023-24	2024-25	2025-26	2026-27	2027-28	**Total**
Water	**60.5**	**40.9**	**33.8**	**18.0**	**22.8**	**175.9**
Renewal	54.8	36.2	30.7	16.8	22.1	160.6
Regulation	5.4	2.6	2.9	22.9	0.4	11.5

	2023-24	2024-25	2025-26	2026-27	2027-28	**Total**
Growth	-	-	-	-	0.3	0.3
Efficiency	0.40	2.0	0.2	1.0	-	3.6
Sewerage	**62.5**	**59.2**	**77.8**	**99.2**	**108.4**	**407.0**
Renewal	40.0	35.0	45.2	33.2	34.9	188.4
Regulation	2.1	1.6	2.1	1.7	-	7.5
Growth	19.2	22.4	30.1	63.7	73.4	208.6
Efficiency	1.2	0.2	0.5	0.7	-	2.5
Non-system assets	**24.3**	**18.7**	**17.6**	**19.4**	**10.6**	**90.6**
Renewal	21.1	17.5	14.5	12.4	10.6	76.2
Regulation	1.6	-	-	-	0	1.6
Growth	-	-	-	-	-	-
Efficiency	1.6	1.2	3.1	7.0	-	12.8
Total	**147.3**	**118.7**	**129.2**	**136.5**	**141.7**	**673.5**

As shown in Table 51 above and Figure 20 below, the key driver for investment is renewal of assets which accounts for $425 Million (63%) of the total proposed investment. The next most significant investment driver is Growth which accounts for $209 Million, (31%). The remainder of the proposed expenditure for the drivers Regulation, $21 Million (3%) and Efficiency $19 Million (3%). Icon Water do not have a funding category for improvements to customer service, not included in regulation of efficiency. It is not clear how this type of expenditure is captured.

Figure 20: Proposed capital expenditure 2023-28 by regulatory driver



Approximately half of the proposed investment in renewal of assets, or $211 million, is made up of a 7 high-cost projects or programs:

- CX11262 LMWQCC Biosolids Management Renewal
- CX11311 Sewer Mains Renewal Program
- CX11313 Water Meter Renewals
- CX11266 Cotter Pump Station Upgrade
- CX11319 Vehicle Lease Renewals for Heavy Vehicle Fleet
- CX11366 Asset Management Information System (AMIS)
- CX11312 Water Main renewals (structural failures)

Further details of these projects and programs are provided in Table 52 below.

The growth driven investment is dominated by one project, CX11061 LMWQCC Secondary Treatment Bioreactors Capacity Upgrade, with proposed expenditure in the regulatory period of $179 million. This accounts for 86% of the proposed expenditure for growth.

Overall, the proposed investment for the 2023-28 period is focussed on a small number of high expenditure project and programs, with the top ten expenditure items totalling $414 million or 61% of the total proposed expenditure.

Table 52: Top ten capital projects and programs by expenditure 2023-28, ($million, $2021-22)

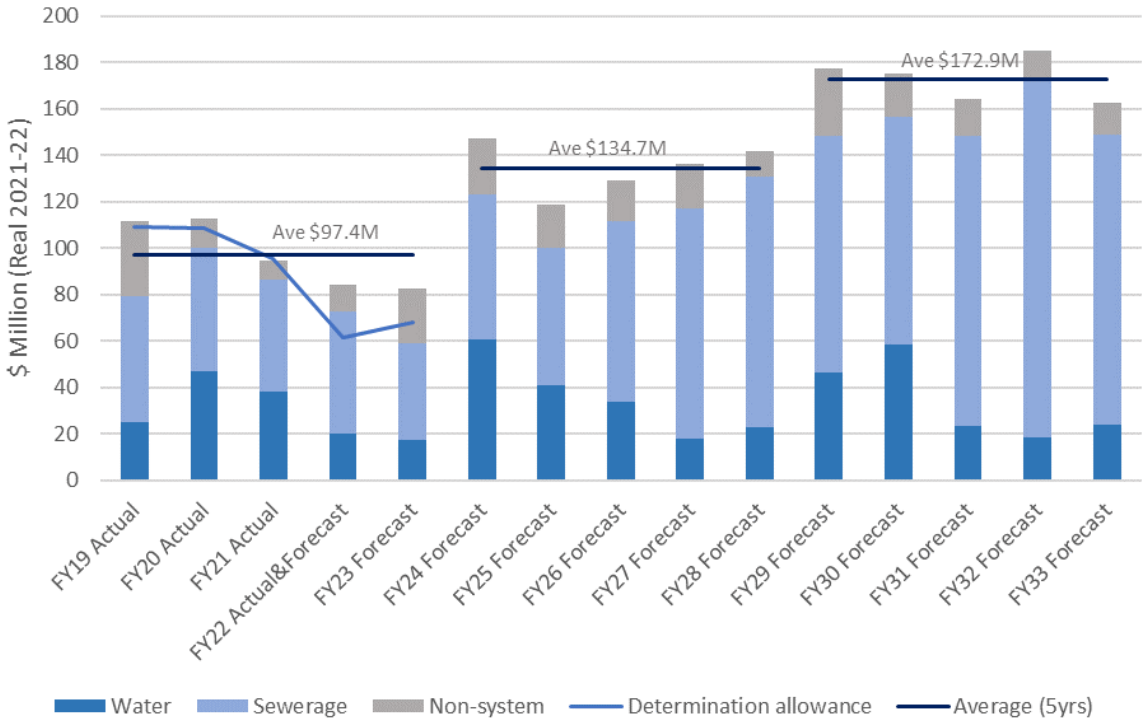
Project/program Ref.	Project/program name	Total proposed expenditure 2023-28
CX11061	LMWQCC Secondary Treatment Bioreactors Capacity Upgrade	**178.9**
CX11262	LMWQCC Biosolids Management Renewal	**61.5**
CX11311	Sewer Mains Renewal Program	**58.8**
CX11313	Water Meter Renewals	**31.1**
CX11266	Cotter Pump Station Upgrade	**22.4**
CX11319	Vehicle Lease Renewals for Heavy Vehicle Fleet	**12.9**
CX11366	Asset Management Information System (AMIS)	**12.3**
CX11312	Water Main renewals (structural failures)	**12.2**
CX11337	Office Expansion Space Utilisation	**11.9**
CX11082	Lower Red Hill Reservoir Tank B (East)	**11.9**

In comparison to historic capital investment, there is a stepped increase in expenditure proposed for the 2023-28 period, increasing from an average expenditure of $97.4 million per year in 2018-23 (actual/forecast), to an annual average of $134.7 million per year in 2023-28. This is an average increase of 38%.

Icon Water's planned investment increases further in 2028-33 with an indicative average annual investment of $172.9 million. This is 78% higher than 2018-23.

Icon Water's longer term capital forecast is shown in below, compared with 2018-23, all in $2021-22.

Figure 21: Comparison of capital expenditure by regulatory period 2018 – 2033 ($million, $2021-22)



To determine whether this increasing expenditure is prudent and efficient, we selected a sample of projects and programs to review in detail. The top ten projects and programs account for 61% of the total proposed capital expenditure, so we selected them for further assessment.

Our assessment of these projects and programs is set out further below. We also reviewed the processes Icon Water used to develop its forecast. Our assessment of those is also set out below.

4.3.2 Project development lifecycle

Icon Water uses its internal Investment Planning and Delivery (IPAD) process to govern the development and delivery of capital projects.

IPAD has a staged approvals process in which projects and programs cannot proceed to the next stage until they are approved by the relevant authority.

Each stage of the IPAD process has planned activities and an acceptable range for the accuracy of cost estimates at that stage. These are set out below.

Table 53: IPAD Stages, activities and cost estimate ranges

Stage	Activity	Cost Estimate range
Identify	Long-term planning, high level analysis, no project defined	No estimate

Stage	Activity	Cost Estimate range
Envisage	Develop the problem statement for the Concept Development Statement	+/-75%
Evaluate	Develop options, assess the options against multiple criteria	+/- 30%
Plan	Develop and endorse the Project Scope Statement	+/- 15%
Develop	Execute detailed design, procurement activities for the Execute Stage	+/- 10%
Execute	Execute contract(s) to complete the implementation of project deliverables	-
Monitor	Defects monitoring and rectification, benefits realisation, financial closure	-

Icon Water's proposed capital expenditure for 2023-28 is set out in Figure 22 and Table 54 below by current IPAD stage i.e., its current stage of project/program development and planning.

Figure 22: Proposed capital expenditure by current stage of development ($million, $2021-22)

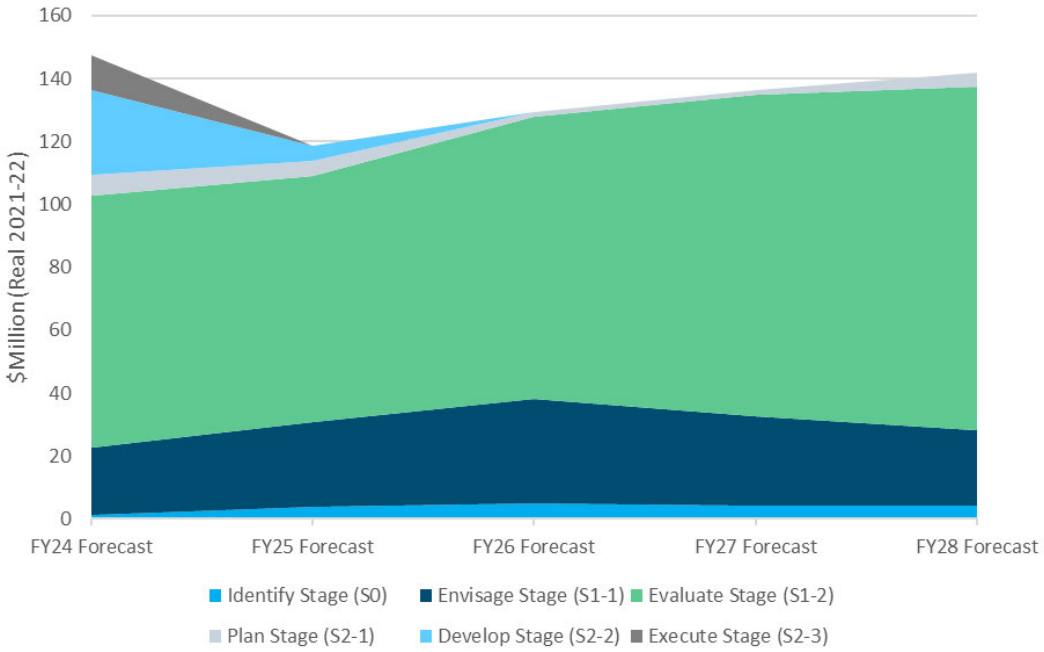


Table 54: Proposed capital expenditure by current stage of development ($million, $2021-22)

IPAD Stage	2023-24		2024-25		2025-26		2026-27		2027-28		2023-28 Total	
Identify Stage (S0)	1.2	*1%*	3.9	3%	4.9	4%	4.2	3%	4.2	3%	**18.5**	**3%**
Envisage Stage (S1-1)	21.5	*15%*	26.7	22%	33.4	26%	28.4	21%	24.1	17%	**134.1**	**20%**
Evaluate Stage (S1-2)	80.0	*54%*	78.6	66%	89.4	69%	102.3	75%	109.1	77%	**459.3**	**68%**
Plan Stage (S2-1)	6.8	*5%*	4.7	4%	1.5	1%	1.6	1%	4.2	3%	**18.9**	**3%**
Develop Stage (S2-2)	26.6	*18%*	4.7	4%	-	0%	-	0%	-	0%	**31.4**	**5%**
Execute Stage (S2-3)	11.2	*8%*	0.1	0%	-	0%	-	0%	-	0%	**11.3**	**2%**
Total	**147.3**	***100%***	**118.7**	***100%***	**129.2**	***100%***	**136.5**	***100%***	**141.7**	***100%***	**673.5**	***100%***

The percentages in the table are the proportion of the expenditure at each IPAD stage for the year.

These show 68% of Icon Water's proposed project and programs over 2023-28 regulatory period are at the Evaluate stage, with only 9% of expenditure at the Plan, Develop or Execute stages.

The Evaluate stage comprises the development and evaluation of options to further assess whether or not a project or program should go ahead, or whether the proposed expenditure is the most efficient way to address the problem. Much of the expenditure we reviewed was not supported by developed options or a viable options analysis.

In general, regulatory practice within the water sector, it is usual to put forward expenditure for an upcoming regulatory period with the majority of the expenditure reasonably developed. This gives the regulator, and customers, certainty that a large proportion of the proposed expenditure is sufficiently developed to represent accurate funding requirements for that period. This means customers will not have to pay more or less than they should, for the services they want and value.

For projects the common approach is to seek development funds in one regulatory period to then allow the time and funding to refine the proposal and put forward the substantive expenditure, such as detailed design and construction, in a subsequent regulatory period.

For this to be the case, we would expect to see a higher proportion of Icon Water's projects at the Plan or Develop stages, with options selected and business cases developed.

Of particular concern is the stages of development of the projects linked to expenditure in the first two years of the period. Only 30% of expenditure in Year 1 and 9% of expenditure in Year 2 is for projects at the Plan to Execute stages.

The early stage of development for a significant proportion of the proposed expenditure raises two key concerns:

- The accuracy of the cost estimate for the project, and
- The ability for the project to be delivered in the proposed timeframe.

Ability to deliver

Noting that the top ten project/programs represent a significant proportion of the total proposed expenditure, analysis of project maturity was conducted excluding these projects.

Figure 23: Proposed capital expenditure by current development stage (excluding top ten projects) $million, $2021-22

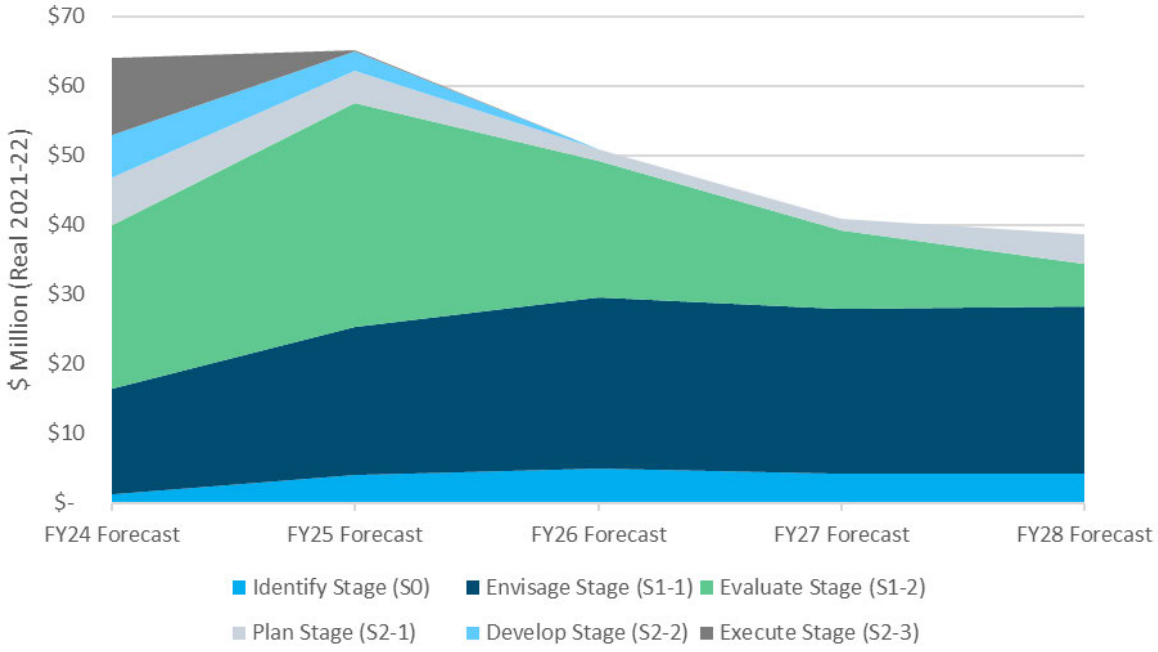


Table 55: Proposed capital expenditure by current development stage (excluding top ten projects) ($million, $2021-22)

IPAD Stage	2023-24		2024-25		2025-26		2026-27		2027-28		2023-28 Total	
Identify Stage (S0)	1.2	*2%*	3.9	*6%*	4.9	*10%*	4.2	*10%*	4.2	*11%*	**18.5**	***7%***
Envisage Stage (S1-1)	15.2	*24%*	21.3	*33%*	24.6	*48%*	28.4	*58%*	24.2	*62%*	**108.1**	***42%***

IPAD Stage	2023-24		2024-25		2025-26		2026-27		2027-28		2023-28 Total	
Evaluate Stage (S1-2)	23.5	*37%*	32.3	*50%*	19.8	*39%*	102.3	*28%*	6.1	*16%*	**93.0**	***36%***
Plan Stage (S2-1)	6.8	*11%*	4.7	*7%*	1.5	*3%*	1.6	*4%*	4.3	*11%*	**18.9**	***7%***
Develop Stage (S2-2)	6.1	*10%*	2.8	*4%*	-	*0%*	-	*0%*	-	*0%*	**8.9**	***3%***
Execute Stage (S2-3)	11.1	*17%*	0.1	*0%*	-	*0%*	-	*0%*	-	*0%*	**11.3**	***4%***
Total	**64.0**	***100%***	**65.1**	***100%***	**50.8**	***100%***	**40.8**	***100%***	**38.7**	***100%***	**259.5**	***100%***

Note: The percentages in the table are the proportion of the expenditure at each IPAD stage for the year.

As shown in Figure 23, similar to the overall capital proposal, only 15% of projects have reached the Plan to Execute Stages. For year 1 (2023-24) this is higher, with 38% of projects in the Plan, Develop or Execute stages, however this drops to only 12% in Year 2.

Comparing the profile of maturity for the 2023-28 capital plan to the 2018-23 capital plan at the time of the last regulatory determination, Calibre, the consultant engaged by the ICRC to review Icon Water's expenditure, noted that over 30% of projects had an endorsed option and were in the Implementation phase, this compares to only 15% of the proposal for 2023-28. Additionally for the 2018-23 proposal, over 60% of expenditure for projects in Year 1 had reached this status, compared with 38% for the 2023-28 proposal[34].

The proposed expenditure for the 2023-28 period is 38% higher than the 2018-23 period and noting the low maturity of the projects linked to this expenditure, particularly for Years 1 and 2, there is a real risk that Icon Water will not be able to deliver the planned program of works in the regulatory period.

The analysis of the ability to deliver on the top ten projects or programs is assessed as part of the individual assessment further below.

The ability to deliver the remaining projects and programs which represent approximately 39% of the capital expenditure, are addressed below.

Using the IPAD stage status of the projects the delivery timeframe has been reprofiled to allow sufficient time to develop the projects. The capital expenditure is also reprofiled to align with this new timeline. For projects at Identify and Envisage stage the reprofiling has included the deferral of $24.3 million of expenditure beyond the 2023-28 period. For all other stages this is just reprofiling within the period. This outcome of this reprofiling is provided as below.

[34] Calibre Final Review of Icon Water's Capital and Operating Expenditure for Water and Sewerage Services, p24.

Figure 24: Reprofiled capital expenditure (excluding top ten projects) $million, $2021-22

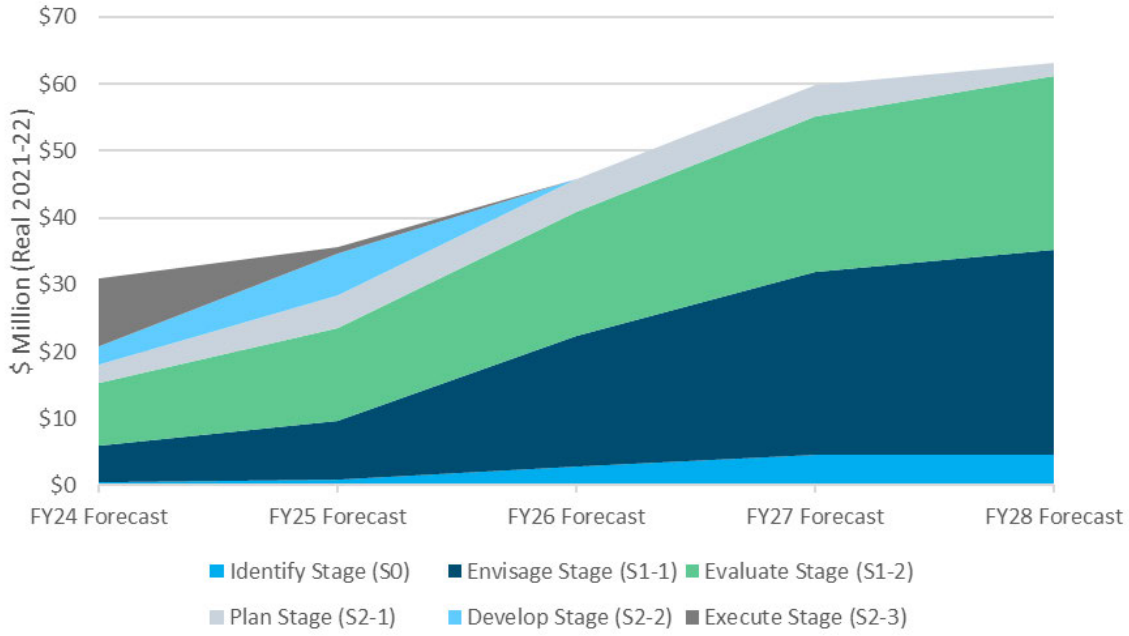


Table 56: Reprofiled capital expenditure (excluding top ten projects) $million, $2021-22

IPAD Stage	2023-24	2024-25	2025-26	2026-27	2027-28	2023-28 Total	Total Adjustment
Identify Stage (S0)	0.5	0.9	2.8	4.6	4.6	**13.5**	**(5.0)**
Envisage Stage (S1-1)	5.5	8.7	19.6	27.2	30.5	**91.5**	**(17.4)**
Evaluate Stage (S1-2)	9.3	14.0	18.6	23.3	26.0	**91.1**	**(1.9)**
Plan Stage (S2-1)	2.8	4.7	4.7	4.7	1.9	**18.9**	**-**
Develop Stage (S2-2)	2.7	6.2	-	-	-	**8.9**	**-**
Execute Stage (S2-3)	10.1	1.1	-	-	-	**11.3**	**-**
Total	**30.9**	**35.7**	**45.7**	**59.8**	**63.0**	**235.2**	**-**
Recommended capital expenditure adjustment by year	**33.1**	**29.4**	**5.1**	**(19.0)**	**(24.3)**	**24.3**	

This proposed adjustment to the 2023-28 capital expenditure is based on a prudency assessment and is about the timing of the expenditure and not an efficiency reduction in expenditure.

Range of cost estimate

Due to the early stage of development of the projects, the capital proposal has a wide range of cost estimates. The majority of projects are yet to complete the Evaluate stage meaning they don't have a developed business case, option confirmed, or full cost assessment.

As shown in Table 57 below, 91% of the capital expenditure has an estimate range of +/-30% or greater, with 23% having a range of +/-75% or no estimate range.

Table 57: IPAD Stages, cost estimate range for proposed expenditure 2023-28 ($million, $2021-22)

Stage	Cost Estimate	$ Total (2023- 2028)	Percentage of total (2023- 2028)
Identify	+/-100%[1]	18.5	3%
Envisage	+/-75%	134.1	20%
Evaluate	+/- 30%	459.3	68%
Plan	+/- 15%	18.9	3%
Develop	+/- 10%	31.3	5%
Execute	Monitor against approval	11.3	2%

As referenced in Icon Water Attachment 7 Capital Expenditure Section 7.3.2., p37.

The lack of certainty regarding the cost estimate does not provide the certainty required to provide a balance of risk between Icon Water and its customers as to the efficiency of the proposed capital expenditure.

This is partially addressed through the reprofiling of the proposed expenditure (excluding the top ten projects) above and is addressed further in the detailed review of the top ten projects below.

The high proportion projects and programs at early stage of development 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.

Aligned with general regulatory practice, the ICRC can manage projects and capital expenditure with a low certainty of being delivered by excluding them from the Determination and then treated as a 'Pass Through Event'. At a later date, once the certainty of the need or timing of the project is more certain the utility can then propose that the project is added to the determination, and this is considered by the regulator. General practice is for types of Pass-Through Events to be nominated in the Determination and this can also include nominating individual projects excluded from the Determination due to low certainty of need or justification of the cost or timing.

For example, in its 2020 Determination the Essential Services Commission of South Australia (ESCOSA) introduced an 'Intra-period review mechanism'[35] for

'robustly scoped and non-discretionary new major capital project/program that it has not incorporated into its forecast capital expenditure for the regulatory period because of a contingency (or trigger) or adverse event (for example, unconfirmed customer demand) which means it is not currently a project/program SA Water can reasonably commit expenditure to.'

This mechanism aims to manage these project that were not reasonably well developed at the time of the determination, including projects put forward by SA Water in its proposal but not supported by ESCOSA in the Determination. The mechanism required SA Water to propose which project are required to be considered within 6 months of the Determination period commencing and that each project considered by ESCOSA once it is notified by SA Water that the justification for the project was confirmed.

In the case of the Icon Water proposal, the general expenditure excluding the top 10 projects or programs has been addressed via reprofiling the expenditure based upon stage of development in the IPAD process. For each of the 10 ten projects individually reviewed, where the project is deemed prudent, but these is uncertainty of the cost and timing estimate exists, this could be dealt with via 'ex-post' review of the expenditure at the time of the 2028 Determination.

Recommendation

Icon Water amend the timeframe for development of projects to align with the requirements of the regulatory determination process.

The proposed capital expenditure (excluding the top ten projects) is reprofiled to align with a more realistic delivery timeframe.

4.3.3 Capital escalation

In Attachment 7 Capital Expenditure[36], Icon Water notes that it has applied a real escalation factor to the estimates for the capital expenditure proposal for the 2023–28 regulatory period. They engaged BIS Oxford Economics to develop ACT-specific escalation factors for engineering construction costs and labour cost escalators that were applied to ICT projects.

Table 58: Icon Water 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%

[35] ESCOSA, SA Water's water and sewerage retail services: 1 July 2020 – 30 June 2024 Price Determination, p15
[36] Icon Water, Attachment 7 Capital Expenditure, P38

Icon Water has applied the price inflator for engineering construction costs to all non-ICT capex projects. For ICT projects, Icon Water has applied the electricity, gas, water and wastewater services wage price.

To assess the reasonableness of the capital expenditure real cost escalators comparison was made to current inflation indicators and forecast costs for the construction sector. The proposed real inflation factors of between 0% and 0.6% are at the lower end of current inflation factors for the construction sector.

ICT real inflation of between 0.6% and 1.0% is also at the lower end of inflationary indicators.

Icon Water note an intention to update the escalators following the Commission's draft decision to provide the most recent forecast in the revised proposal ahead of the Commission's final decision in 2023.

Recommendation

In comparison to current inflationary indicators and construction sectors cost forecasts, Icon Water has applied a reasonable level of real cost escalation to its capital expenditure proposal.

It is noted that these inflation factors will be reviewed post the ICRC's Draft Report and will therefore be required to be reassessed at that time to ensure they are again reasonable.

4.3.4 Capital expenditure efficiency

Based on the assessment of Icon Water's asset management and capital delivery processes and practices earlier in this document, and our findings during the review, it is proposed to apply a catch up to address:

- The low maturity of asset management processes
- The improvements required to the asset management data
- The limited data used to develop cost estimates, including options not selected.

Additionally, we are proposing an ongoing efficiency target to recognise that Icon Water will continue to improve its processes and practices and will make further efficiencies.

The application of efficiency targets is common practice across the water sector and recent catch-up and continuing efficiency targets are provided in Table 59.

Table 59: Reference recent capital expenditure efficiency targets

Regulator	Price determination	Catchup efficiency target	Continuing efficiency target
QCA	Seqwater 2021	Catch up 1.8 – 8.8%	0.5 % pa

Regulator	Price determination	Catchup efficiency target	Continuing efficiency target
IPART	Sydney Water 2020	Specific catch up for 2 programs ($56m)	0.8% pa.
ESCOSA	SA Water 2020	1.5% pa	5% fixed, plus 0.5% pa

Aligned with the approach for setting the reference efficiency targets, our proposed capital expenditure efficiency targets for Icon Water for the upcoming regulatory period are provided in Table 60 below.

Table 60: Proposed capital expenditure efficiency targets

Efficiency Target	Approach	2023-24	2024-25	2025-26	2026-27	2027-28
Catch up efficiency	1.0% pa Applied to capital expenditure excluding the top 10 projects and programs	1.0%	2.0%	3.0%	4.0%	5.0%
Continuing efficiency	2% fixed across all years Applied to all capital expenditure	2%	2%	2%	2%	2%

It should be noted that to avoid the double counting of efficiency the catch-up efficiency target is limited to the expenditure outside of the top ten projects and programs. Our recommendations on the efficiency of those projects and programs are subject of separate review and findings are set out further below.

The continuing efficiency target is set as a fixed 2%, rather than as an annual target meaning it does not compound.

These efficiency targets are similar to those identified by Calibre for the expenditure review linked to the 2018 determination, which included a catch-up efficiency of 1.5% per year and a continuing efficiency of 0.4 percent per year.[37]

Recommendation

[37] Calibre Final Review of Icon Water's Capital and Operating Expenditure for Water and Sewerage Services, p133

The catch up and continuing efficiency targets set out in Table 60 are applied to the capital expenditure proposal for 2023-28.

4.4 CX11061 LMWQCC Secondary Treatment Bioreactors Capacity Upgrade

4.4.1 Project Overview

The LMWQCC was commissioned in 1978 and currently treats approximately 100ML/d (99%) of the wastewater from Canberra. The current secondary treatment bioreactors are at or nearing capacity and require expansion to accommodate ACT population projections.

The purpose of secondary treatment is to remove a high proportion of the fine and dissolved organic solids, convert ammonia to nitrate and remove a proportion of the nitrogen – by reduction of nitrate to nitrogen gas and oxygen.

As the secondary treatment process reaches its capacity limit the risk of non-compliance with regulatory ammonia limits is greater, particularly in incidents of:

- Prolonged periods of wet weather
- Failure of equipment and reduced treatment capacity, or
- Numerous shutdowns for maintenance or project work occurring in winter which does not allow the plant time to recover between interruptions.

The proposed upgrade of the secondary treatment plant bioreactors is planned in response to forecast population increase and to address current and increasing risk of environmental non-compliance. There have been 6 exceedances of the discharge allowances linked to wet weather events in the past 2 years.

The high-level timeframe for the development of the updates is provided in Table 61.

Table 61: High level timeframe for LMWQCC Secondary Treatment Bioreactors Capacity Upgrade

Stage	Planned start date	Planned completion date
Planning stage	Dec 2022	Aug 2023
Detailed design	Aug 2023	Sept 2025
Execute (Construction)	Sept 2025	Sept 2029

4.4.2 Current Status

The project is at the Evaluate stage of the IPAD process.

4.4.3 Documents reviewed

- Engineering Project Envisage Stage - Concept Development Statement [CX11061] LMWQCC Secondary

Treatment Bioreactors Capacity Upgrade, June 2017

- LMWQCC Secondary Treatment Bioreactors Capacity Upgrade Project change request (PCR), May 2021
- CX11061-REG-009B_DOAR Register
- CX11061-REG-011 Business Risk Assessment
- CX11061 -LMWQCC Secondary Treatment Upgrade - Options Assessment Report, Hunterh2o, June 2022
- Request for Quotation CX11061 LMWQCC Secondary Treatment Upgrade No. IW2020-10172, July 2021
- Growth Forecast Study Planning Horizon 2020 to 2043, March 2021
- LMWQCC Secondary & Tertiary Systems Upgrade Separable Portion 2 Preliminary Design Report, GHD, March 2015
- Lower Molonglo Water Quality Control Centre, Canberra Sewerage Strategy 2010 – 2060, 2012
- Lower Molonglo Water Quality Control Centre, Environmental Authorisation Under the Environmental Protection Act 1997, August 2021
- Icon Water presentation: 2023-28 Water & Wastewater Price Proposal LMWQCC Secondary Treatment Bioreactors Capacity Upgrade (CX11061)
- Wastewater System Strategy 2020-2070Presentaion to Board Feb 2022
- CX11061 GAN-G-002 Bioreactor construction plan
- LMWQCC Capacity Update Final PR-000-100-218/01 Version 1700308 Aspect Process Services Pty Ltd
- Correspondence with the EPA regarding wet weather events (various)

4.4.4 Prudence

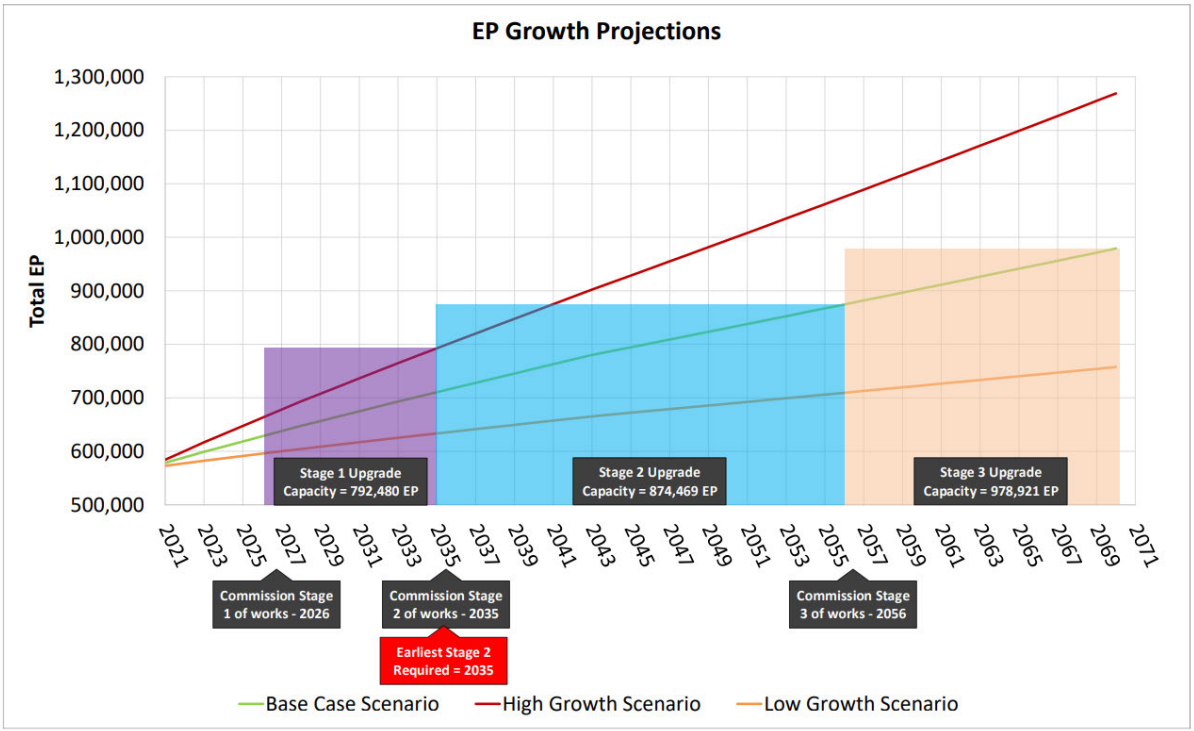
Investment driver/benefit

The primary driver for this project is increased sewerage treatment capacity to meet population growth. There are two factors driving the need for the project to proceed:

- Biological treatment capacity – linked to projected population growth with increased load on the treatment process
- Volumetric treatment capacity – long term linked to population growth but in the short-term, driven by prolonged rain events, with a risk of controlled releases of partially treated effluent from the bypass storage dam and a regulatory non-compliance.

The current volumes and loads treated at the plant is above the design capacity and this has resulted in controlled releases of partially treated effluent during wet weather events.

Figure 25: EP growth projections



This project is planned as part of the long-term pathway involving major augmentation at LMWQCC. Linked to *the Lower Molonglo Water Quality Control Centre, Canberra Sewerage Strategy 2010 – 2060*, the treatment capacity updates for the LMQCC and planned to be conducted in three stages.

This project is limited to Stage 1 of the upgrades and the costs and timing referred to are for stage 1 only. At this stage, the need and timing for the remaining two stages is still to be confirmed.

Icon Water's Wastewater System Strategy 2020 –2070 outlines six possible future configurations for the wastewater system, a number of which include the construction of an Eastern Treatment Plant (ETP) which would take between 10 – 30% of Canberra's sewage flow by 2070. Secondary treatment augmentation options for LMWQCC must accommodate both the possibility that a new ETP may be constructed in the future, diverting future loads from LMWQCC, and the possibility that treatment will be centralised at LMWQCC.

Although construction of an ETP may mitigate the need for stages 2 and 3 of the LMWQCC upgrades, Stage 1 is still required as it precedes the construction of the future works and would form part of the overall strategy.

With the plant operating at or above the design capacity this has resulted in six wet weather event discharges of partially treated effluent between August 2020 and November 2021.

Risk

Upgrade to the secondary treatment process is planned to ensure the LMWQCC plant can meet technical and environmental obligations and reduce the risk that non-compliant effluent is released into the Murrumbidgee River.

Icon Water's presentation *2023-28 Water & Wastewater Price Proposal LMWQCC Secondary Treatment Bioreactors Capacity Upgrade (CX11061*), noted the current issues with the plant operation as:

- The secondary treatment process has limited capacity, reducing the opportunity for operational shutdowns to accommodate project cut ins and routine maintenance
- The secondary treatment operational process limits are being exceeded in cold weather conditions, and
- LMWQCC had several controlled releases of partially treated effluent from the bypass storage dam in intense weather events in the last 18 months, attracting community, media and regulatory attention.

These issues aligned with an assessment of the risk as Medium documented in Table 62.

Table 62: LMWQCC Secondary Treatment Current Risk Assessment

Risk No.	Risk description	Likelihood	Consequence	Current Risk Ranking
1	Inadequate process capacity at LMWQCC leads to an inability to schedule plant shutdowns for maintenance and capex projects during winter, resulting in minor financial impacts	Possible	Minor	Medium
2	Growth and variability in influent nutrient loads (diurnal peaks, wet weather) and/or reduced process capacity from project and maintenance works shutdowns leads to ammonia breakthrough, resulting in a minor compliance breach.	Possible	Minor	Medium
3	Inadequate secondary process capacity leads to increased reliance on and frequency of spilling of bypass storage dam, resulting in moderate stakeholder dissatisfaction and adverse local media attention.	Unlikely	Moderate	Medium

These risks are manageable via an operational response and do not in themselves warrant the need of the upgrades to the secondary treatment capacity. However, as the population increases, and the impacts of climate change increase the risk of more prolonged winter rain events these risks will increase to the point where they are no longer manageable via operational measures.

Document *CX11061-REG-011 Business Risk Assessment* notes that the risk will increase by 2026 - 2030 as detailed in

Table 63.

Table 63: LMWQCC Secondary Treatment Current Risk Assessment as at 2026-2030

Risk category	Risk description	Inherent rating (nil or failed controls)	Current controls	Risk category
Operational	Failure to implement the upgrade -unable to adequately treat sewage resulting in increased bypasses to the dam	*Very High*		*Very High*
Environmental	Failure to implement the upgrade -unable to adequately treat sewage resulting in partially treated effluent discharging into the Molonglo River (in dry weather)	*High*		*High*
Legal/ Compliance	Failure to implement the upgrade -unable to adequately treat sewage resulting in partially treated effluent discharging into the Molonglo River (in dry weather) (Environment Protection Act) (failure of general duty) (UTR already interested)	*High*	Wet weather plans, WSSEP, incident management	*High*
Financial	Failure to implement the upgrade -increase in costs (ops and maintenance costs and fines, Directions for urgent construction) resulting in severe financial impact	*Very High*	Wet weather plans, WSSEP, incident management plans, operational strategies, maintenance planning, site EMP, dam storage, network buffering	*Very High*
Reputation	Failure to implement the upgrade -unable to adequately treat sewage resulting in partially treated effluent discharging into the Molonglo River and severe reputational damage	*Very High*	Wet weather plans, WSSEP, incident management plans, operational strategies, maintenance planning, site EMP, dam storage, network buffering, sewage strategy, regulator engagement	*High*
Safety	Failure to implement the upgrade leads to repetitive injuries, mental health	*High*	Wet weather plans, WSSEP, incident management plans, operational strategies,	

Risk category	Risk description	Inherent rating (nil or failed controls)	Current controls	Risk category
	impacts, errors occurring through rushing, exposure to higher threshold of the EA of pathogens through discharge of partially treated effluent resulting in moderate safety incidents		maintenance planning, site EMP, dam storage, network buffering, sewage strategy, regulator engagement	

Extract from CX11061-REG-011 Business Risk Assessment

The timing of the project is to stage the upgrade works to address these risks before they reach an unmanageable state.

Timing

Icon Water noted the current progress of the project and identified four key milestones:

- January 2023 –Business case approval (Evaluate Stage)
- Mid-2023 –Project Delivery Plan approval (Develop Stage)
- End 2025 –Detailed design complete (Plan Stage)
- 2026 –2030 –Construction and commissioning

No further details on timing were provided.

The capital expenditure forecast indicates construction expenditure will be staged between 2026 and 2032 and it is not clear how this aligns with a 2030 commissioning date.

Without further details of the scheduling of works it is difficult to fully assess the prudence of the timing of this project, or the efficiency on how it is proposed to be delivered. However, based upon the increased risk of exceedance of secondary treatment capacity by 2030 this timing is deemed reasonable.

4.4.5 Efficiency

The project is still at a relatively early stage of development with options assessment not yet complete and only indicative costing provided.

Option Assessment

The project has undergone a project option selection process aligned with the Icon Water IPAD project governance process. A 'long list' of 9 options was assessed in two stages to:

- Confirm whether the options can meet the technical performance requirement, and

- Assess the selected options through a non-cost MCA.

This reduced the 'long list' of options down to 4 options:

- **Option 1/2 Hybrid** – Side stream Membrane Bioreactor (MBR)
- **Option 3** - Parallel conventional Continuous Stirred Tank Reactor (CSTR) with tertiary membranes for filtration and disinfection
- **Option 4** - Parallel aerobic granular sludge (Nereda®) with tertiary membranes for filtration and disinfection
- **Option 5** - Parallel Integrated Fixed Film Activated Sludge (IFAS) with tertiary membranes for filtration and disinfection.

Details of the 4 shortlisted options is provided in Table 64.

Table 64: LMWQCC Secondary Treatment Bioreactors Capacity Upgrade short listed options

Core Technology	Key Differentiating Features	Total Stage 1 Capital Cost ($Million, $2021-22)	Cumulative PV at 7% Discount Factor ($Million, $2021-22)
Option ½ Hybrid - Side stream Membrane Bioreactor (MBR) (Stage 1) followed by complete conversion to MBR (Stages 2 & 3) or as required for condition and operational reasons.	1. Smallest footprint and least construction complexity of options. 2. Does not require additional filtration or disinfection for discharge. 3. Increased maintenance complexity due to large number of pumps and valves. 4. Low number of cut-ins increases constructability.	348.9	*595.5*
Option 3 – Parallel conventional Continuous Stirred Tank Reactor (CSTR) with tertiary membranes for filtration and disinfection (Stage 1 parallel and Stage 2 & 3 replace existing).	5. Largest footprint, difficult to fit onsite and greater number of environmental and cultural heritage interactions. 6. Similar to existing process so high degree of familiarity for operators and maintainers. 7. Higher construction related Scope 3 emissions than other options due to high concrete and roadworks volumes.	489.6	709.8

Core Technology	Key Differentiating Features	Total Stage 1 Capital Cost ($Million, $2021-22)	Cumulative PV at 7% Discount Factor ($Million, $2021-22)
Option 4 – Parallel aerobic granular sludge (Nereda®) with tertiary membranes for filtration and disinfection (Stage 1 parallel and Stage 2 & 3 replace existing)	8. Compact site footprint as process does not require clarifiers. 9. Interaction / reliance on overseas technology provider. 10. Low energy consumption. 11. Produces higher effluent TSS placing greater load on tertiary filtration. 12. Potentially higher operational Scope 1 Greenhouse Gas emissions than other options.	466.4	665.4
Option 5 – Parallel Integrated Fixed Film Activated Sludge (IFAS) with tertiary membranes for filtration and disinfection (Stage 1 parallel and Stage 2 & 3 replace existing).	13. Complex hydraulic design and commissioning bioreactors can be complex due to presence of media. 14. Biofilms on media make process more robust to changing influent characteristics	489.0	671.9

Source: Table E2: Upgrade Options Summary from CX11061 -LMWQCC Secondary Treatment Upgrade – Options Assessment Report, Hunterh2o, June 2022.

The project has yet to complete the formal MCA and NPV assessment of options to select a preferred option based on cost and non-cost factors. This is planned to be complete in late 2022.

It is understood from Icon Water that the cost estimate for 2023-28 is based on Option1/2 Hybrid.

Cost estimate

Following completion of the options assessment, scheduled for late 2022, a more detailed and robust cost estimate is planned to be developed. For the purposes of assessing a cost of the project to include in the 2023-28 capital forecast, Icon Water used Option 1/2 hybrid, with a total project cost of approximately $350 million (real $ 2021-22), spreading capital expenditure from 2018 to 2032. The proposed expenditure in the 2023–2028 regulatory period is $178.9 million.

It should be noted that Icon Water indicated that the original expenditure profile was for $241 million in the 2023-28 period, however it deferred the contingency (30%) linked to the expenditure in

the period to the next regulatory period. It should be noted that this is not a cost saving only the deferral in timing of the expenditure.

Icon Water stated the reason for deferring this expenditure was because it believes there is a less than 50% probability that this expenditure would be incurred in the period and customers shouldn't bear that risk in its forecast.

This will benefit customers in the short term but could still be incurred in the next regulatory period.

Limited details of a breakdown of this cost or how the estimate was calculated have been provided. Document *CX11061 -LMWQCC Secondary Treatment Upgrade – Options Assessment Report*[38], provides a high-level breakdown of capital costs and these are provided in Table 65.

Table 65: LMWQCC Secondary Treatment Upgrade – Option 1 Capital Cost Estimate, Stage 1

Item	Estimate ($million, $2021-22)
[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]

[38] CX11061 -LMWQCC Secondary Treatment Upgrade - Options Assessment Report, Hunterh2o, June 2022

Item	Estimate ($million, $2021-22)
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Source: Table 4-29: Option 1 Capital Cost Estimate Stage 1 from CX11061 -LMWQCC Secondary Treatment Upgrade - Options Assessment Report, Hunterh2o, June 2022.

The inclusion of 43% contingency is high and does not align with the use of P50 cost estimating to balance the risk between Icon Water and Customers.

However, as mentioned above, Icon Water has excluded this contingency from the expenditure put forward for the 2023-28 period.

Without further details of the cost estimate it has not been possible to fully assess the efficiency of the total costs, but as Icon Water is only seeking to recover $179 million of a potential $350 million project via customer prices in the 2023-28 period there is a low risk of over recovery of costs. The further expenditure will be reviewed as part of the next regulatory determination and any adjustments made to the efficiency of the project will be made then, with further progression of options analysis and detailed costing.

It is suggested that an ex-post review of the project costs to date be undertaken as part of the next determination to properly address the risk of over-recovery from customers on this project.

The Options Assessment report[39] notes the operating costs for Option 1 are $20,247 per annum ($2021-22). The start date of the operating cost or comparison to current costs has not been provided.

Based on the current risk and operational mitigation identified by Icon Water it is likely that there would be cost savings associated with the upgrade to the treatment process, with no longer a need to manage capacity constraints or emergency controlled effluent releases operationally.

In its presentation, Icon Water noted:

'Opportunities are being investigated in:

- Process technologies that require less (or no) tertiary processing
- Modernisation of treatment process
- Intensification of the process.[40]'

[39] CX11061 -LMWQCC Secondary Treatment Upgrade - Options Assessment Report, Hunterh2o, June 2022

[40] 2023-28 Water & Wastewater Price Proposal LMWQCC Secondary Treatment Bioreactors Capacity Upgrade (CX11061), Icon Water July 2022

Icon Water has not proposed any process efficiencies or changes to operating costs.

Delivery

As noted above, the project is still at an early stage of development and limited information has been provided as to the delivery model or approach.

Icon Water noted in its presentation on the project that:

- 'Future Engagements will be made based on a delivery methodology still being determined
- Engagements likely to require tier 1 contractors but efforts to maximise local workforce to be investigated.'[41]

Without this information it is not possible to assess if the delivery model is efficient.

4.4.6 Recommendations

Based on the need to address increasing population and plant capacity constraints, with the risk of environmental and technical regulatory non-compliance, this project is deemed prudent.

Based on current development of the project, there is a risk it will not proceed within the timeframe proposed. The detailed design is expected to be complete by December 2025 and construction and commissioning complete by 2030. The deferral of the contingency to outside of the 2023-28 regulatory period effectively mitigates this risk. Therefore, proposed timing of the capital expenditure is accepted as prudent.

The option selection for the project has yet to be completed and costings are yet to be confirmed, therefore the full efficiency assessment is not possible. As the contingency has been deferred outside the 2023-28 period, it is reasonable to assume the $178.9 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 66.

Table 66: LMWQCC Secondary Treatment Bioreactors Capacity Upgrade Capital Expenditure Recommendation $million, $2021-22

$ Real 2022	2023-24	2024-25	2025-26	2026-27	2027-28	2023-28 Total
Proposed Capex	16.27	9.14	25.92	59.80	67.78	178.91
Recommended Adjustment	0	0	0	0	0	0
Recommended Capex	16.27	9.14	25.92	59.80	67.78	178.91

[41] 2023-28 Water & Wastewater Price Proposal LMWQCC Secondary Treatment Bioreactors Capacity Upgrade (CX11061), Icon Water July 2022

4.5 CX11262 LMWQCC Biosolids Management Renewal

4.5.1 Project Overview

All the waste solids from the sewage treatment process at 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.

Current Status

The project is currently at the Evaluate stage of the Icon Water IPAD process.

4.5.2 Key Documents reviewed

- 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

4.5.3 Prudence

Investment driver/benefit

The primary driver for this investment is the renewal of assets to maintain the waste solids from the sewage treatment process at LMWQCC. A secondary driver is catering for increased treatment capacity in response to population growth.

Risk

The driver for the project, being the renewal of assets, is linked to, and in part quantified by, the risk assessment.

Icon Water identified three main risks if the project does not proceed:

- End of life infrastructure means LMWQCC furnaces do not operate reliably, resulting in severe disruption to processing and disposal operations
- Population growth means LMWQCC furnaces do not have the capacity to process biosolids, resulting in major disruption to operations (through stockpiling requirement)
- Inadequate furnace capacity at LMWQCC causes stockpiling of biosolids, resulting in moderate damage to the environment and reputation.

These risks have been assessed currently as medium or low risk and as the assets deteriorate over time the risk increases to very high or medium, as detailed in Table 67.

Table 67: LMWQCC Biosolids Management Renewal Project Key Risk

Risk no.	Risk description	Risk Rating Now		Risk Rating in 2027	
		Likelihood	Consequence	Likelihood	Consequence
1	End of life infrastructure means LMWQCC furnaces do not operate reliably, resulting in severe disruption to processing and disposal operations	Rare	Severe	Almost Certain	Severe
		MEDIUM		VERY HIGH	
2	Population growth means LMWQCC furnaces do not have the capacity to process biosolids, resulting in major disruption to operations (through stockpiling requirement).	Rare	Major	Almost Certain	Major
		MEDIUM		VERY HIGH	
3	Inadequate furnace capacity at LMWQCC causes stockpiling of biosolids, resulting in moderate damage to the environment and reputation.	Rare	Moderate	Possible	Moderate
		LOW		MEDIUM	

As part of the review Icon Water confirmed that although these risks are rated as medium/low now, they escalate to very high/medium by 2027. That is why the assets are being refurbished at present, extending operational life to 2030, with renewal required at that point.

Timing

The timing of the investment is required to be operational prior to the existing furnaces reaching the end of their operational life. There are a number of projects in the current period (2018-23) which will extend the operational life of the furnaces to approximately 2030.

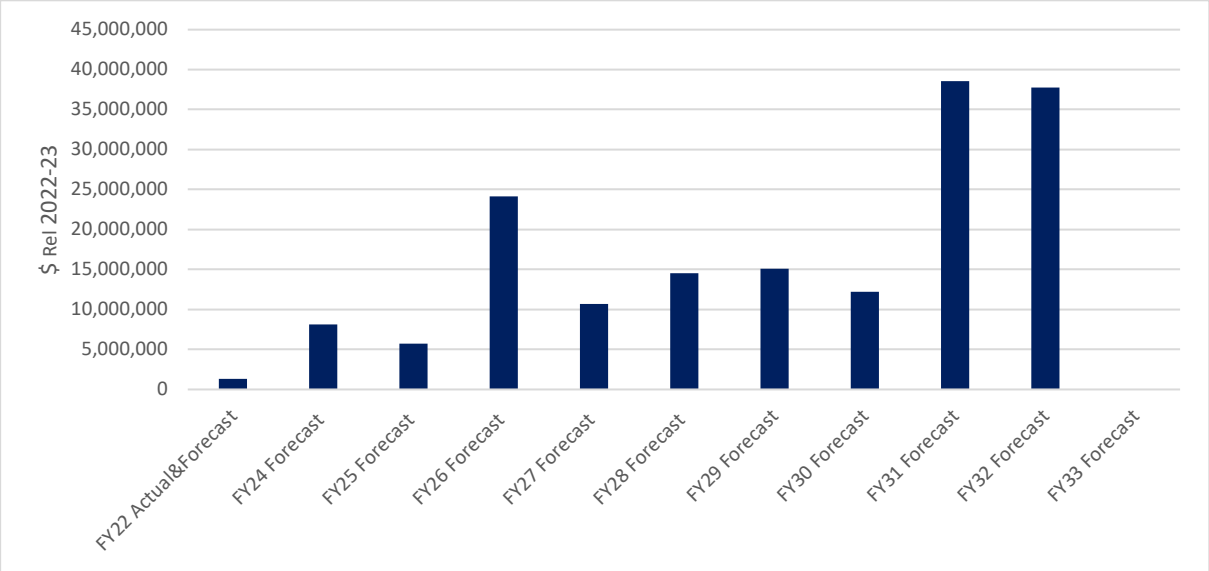
Icon Water indicated that it is targeting the development of the project to meet this approximate 2030 timing. The timing for the project as provided in the Concept Development Statement is provided in Table 68.

Table 68: LMWQCC Biosolids Management Renewal Project timing

Stage	Target Completion Date
Plan Stage	June 2022
Develop Stage	Dec 2028
Execute Stage	Dec 2030

The profile of the expenditure is spread between 2022 and 2032. This is longer than would normally be required for a project of this scale and nature. Additionally, there is a reasonably significant level of expenditure in 2025/26, which appears out of step with a usual spend profile for a project of this type. Icon Water indicated this was due to timing of the earthworks for the project to coincide with the earthworks for the LMWQCC Secondary Treatment Bioreactors Capacity Upgrade project to deliver cost savings.

Figure 26: LMWQCC Biosolids Management Renewal Project Capital Expenditure Profile



Icon Water did not provide quantification of the saving by aligning the two projects. Based on the condition of assets, as established from the various asset condition assessment reports, and criticality of biosolids treatment assets for the operation of the LMWQCC and maintaining compliance sewerage treatment, this investment is assessed as prudent. However, we recommend adjusting the timing to align with the operational life of the assets post current refurbishment so that both investment benefits can be maximised.

Aligned to Icon Water's asset condition report and risk assessment the project should be completed by 2030. Without evidence of cost saving by bringing forward the project to combine earthworks operations with the earthworks for the Secondary Treatment Bioreactors Capacity Upgrade project it is not deemed prudent to accelerate the project.

Efficiency

The project is still at a relatively early stage of development with options assessment not yet complete and only indicative costing provide.

Option Assessment

The project has undergone a project option selection process aligned with the Icon Water IPAD project governance process. Three options are currently being considered:

- Option 1 - Fluidised Bed Combustion
- Option 2, 3, & 4 - Mesophillic Anaerobic Digestion
- Option 5 – Gasification

A summary of the provisional assessment of these options is included in Table 69.

Table 69: Summary of LMWQCC Biosolids Management Renewal Project options[42]

Option	Non-Cost MCA Score	Non-Cost Differentiating Features	Stage 1 Capex (including contingency) $million, $2021-22
Option 1 Fluidised Bed Combustion	79 % Rank 2	• Provides PFAS and microplastic destruction. • Potentially higher Scope 1 GHG emissions than other options (due to N2O in flue gas). • Potential for greatest electricity production of options (reduced Scope 2 GHG emissions). • Lowest complexity of options. • Currently limited number of local suppliers and supplier partnerships with local • contractors will take significant time to develop.	$ 230.2
Option 2, 3, & 4 Mesophillic Anaerobic Digestion	54 – 60 % Rank 3, 4, 5	Does not remove PFAS or microplastics. • Larger footprint than options 1 and 5 and thus greater construction impacts. • Marginally energy positive when using thermal drying to reduce biosolids transport volume. • Highest operational complexity due to multiple system interactions.	$ 231.4
Option 5	79 % Rank 1	• Provides PFAS and microplastic destruction. • Biochar product has higher agricultural benefit than ash produced in Option 1. • Limited hands on operational and maintenance experience of equipment. • Currently limited number of local suppliers and types of gasifiers available.	$ 232.6

[42] Hunter H2O, CX11262-LMWQCC Biosolids Renewal Concept Design, Options Assessment Report Table E1, piii.

Formal MCA assessment of options and selection of the preferred option is yet to occur. This is planned to be completed by December 2022.

Cost Estimate

Following completion of the options assessment, scheduled for December 2022, a more detailed and robust cost estimate is planned. For the purposes of assessing a cost of the project to include in the 2023-28 capital expenditure forecast, Icon Water assumed Option 5 Gasification as the preferred option and has costed on this basis.

Icon Water's capital proposal costing was based upon the preferred option at the time of development which is based on Option 3. The total project cost has been estimated at $169 million ($2021-22) with capital expenditure spread between 2020 and 2032. The proposal capital expenditure in the 2023-28 regulatory period is $61.5 million. As the time of the interviews Icon Water had selected Option 5 Gasification as the preferred option but had not adjusted the capital expenditure estimate.

It should be noted that Icon Water indicated the original expenditure profile was for $100 million in 2023-28, however similarly to the previous project assessed above, it has deferred the contingency (30%) to the next regulatory period.

Again, it should be noted that this is not a cost saving only the deferral in timing of the expenditure.

Icon Water stated the reason for deferring this expenditure was because it believes there is a less than 50% probability that this expenditure would be incurred in the period and customers shouldn't bear that risk in its forecast.

This will benefit customers in the short term but could still be incurred in the next regulatory period.

This project also has the potential to deliver operating cost efficiencies though the generation of heat and syngas to support the operation of the onsite treatment process or sell on the energy and the sale of by products such as ash for construction products, resulting in lower costs or new revenue.

Any impact on operating costs will fall outside of the 2023-28 period and has not been considered in this assessment.

Delivery

As noted above, the project is still at an early stage of development and limited information has been provided as to the delivery model or approach.

Icon Water noted in its presentation on the project that:

- 'Future Engagements will be made based on a delivery methodology still being determined
- Engagements likely to require tier 1 contractors but efforts to maximise local workforce to be investigated'[43].

[43] Icon Water presentation 2023-28 Water & Wastewater Price Proposal, LMWQCC Biosolids Management Renewal, July 2022

Without this information it is not possible to assess if the delivery model is efficient.

4.5.4 Recommendation

The project is 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.

The proposed timing of the capital expenditure is not deemed prudent as the construction activities and costs are spread across seven years (2025-26 to 2031-32) which is longer than is required for construction of this type and scale of project. 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. It is recommended to reduce the project timeline from 10 years to 5. This will:

- Provide sufficient time to plan, design and construct the new assets ahead of the required renal date of 2030
- Reduce the project management, governance and administration overheads, based on a shortened project timeframe
- Provide more time to fully plan, scope and cost the project ahead of construction commencing.

The recommended reprofiled project expenditure for the 2023-28 regulatory period, and an efficient estimate for the project, is set out in Table 70 below.

This estimate is based on realigning the timing of the expenditure and consideration of similar projects, consideration of the early development of this project and the lack of a preferred option, scope and confirmed costings.

It is considered that this cost allowance and the reprofiling of the expenditure provides an appropriate balance of risk between customers paying for services they require and Icon Water having sufficient funding to effectively manage its operational risk. It should be noted that this a reprofiling of the expenditure and not necessarily a reduction in the overall project cost.

Table 70: LMWQCC Biosolids Management Renewal Capital Expenditure Recommendation, $million, $2021-22

$ Real 2022	2023-24	2024-25	2025-26	2026-27	2027-28	2023 - 28 Total
Proposed Capex	7.91	5.61	23.44	10.39	14.12	61.47
Recommended Adjustment	-4.52	-2.22	-16.67	3.16	16.36	-3.89
Recommended Capex	3.39	3.39	6.77	13.55	30.48	57.57

4.6 CX11311 Sewer Mains Renewal Program

4.6.1 Project overview

The sewer mains renewal program is designed to maintain a defined level of service to Icon Water customers and to provide reliable sewerage services that ensure compliance with the relevant environmental licence requirements. The program is designed to target investment using evidence-based assessments and decision-making frameworks that enable interventions that address degradation of the system and minimise service disruptions.

A number of elements are involved in developing the required level of expenditure for this program including planned sewer cleaning and inspection programs, reactive maintenance activities, flow modelling, sewer system monitoring, root cleaning programs and climatic data collection, such as long-term weather forecasts monitoring expected rainfall and drought conditions, as well as the moisture content of the ground.

The historical approach to this program is to develop an annual package of sewer mains designated for renewal based on the analysis of inspection programs and reactive maintenance activities. The scope covers the use of a range of remedial methods such as pipe relining, pipe bursting and site restoration works. The actual method of renewal selected is dependent on the site-specific conditions such as sewer location, depth, and the condition of the host pipe.

The program in its current form allows for the rehabilitation of 20 kilometres of reticulation sewer mains per year during 2023-28, with a total target of 100 kilometres of completed rehabilitated sewer.

4.6.2 Current Status

The program is at the Envisage Stage of the IPAD process.

4.6.3 Documents reviewed

- AMP Sewerage Collection and Transfer
- Concept Development Statement CX11311 – Sewer Mains Replacement 2023-28
- April 2022 UIRF Pre-Read Icon Water
- CX11060 – Sewer Mains Renewal Program – ESP Endorsed 1 April 2019
- CX11311 – CDS Cost Calculator
- Initiatives – Sewer Mains Renewal Program 2023 – 2028
- National Performance Report 2020-21 Urban Water Utilities
- Planned Water Retic and Sewer Network Maintenance Program 2020-21
- Strategic Review of CX11060 Sewer Main Renewals Program 2018-2023, Investment Review Committee memo

- Refence to RFI C095 – EDA Analysis of the long term program
- Utility Industry Regulatory Forum Presentation – April 2022

4.6.4 Prudence

Driver/benefit

Icon Water has undertaken Customer Surveys[44] to test the level of service and willingness to pay as part of its submission for 2023-28 which identified:

- The community is committed to Icon Water maintaining quality and reliable core services and is willing to pay something towards reducing interruptions or issues for those who experience them more than usual, and
- Continuing to undertake targeted renewal programs where more frequent interruptions are observed is supported.

Icon Water is also required to meet the following customer service standards:

- Less than 0.5% of connections have more than three service interruptions per year
- Less than 5% of connections experience an outage of more than six hours (planned or unplanned).

To achieve the expected outcome of <5% and <0.05%, Icon Water has set a sewerage network performance target of an average of 40-66 breaks and chokes per 100km of main/year.

Icon Water also participates in industry benchmarking activities which enables it to make comparative assessments of performance against other water utilities offering the same service through the National Performance Report. Icon Water's most recent historical performance is presented in the table below.

Table 71: Icon Water's Historical Sewer Main Choke Performance

	2016-17	2017-18	2018-19	2019-20	2020-21	Average
Number of sewer mains breaks and chokes per 100km	48.9	55.6	72.1	83.8	52.3	**62.5**

The table above identifies that the most recent performance indicates an improvement on previous performance. This is attributed to the effectiveness of the current program.

Commentary from the current National Performance Report highlights that for the 2020-2021 period the average breaks per 100km of main for relevant peers is 30.6/100kms/year. Noting that whilst the most recent result for Icon Water of 52.3 is a significant improvement, it is still well behind the industry average.

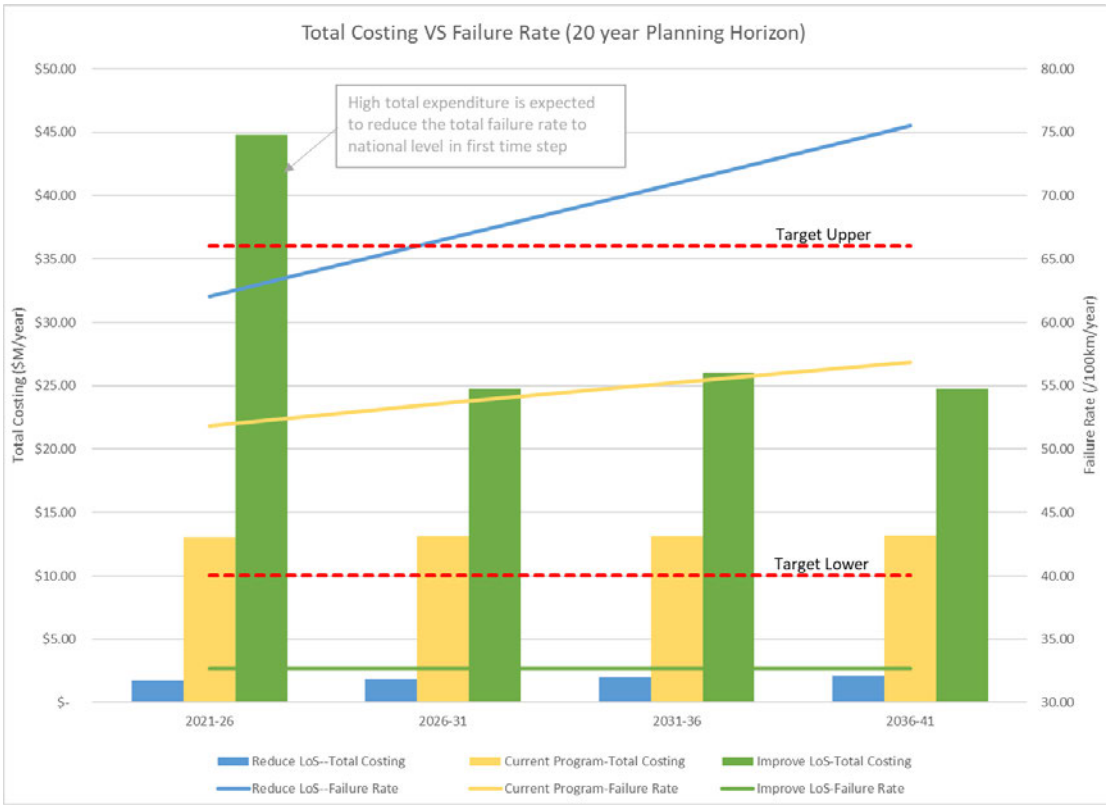
The National Performance Report data also shows that the majority of water utilities saw an improvement against this metric in the 2020-21 year. Commentary in the report notes "The overall

[44] Icon Water Customer and Community Strategic Engagement Project Report, April 2022

decrease in sewer main breaks and chokes is consistent with the return to average to above-average rainfall for much of eastern Australia in 2020–21, leading to wetter soil conditions and a decreased risk of breaks and chokes."

Icon Water has undertaken modelling to forecast the level of investment required to achieve the target break and choke rate. With reference to the work done to justify investment, evidence of the effectiveness of the program to maintain performance has been provided through the EDA analysis of the long term forward program. Results are presented below.

Figure 27: EDA analysis of the long term forward program



The above figure is a graphical representation of the modelled impact of the level of investment proposed for 2023-28. As shown, the current proposed investment is forecast to maintain performance within the target levels.

The information provided identifies that the level of investment accounts for the deferral of capital works that occurred in 2021-22 and 2022-23 which seeks to lift the scope from 16kms per year to 20kms per year for the 2023-28 pricing period to bring the program back in line with investment modelling.

Risk

The most recent risk assessment for the proposed program was held in March 2022, in accordance with Icon Water's risk management methodology.

The key risk identified that "recurring blockages or overflows associated with degradation of the reticulation sewer mains are also expected to have customer dissatisfaction or reputational, and possible regulator involvement or legal/compliance consequences." The medium risk rating assumes the sewer renewal program as a control.

Table 72: Sewer Mains Replacement Risk Assessment[45]

Risk no.	Risk description	Current risk rating
RSK-2648	Degraded reticulation sewer mains leads to **increased blockages and overflows as well failing customer and network KPIs**, resulting in **moderate** impact to business **operations**.	Medium (Possible/Moderate)

Timing

The program is planned to be delivered evenly over the period. Past performance indicates that some variation in the program is expected and in the previous pricing period a significant change was associated with deferral of works to accommodate more urgent trunk main sewer renewals.
Based on the above assessment, the proposed program is deemed prudent.

4.6.5 Efficiency

Option assessment

An options assessment of the 2023-28 program has not been undertaken to date, due to the fact that the program has currently been assessed to the Evaluate Stage in Icon Water's IPAD process. In the face-to-face interviews the previous regulatory periods options assessment was presented with four options considered. The options differed only by the quantum of sewer main renewals to be undertaken.

Cost estimate

The cost estimate is based on previous work undertaken and projected over the forward expected program. As outlined in the Concept Development statement, the estimated cost for the proposed program is $520/m equating to a total program cost of $52 million.

Delivery

It is proposed that the delivery of the program will be through a panel arrangement common to the existing agreements in place. This includes the use of two contractors, engaged with an agreed schedule of rates that price work packages for delivery as they are issued by Icon Water. Via competitive tender, two panel contracts were established for lining and bursting. The packages are then split between the two contractors based on required method of renewal.

[45] *Sourced from Concept Development Statement – CX11311 – Sewer Mains Replacement 2023-28*

4.6.6 Recommendation

The review of current system performance has highlighted that previous sewer main programs implemented by Icon Water to improve performance has had a positive impact. The deferral of work from the last program coincided with increased rain fall within the catchment area which has been reported to result in a positive impact on sewer systems across the eastern states. Icon Water's approach to the definition of the sewer main program is based on its Enterprise Decision Analysis tool which assesses the impact of investment levels. The EDA analysis identifies a program of 20 km/yr, will result in continued performance within Icon Water's target for sewer main breaks and chokes per 100kms. Based on this analysis the program has been assessed as prudent.

The cost estimate for the program is not detailed based on the early stage of development in IPAD process. The program is consistent in the nature of the scope and delivery of the former program and the current proposed capital expenditure is based upon the previous period's unit rates for delivery and applied to the greater length of sewer main renewals. It is reasonable to assume this provides a reliable estimate for the cost of the program and recommended that Icon Water focus on the design of the program to produce efficiencies in delivery.

Table 73: CX11311 Sewer main Renewals Program Expenditure Recommendation, $million, $2021-22

Sewer Main Renewals	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Proposed Capex	11.51	11.64	11.63	12.00	12.04	58.81
Adjustment	0.00	0.00	0.00	0.00	0.00	0.00
Recommended Capex	11.51	11.64	11.63	12.00	12.04	58.81

4.7 CX11313 Water Meter Renewals

4.7.1 Project Overview

CX11313 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 2018-2023 period to install or replace 49,961 water meters.

Icon Water is proposing 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.

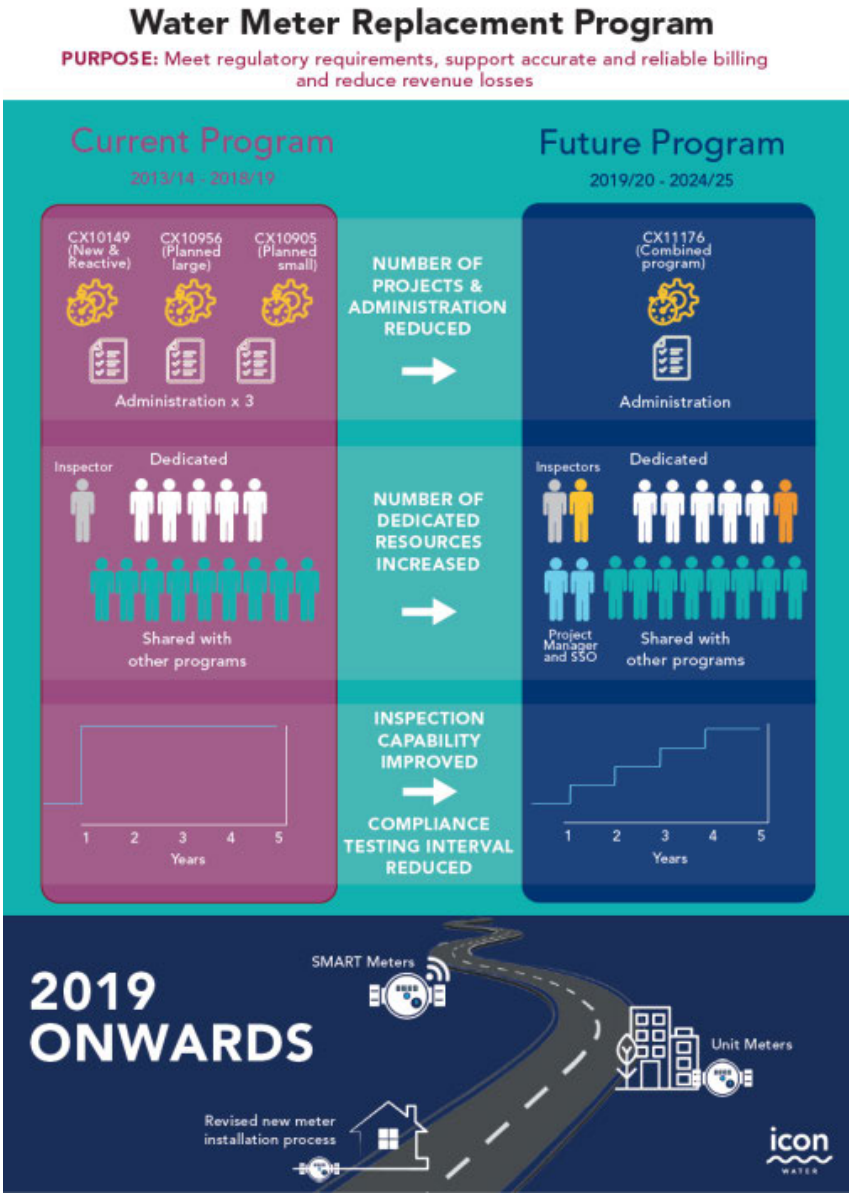
The proposed scope of this program is to:

- 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.

In assessing this program for the upcoming regulatory period, Icon Water considered maintaining its current program approach or reviewing and optimising various elements of the approach including the replacement criteria, replacement method and resourcing of the program.

The revised approach is shown in the below diagram.

Figure 28: Icon Water's revised Water Meter Replacement Program approach[46]



4.7.2 Current Status

CX11313 Water Meter Renewals is currently in the EVALUATE stage of program planning and development with implementation planned from 2023-24.

4.7.3 Documents reviewed

- Stream 3 Tue 330 - 5 CX11313 Water Meter Renewals
- CX11313 CDS - Meter Replacement Program 2023-28

[46] Stream 3 Tue 330 - 5 CX11313 Water Meter Renewals, Icon Water, July 22, slide 5

- CX11313 CDS costs_C044
- RFI C044_water meter program CX11313
- Meter Replacement Program Data Request
- Meter Replacement Program Data Request updated

4.7.4 Prudence

Driver/benefit

Icon Water states the drivers of this program to be:

- Compliance with the ACT Water Metering Code, AS 3565-Part4 and NMI 49-1, and
- Maintaining accurate measurement of water use to reduce water loss, revenue loss and to support equitable and reliable billing between customers

Risk

A key corporate risk was assessed in line with Icon Water's internal risk management processes. The outcome of that risk assessment is set out in Table 74 below.

Table 74: Icon Water risk assessment of CX11313 Water Meter Renewals

Risk no.	Risk description	Likelihood	Consequence	Current Risk Rating
1	Failure to issue new or renew deteriorated water meters leads to inaccuracies in water usage billing data, resulting in minor regulatory non-compliance.	Likely	Minor	Medium

Timing

Icon Water is proposing an ongoing program of water meter installations and replacements across the 2023-28 regulatory period.

4.7.5 Efficiency

Option assessment

Icon Water has not carried out an options assessment process for the 2023-28 expenditure. It provided the outcomes of its options assessment for 2018-23 in its presentation to us in July 2022, assessing 3 program approaches:

1. Do nothing – cease all water meter installations and replacements
2. Maintain the current program approach – current replacement criteria, method, and resourcing, or
3. Review and optimise the program – review the replacement criteria, method, and resourcing.

Ceasing all meter replacements for a 5-year period represents a financial and operational risk to Icon Water. Water meters will invariably fail during that period and expense will be incurred. A proactive and reactive program of meter replacements is a reasonable requirement of a functioning water business.

Continuing its previous approach, Icon Water's options assessment estimated a 5-year spend of $17.2 million across 2018-23 to replace ageing or failed water meters and install new water meters (with new connections).

The options assessment provided an estimate of $20.7 million across the same 5-year period to review and optimise Icon Water's current approach to its water meter program.

On the basis of the options assessment, Icon Water elected to pursue an improved model for $20.7 million across the 5-year regulatory period.

It is this model that it has based its current cost estimate for the 2023-28 regulatory period.

Cost estimate

Icon Water's Project Envisage Stage – Concept Development Statement sets out a cost estimate of $31.2 million for this project/program and the following assumptions relevant to the cost estimate:

- For standard mechanical meters, equipment and material unit rates have been applied based on historical costs reported against the current program CX11176 (excluding labour)
- Labour is a significant component of the Execute costs, accounting for 65% of estimated Execute costs (compared to roughly 60% on the current CX11176 program). The increase in the proportion of costs is considered reasonable as the installation costs are estimates on Water Industry Operators (WIOs) effort calculated at internal fully burdened rates. The installation or estimated effort against WIOs is the largest of labour costs; opportunities to reduce or optimise will be investigated under the Evaluate stage
- New and replacement meter numbers have been estimated by extrapolating current issue data and accounting for growth forecast and ACT Government Land Release numbers
- Unit meter impacts have been included in the new meter estimates by adopting Equivalent Person (EP) per connection ratios provided by the Analytical Services team to the Metering Team. It is assumed that developers will pay initial equipment and installation costs for new builds
- EP and connection estimates assume growth is represented as 'medium density development' at 2.1 EP/dwelling (based on 2016 census data). Additionally, it is assumed that the growth triggers new water and sewer connections
- Replacement meters have been estimated assuming the same replacement criteria is maintained under the current program [current replacement criteria will be reviewed and reassessed following current and ongoing compliance testing]
- The estimates for reactive meter replacements have been based on historical replacement rates, taking into account the top four reasons of reactive replacement (i.e., non-registering, leaking, damaged, and noisy), which support extrapolation of historical reactive replacements to increase proportionally with growth rates
- At this stage, allowances for development of rollout scenarios for the transition from mechanical to digital metering to be included in the 2021 Insights/Willingness to pay customer surveys have been

provided under Evaluate costs. At this stage, there are no provisions or contingencies for digital infrastructure under Plan or Execute. The estimates provided in this CDS allow for opportunistic preparation at new or replacement meter installs for future installation of digital infrastructure (e.g., potentially a deeper install to allow for digital equipment to be installed at a later date). However, this is subject to the outcome of CX10989, Insights/Willingness to pay customer surveys, and Evaluate stage analysis.

A total program cost of $31.2 million is proposed with $30.6 million forecast to be spent in the 2023-2028 regulatory period. The remaining development funds are incurred in 2021-22 and 2022-23.

Delivery

Icon Water proposes to approach the market through an open tender process for the supply of meters and associated materials, while administering and carrying out the program works using internal Icon Water resources.

Icon Water proposes to install the following during 2023-28:[47]

- 17,930 new meters
- 8,310 reactive meter replacements
- 37,914 proactive meter replacement (small)
- 2,995 proactive meter replacement (large)

Icon Water has forecast the number of new meters and connections required based on population growth. We consider the growth forecast resulting in a total of 17,930 new meters/connections ambitious given previous connections data provided by Icon Water. Icon Water installed the following number of new connections over the last 10 years.

Table 75: New meter/connection installs 2012-13 to 2021-22

2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
2056	1734	1688	1245	1744	1501	1555	1629	1956	1709

The 10-year average is 1,670 new meters/connections per year. The 5-year average is 1,670 and the most recent 3-year average is 1,764.

Assuming growth is in line with the most recent 3 years, and not the 10-year average, we consider 8,820 new meters/connections to be an appropriate forecast for the next regulatory period (compared with the 17,930 forecasts by Icon Water).

Over the last 10 years, Icon Water has replaced the following number of meters, reactively.

[47] RFI C044_water meter program CX11313, Icon Water, August 2022

Table 76: Number of water meters replaced reactively 2012-13 to 2021-22

2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
596	459	660	540	398	685	1016	841	694	469

The 10-year average is 635 meters replaced reactively per annum. Over the most recent 5 years the average was 741 meters replaced per annum and in the most recent 3 years, the average was 668 meters replaced per annum.

Allowing for the worst-case scenario, we consider a forecast of 3,705 meters to be replaced reactively during the next period more reasonable than Icon Water's forecast of 8,310 based on the average over the most recent 5 years. This is based on 741 reactive meter replacements per year as per the 5-year average above.

Over the last 10 years, Icon Water has proactively replaced the following number of meters per annum.

Table 77: Proactive meter replacements 2012-13 to 2021-22

2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
3172	361	1864	9868	7359	5950	6721	7117	7614	6476

On average, Icon Water has proactively replaced 5,650 meters per annum over the last 10 years. Over the last 5 years the average per annum was 6,775 and in the most recent 3 years, Icon Water replaced on average 7,069 meters proactively.

Icon Water has advised, due to the expected life of the meters, it needs to replace 40,909 meters during 2023-28. However, recent performance indicates it can deliver 35,345 without scaling up its resourcing and delivery.

Icon Water has advised it is revising the way it plans to deliver this program but has not yet carried out analysis to determine the most efficient delivery model. Revising its delivery model could provide for the scale efficiencies required to deliver 40,909 meter replacements due to end of life during the 2023-28 regulatory period so for this reason, we accept Icon Water's forecast for proactive meter replacements.

We note consideration should be given to whether a competitive tender process would deliver a more efficient outcome for the supply and install of Icon Water's water metering fleet across the 5-year regulatory period, instead of an internal delivery method.

4.7.6 Recommendation

The program is deemed prudent but the forecast number of meters to install is considered inefficient.

Historic data indicates Icon Water needs to reactively replace on average 741 meters in years where it experiences the largest number of failures. This would indicate a total of 3,705 over the next regulatory period compared with the 8,310 forecasts by Icon Water.

Similarly, Icon Water's forecast for new meters/connections based on growth is higher than the average number of new meters/connections installed over the last 10 years. Assuming the highest growth in connections over the last 10 years, Icon Water will need to install 8,820 new meters/connections in 2023-28, compared with the 17,930 forecasts by Icon Water.

Icon Water has, on average, historically replaced 7,069 meters proactively. It has advised us it needs to replace 40,909 during 2023-28 due to end of life. It will need to ensure it can deliver that many meter replacements under its new delivery model.

For this reason, we consider it prudent for Icon Water to deliver the following meter installs/replacements during 2023-28:

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

This is a total of 53,434 – a 20% reduction on the 67,149 forecasts by Icon Water. We have reduced Icon Water's cost estimate for this program by the same amount – a reduction of $6.24 million spread evenly across the 5-year period.

Table 78: Recommended expenditure on Water Meter Renewals, $million, $2021-22

Water Meter Renewals	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Proposed Capex	5.95	6.10	6.21	6.34	6.55	31.14
Adjustment	-1.25	-1.25	-1.25	-1.25	-1.25	-6.24
Recommended Capex	4.70	4.85	4.96	5.09	5.30	24.91

4.8 CX11266 Cotter Pump Station Upgrade

4.8.1 Project Overview

The Cotter Water Pump Station (CWPS) forms part of critical assets to ensure raw water supply to Stromlo Water Treatment Plant, one of Icon Water's two water treatment plants. Recently Icon Water developed a source water strategy that takes into account expected population changes as well as forecast impacts of changing climate conditions. The CWPS upgrade project has been identified as a critical component of the delivery of this strategy.

The existing pump station was first commissioned in 1915 with some equipment still in original condition. Being one of the oldest buildings in the ACT, a heritage order has been placed on the building and facilities that has limited the required works to enable the CWPS to meet the pumping requirement and capacity for current and future needs. These restrictions, and analysis of options, has led to the construction of a replacement Cotter WPS No. 2 as the most efficient long-term option. In addition, the project will improve the reliability of the CWPS and lead to cost reductions associated with the employment of more efficient pump technology.

Prior to this stage of works, intermediate actions were undertaken to construct Pump 10, in a separate facility on-site (including the required connecting pipe work). The performance and reliability of the new pump demonstrated potential benefits for Cotter WPS No. 2 through recorded pump efficiencies and reliability. The majority of the components of Pump 10 will be used as part of the new construction project.

4.8.2 Current Status

The project is at the Develop stage of the IPAD process.

4.8.3 Documents reviewed

- CX11266 – Project Development Stage Proposal – Cotter Pump Station Upgrade 05.08.2020
- CX11266 – Business Case Cotter Pump Station Improvements – Endorsed 27.2.2020
- CX11266 – PCR 001
- CX11266 Cotter Pumping Station improvement – Capex Determination
- CX11266 PCR-02 Cotter Pump Station Improvements – Endorsed 29.6.2020
- Item no. 19 Board decision Meeting No.:266, 26 Aug 2020
- 2023-28 Water& Wastewater Price Proposal – Cotter Pump Station Upgrade (CX11266) presentation – July 2022

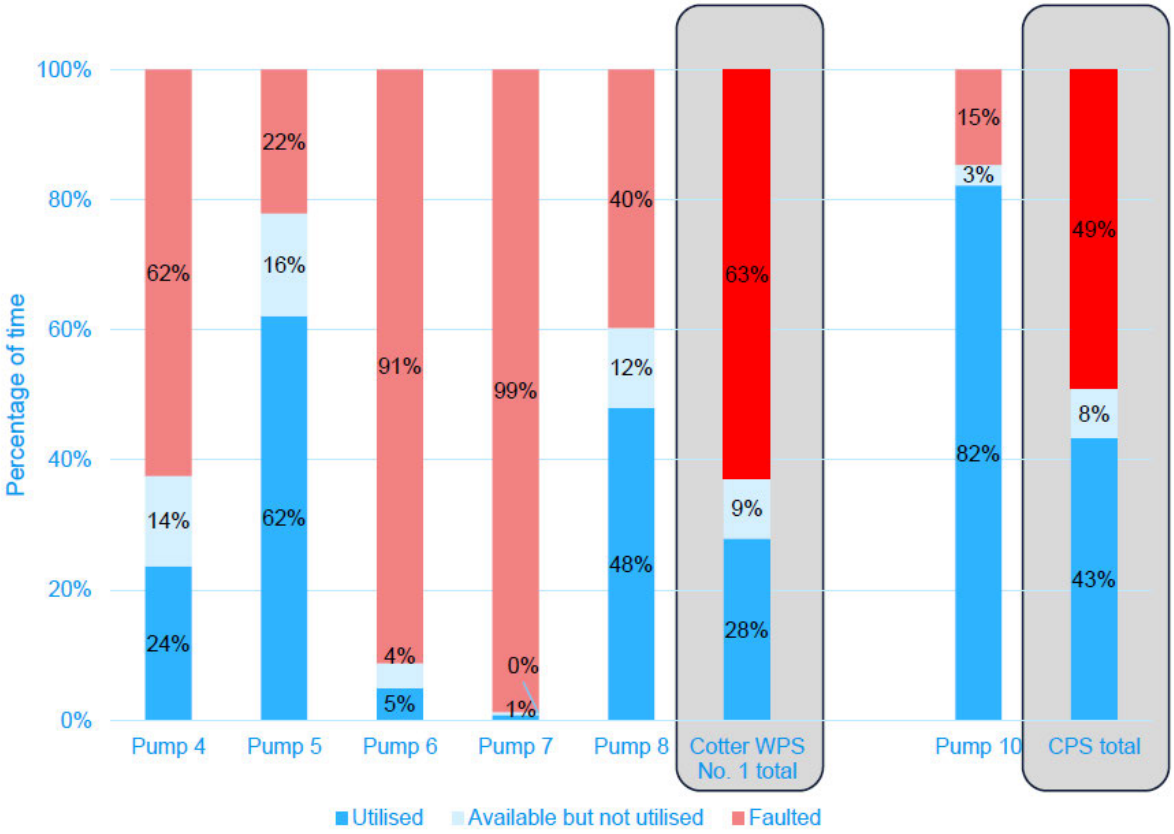
4.8.4 Prudence

Driver/benefit

The CWPS upgrade project is part of Icon Water's response to its source water strategy. The improvements are required to ensure reliable and efficient abstraction from Cotter Dam and the Murrumbidgee River. Key drivers for the project include:

- Poor reliability – pump failures have led to the inability to meet targeted abstraction rates from Cotter Dam. The lower level of abstraction therefore requires a higher reliance on other raw water sources in the network that are less desirable due to cost to treat and reliability.
- Inability to extract at the desired rate led to 43% of Canberra's remaining storage in Cotter Dam (it holds only 27% of the total) as operations were adjusted to supplement the unsustainable shortfall in abstraction.
- Difficulty in maintenance – created by the heritage listing, outdated technology, limited support from suppliers, related site restrictions and the high level of required planned maintenance to ensure pump availability.
- Poor efficiency – The existing heritage listed pumps require 57% more energy than modern pump technologies.

Figure 29: Cotter Water Pump Station – Pump performance[48]



The above figure demonstrates the recorded level of reliability and percentage of time available for the existing pumps in the CWPS. The five operational pumps in Cotter WPS No. 1 on average faulted 63% of the available time. Pump 10, installed in 2011, demonstrates the improvement in performance and reduction of maintenance.

In addition to the reliability issues, it has been highlighted that the installation of new pump technology will lead to efficiency improvements of up to 350kW/h/ML. Equating to a 35% improvement in energy consumption.

Risk

Icon Water has identified two main risks if the CWPS upgrade project does not proceed:

1. Insufficient water being sourced for the community which results in a severe impact to businesses and operations
2. A severe safety risk associated with a fire or electrical hazard within the Cotter WPS No. 1.

These risks have been assessed as medium with the details provided in Table 79 below.

[48] *Sourced from the 2023-28 Water& Wastewater Price Proposal – Cotter Pump Station Upgrade (CX11266) presentation – July 2022*

Table 79: Cotter Pump Station Upgrade Risk Assessment[49]

Risk no.	Risk description	Likelihood	Consequence	Current Risk Rating
1	Limited redundancy options for water source supply (should Cotter Pump Station go offline through pump failure) means that insufficient water can be sourced for the community, results in a severe impact to business operations	Rare	Severe	Medium
2	Pump failure causes fire or electricity hazard inside the Cotter Pump Station, resulting in a severe safety incident.	Rare	Severe	Medium

Timing

Some adjustments to timing have been proposed for the purpose of optimising investment timing. A decision was made to progress the project to the Develop Stage and pause the commencement of the Execute stage until the 2023-28 regulatory period. The following highlights the key milestones for the delivery of the project.

Table 80: Cotter Pump Station Upgrade Project timing

Stage	Target Completion Date
Plan Stage	Complete
Develop Stage	Jun 2023
Execute Stage	Jun 2025

The profile of expenditure demonstrates alignment with the above timeframe with costs peaking at the expected time of construction and delivery.

The business case identifies the selected option will lead to operational savings of $2.8 million over a 10-year period.

The investment in the Cotter Pump Station Upgrade is assessed as prudent based on:

- The investment enabling Icon Water to implement its source water strategy
- It resolves the current operational issues associated with reliability, constraints and associated costs experienced with Cotter Pump Station No. 1, and
- The project will release operational savings as assessed under the options analysis of $2.8 million over 10 years.

[49] *Sourced from CX11266 – Business Case Cotter Pump Station Improvements – Endorsed 27.2.2020*

4.8.5 Efficiency

Option assessment

The project underwent an options analysis as part of the development of the business case. A total of six options were developed for assessment as presented in the Table 81 below.

Table 81: Summary of Cotter Pump Station Upgrade Project options ($million)

Option	Non-Cost MCA Score	Non-Cost Key Benefits/Disadvantages	Initial Capex	Option
Option 1 Maintaining current status quo by focusing on preventative and reactive maintenance	1.32/5 Rank 5	Nil	Nil	53.81
Option 2 Temporary augmentation with diesel driven pumps	1.82/5 Rank 4	Short, 18-to-32-week, lead time can mitigate some risk of further decline in CPS reliability Frequent refuelling and maintenance Occupies footprint for Option 3 & 4 preventing these options from progressing Environmental impact (noise, CO2 emissions, fuel transport and storage) HV hazards in existing switch room not addressed	3.84	70.18
Option 3 Construct new pump station (Cotter WPS No. 2).	3.04/5 Rank 2	Duty/Duty capacity at 100 ML/d with modern pumps Energy efficiency maximized unless standby pumps required Provision for future expansion of two additional pumps Approximate 34-month lead time. Major impact on Pump 10 during construction. WPS No. 1 (pumps 7 & 8) still required as standby capacity HV hazards in existing switch room not addressed	18.81	49.08
Option 4 Construct new pump station (Cotter WPS No.	4.89/5 Rank 1	Duty/Duty/Standby capacity at 100 ML/d with modern pumps, allowing for decommissioning of WPS No. 1	21.65	46.45

Option	Non-Cost MCA Score	Non-Cost Key Benefits/Disadvantages	Initial Capex	Option
2). Install pump 11 and 12.		Max. capacity to 150 ML/d providing greater operational flexibility Energy efficiency maximized under all operating configurations Allows for decommissioning of HV switch gear in existing switch room Provision for future expansion of one Approximate 34-month lead time. Major impact on Pump 10 during construction.		
Option 5 Refurbish the historic pump station (Cotter WPS No. 1)	N/A	Not Assessed Requires removal of heritage listing. This would likely only be obtained if there were no reasonably practicable alternatives. Would likely require heritage items to be relocated elsewhere.	N/A	N/A
Option 6 Install pump 12 in temporary cabin	2.79/5 Rank 3	Duty/Duty capacity at 100 ML/d with modern pumps Energy efficiency maximized unless standby pumps required Avoids major modification to Pump 10 during construction Short design life will require augmentation in approximately 15 years. Cabin design restricts and complicates maintenance task on the pump and VSD HV hazards in existing switch room not addressed Requires decommissioning of pumps 4, 5 & 6 to accommodate new switch gear in existing HV switch room, resulting in no net increase in pumping capacity Pump 7 & 8 retained as standby capacity Does not facilitate future expansion for Pump 11 and 13 Minimal CAPEX saving when compared to option 3 & 4 as the bulk of the costs are in	15.63	48.49

The outcome of the above options assessment was to select Option 4 with the following reasons provided in the Business Case[50]:

- It was the only option that addressed all the stated objectives
- It had the highest multi criteria assessment score of 4.89/5 (outranking the closest option by 1.85 points)
- It produced the highest risk reduction outcome
- It was the highest performer with respect to safety
- It was the most effective from a long-term life cycle solution, and
- Whilst it had the highest initial capital investment, it performed well against the total cost of ownership.

The business case identifies the selected option will lead to operational savings of $2.8 million over a 10-year period due to increased pumping efficiency and lower electricity costs, and reduced maintenance requirements. These savings will commence following the completion of the upgrade scheduled for June 2025.

Cost estimate

A detailed cost estimate was developed as part of the Develop stage proposal which sets out a total capital budget of $22.8 million to the end of the Execute stage. As part of the 2023-28 submission, Icon Water revised the estimate for the total project cost and as outlined in a memorandum[51] received as part of the information requested, a further estimate has been prepared for approval by the Investment Review Committee in August 2022. A summary of the changes to estimates is provided in Table 82.

Table 82: Summary of Cotter Pump Station Upgrade Project Cost Estimates Variations $million, $2021-22

Item	Project Evaluate Stage Feb 2020 ($M) +/- 30%	Project Development Stage Aug 2020 ($M) +/- 10%	2023-28 Pricing Submission Jun 2022 ($M)	Current estimate Memo Aug 2022 ($M)
Evaluate, Plan and Develop Stage Costs	$1.7	$2.9	$3.1	$3.3
Execute Stage	$19.95	$19.88	$23.4	$24.4
Total	**$21.70**	**$22.77**	**$26.5**	**$27.7**

[50] Project Development Stage Proposal – VX11266 Cotter Pump Station Upgrade
[51] Memorandum RFI C099 and C100 – Cotter Pump Station (CX11266)

Icon Water has explained the change in cost estimate by stating:

"The total value in this estimate has increased from the amount included in the regulatory submission. This is primarily due to a significant increase in forecast construction estimate contingency as a result of recent information on costs for Sydney Water to build a very similar pump station, offset slightly by reductions in estimated consultant and internal labour costs."

Assessing the detail of the contingency allowance in the current estimate highlights the level of uncertainty relating to the cost of construction, leading to an additional $2.8 million allowance. The additional contingency, derived from industry commentary and the benchmarking against Sydney Water is assessed as reasonable. The current forecast supports costs associated with the Execute stage, including project management, internal and external stakeholder management and consultants support and accounts for 14.7% of the overall construction cost.

Delivery

The delivery approach for the project is to apply a detailed design and construct approach using external support and led by an internal team from Icon Water. The detailed design and construction support has been procured through Icon Water's design panel with GHD selected to provide support to completion of the contract.

The supply of equipment and construction will be through a single Principal Contractor, engaged under Icon Water's standard Construction Works Contract. The Principal Contractor will be selected through a competitive open Expression of Interest and Request or Tender process.

4.8.6 Recommendation

The Cotter Pump Station Upgrade Project has been assessed as prudent based on the requirement to meet the current and future needs of Icon Water's source water strategy and the resolution of reliability and performance issues. The project is at the Develop stage and recent industry benchmarking has identified forecast increased costs associated with construction market changes. The additional costs associated with contract costs are accepted. Additional overhead costs compared to the current submission are not accepted as the additional costs to deliver have been identified as construction costs and not related to additional internal costs associated with the project delivery. For this reason, $1 million of the $2.8 million of additional costs are considered efficient and the following recommended adjustment is made to the latest estimate provided as part of this review.

Table 83: CX11266 Cotter Pump Station Upgrade Project Expenditure Recommendation, $million, $2021-22

Cotter Pump Station Upgrade	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Proposed Capex	20.48	1.97	0.00	0.00	0.00	22.45
Adjustment	0.91	0.09	0.00	0.00	0.00	1.00
Recommended Capex	21.39	2.06	0.00	0.00	0.00	23.45

In addition, the capital expenditure allowance for the Cotter Pump Station Upgrade, the business case of the project identified operating cost savings of $2.8 million over 10 years due to increased pumping efficiency and lower electricity costs, and reduced maintenance requirements. These savings will commence following the completion of the upgrade scheduled for June 2025. Based upon these identified savings it is recommended that the proposed operating costs are reduced by $140k in 2025-26 and $280k per annum from 2026-27. The lower saving in 2025-26 is to allow for delay to project delivery and potential commissioning issues.

4.9 CX11319 Vehicle Lease Renewals for Heavy Vehicle Fleet

4.9.1 Project Overview

CX11319 Vehicle Lease Renewals for Heavy Vehicle Fleet is a project designed to manage the leasing of heavy vehicles used to perform maintenance on Icon Water's water and sewer networks.

Icon Water leases these vehicles through a fleet management organisation and the leases have varying termination dates.

This project manages the prudent extension of leases where permissible, and the replacement of heavy fleet vehicles at the end of their useful life.

Icon Water is proposing to spend $12.9 million across 2023-28 to manage the renewal of its heavy vehicle fleet.

The project covers the replacement of heavy vehicles such as trucks, jet-rodders, hydro diggers and recyclers. Replacement of light commercial and passenger vehicles is not in scope for this project. These replacements are managed under CX11320.

The objectives of the project are that fleets assets are[52]:

- Fit for purpose and dynamically managed for maximum utilisation, balancing capability, reliability,

[52] Stream 3 Wed 130 - 315 CX11319 Vehicle Lease Renewals for Heavy Vehicle Fleet, Icon Water, July 2022, slide 5

flexibility and lifecycle costs

- Safe and proactively maintained, supporting a positive workforce culture complying with regulatory and reporting requirements, and
- Efficient, sustainable and actively renewed, supporting a transition to net zero greenhouse gas emissions.

There are a set of measures against these objectives in the Mobile Plant and Vehicles Asset Management Plan to demonstrate a willingness to monitor and meet these objectives.

4.9.2 Current Status

CX11319 is part of an ongoing program of work now required due to a change in the accounting standards (AASB16) that requires operating leases to be reflected as assets in the balance sheet instead of operating expenditure. Vehicle replacements were reflected as operating expenditure by Icon Water until 2019-20.

4.9.3 Documents reviewed

- Stream 3 Wed 130 - 315 CX11319 Vehicle Lease Renewals for Heavy Vehicle Fleet
- AMP Vehicles and Mobile Plant (1)
- CX11319 Vehicle Lease Renewals for Heavy Vehicle Fleet Reply V1
- Mobile Plant and Vehicles Strategy
- Fleet Forecast Model 2022-23 - price review - 10-year view updated
- C129
- Response to RFI C128

4.9.4 Prudence

Driver/benefit

In its presentation to us in July 2022, Icon Water explained its "fleet of heavy vehicles has a finite life that is impacted by the nature of the work they perform and by the size of the geographical area they are required to cover in providing essential maintenance to our water and sewer networks. Retaining these vehicles beyond their usable life creates inefficiencies through reduced fuel efficiency and higher repair costs arising from increased asset failure. It also places at risk our ability to meet our KPIs for delivery of our water and sewerage services."

Icon Water also advised the lease provider also imposes constraints on the number of years they are willing to extend a lease, and several of their vehicles are reaching that maximum term now.

During 2018-23, for various reasons, Icon Water advised it had leant heavily on lease extensions to manage its heavy vehicle fleet. However, the capex forecast for the coming regulatory period assumes this position will be reassessed, with a move back to renewing vehicles on lease termination.

Icon Water advised it will be considering the use of an 84-month maximum renewal period for heavy vehicle leases.

Icon Water advised that the successful and timely delivery of its network maintenance programs is heavily dependent on its access to reliable, fit-for-purpose heavy vehicles.

In a response to our requests for additional information, Icon Water advised the following water jobs occurred over the last 3 years, attended by the 25 water trucks Icon Water maintains in its heavy vehicle fleet.

Table 84: Water jobs attended by water trucks 2019-20 to 2021-22[53]

	2019-20	2020-21	2021-22
Jobs completed	15,360	14,156	13,377
Water trucks on hand	25	25	25

Under this program, Icon Water is proposing to renew 39 of its 48 heavy vehicles during the 2023-28 regulatory period. It is also proposing to review and improve the way it manages this program with:

- The creation of two new dedicated roles in the Infrastructure Services group restructure: Team Leader Supply Chain and Logistics and Fleet & Facilities Coordinator (in 2022)
- The transition of relevant fleet management services currently provided under the Corporate Services Agreement (expiring in June 2023) to new sourcing arrangements, and
- The seeking of a competitive market tender for the provision of fleet services at the expiry of contract with the current fleet management provider in March 2023.

Risk

No risk assessment was provided by Icon Water on the impact of various of funding levels or not renewing its fleet in line with its forecasts.

Timing

The AMP Vehicles and Mobile Plant sets out a reasonable process for assessing fleet asset condition and performance:

- Condition assessment is undertaken for assets, consistent with EN 05.00.45 Condition Assessment Guide
- Condition grading information is primarily derived from the FMO's management system records, including Mobile Plant and Vehicles Asset Management Plan 27 service maintenance records and reactive service requests
- Performance is assessed through compliance with "licences and other regulatory requirements" and

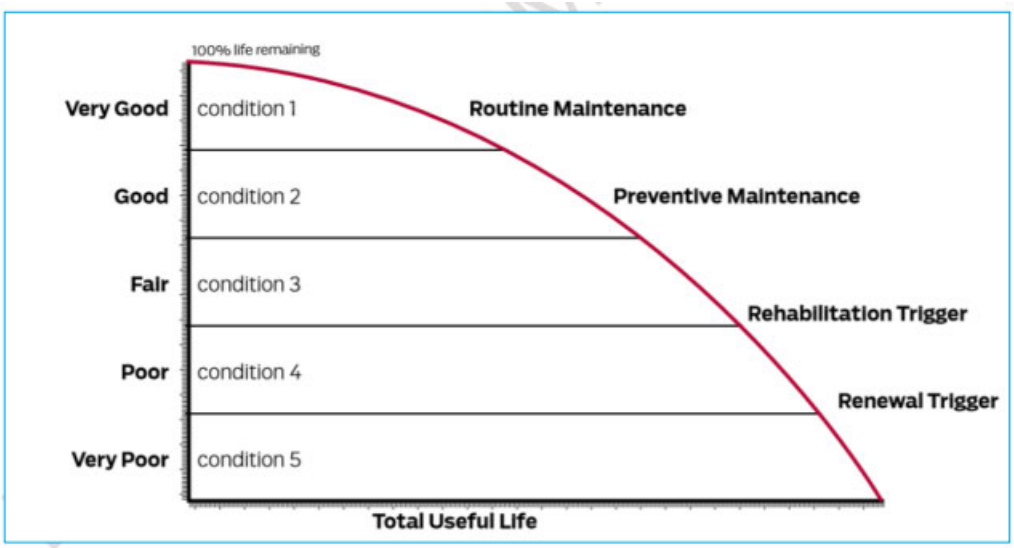
[53] Icon Water also advised for a 2-month period during the peak of COVID19 lockdowns, routine maintenance that would usually be attended by water trucks was de-prioritised, meaning the 2021-22 jobs completed numbers are understated.

assessment against Tier 2 objectives in the Mobile Plant and Vehicles Strategy

- Discussions with the vehicle user(s) to understand the general condition of the vehicle can also form part of the assessment.

Outcomes of the process set out the following approaches to managing the asset (see Figure 30 below).

Figure 30: Icon Water condition assessment and management approach



However, Icon Water advised, the primary trigger for heavy vehicle renewals historically has been vehicle age, and lease term. The mileage of vehicles approaching end of lease are then assessed against the contract mileage to determine whether renewal is appropriate or whether the lease could be extended.

Icon Water advised, a number of its leases are either at or approaching the maximum term for extensions and will need to be replaced if the business need still exists for these vehicles.

In a response to our requests for additional information, Icon Water advised 10 of its 48 heavy fleet vehicles are either beyond the maximum extension term right now or will meet that maximum in the 2023-2028 regulatory period.

In response to a request for additional information on the timing of these renewals (i.e., why such a large proportion of the fleet fell due for renewal in the 2023-2028 regulatory period), Icon Water advised:

Water trucks comprise just over 50% of our heavy vehicle fleet. Following a detailed review of requirements, 21 of these vehicles were refreshed over a 2-year period running through 2015 – 2017, with an expected useful life of 7 years. Another fit for purpose review of these vehicles is planned in the next 24 months after which time the fleet will again be refreshed. This refresh will fall entirely into the next regulatory period. These heavy vehicles are in good working order and the replacement schedule assumes the leases will be extended for between 12 and 18 months. It's possible that the order of replacement for these heavy vehicles may vary to ensure the least serviceable vehicles are replaced first.

Our hydro digger sub-fleet fleet of 5 vehicles was also acquired over a 12-month period during 2015-2016 and these will fall due for replacement during the 2023-2028 period following a fit for purpose review of the fleet. We have had ongoing performance issues with this sub-fleet where retaining them beyond their current lease term is not a viable option.

Replacing these two sub-fleets as part of a structured program means we only need to undertake the fit for purpose review once for each type of vehicle and enables us to access better pricing due to the high volume of vehicles ordered. It also ensures conformity of the fleet, reducing the need for staff to train on different types of equipment.

For the remainder of the scheduled vehicle replacements, the forecast generally assumes the heavy vehicles will be replaced upon expiry of the current lease, although a couple have an extension period assumed first which is to give us time to verify our requirements prior to ordering.

It is useful to note that the forecast age of the vehicles at replacement will range between 7 and 11 years. Assuming that the fleet is evenly distributed, in any regulatory period it is expected that 45-75% will be due for renewal. The renewals due in 2023-28 is slightly higher than this due to some lumpiness in how the fleet has been procured in the past.

4.9.5 Efficiency

While it has not been established that there is a robust process behind the development of the proposal for the 2023-28 regulatory period, Icon Water have been able to confirm the renewal need for each of the 39 vehicles proposed to be replaced during the period (see above).

We would expect to see renewals of a fleet of this size based on replacement criteria (largely set out by Icon Water) and condition assessment of the fleet to determine whether renewal is required, or alternate arrangements can be made to optimise the lifecycle cost of the fleet.

Icon Water advised, it has limited data on asset condition and performance.

Figure 31: Icon Water assessment on the data it retains on fleet vehicles

Asset description	Asset information	Maintenance /Failure history	Condition assessment information	Cost information	Performance information
Passenger vehicles	Good	Fair	Poor	Good	Poor
Light commercial vehicles	Good	Fair	Poor	Good	Poor
Heavy commercial vehicles	Good	Fair	Poor	Good	Poor
Mobile plant and equipment	Fair	Poor	Poor	Fair	Poor

However, based on the historical expenditure under this program, provided by Icon Water, we can see its expenditure on the heavy vehicle fleet has been relatively low since 2016-17.

Table 85: Icon Water historical expenditure on the heavy vehicle fleet

Heavy Vehicle Renewals (nominal $)

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022*
Extensions	$ 174,641	$ 79,789	$ 28,244	$ 56,848	$ 236,081	$ 116,494	$ 32,213	$ 155,450	$ 15,502	$ 106,798	$ 137,641	$ 170,299
Replacements	$ 171,371	$ -	$ 1,273,712	$ 246,091	$ 514,489	$ 3,880,661	$ 4,797,153	$ 448,749	$ 1,284,638	$ 66,272	$ 147,001	$ -
Total renewal cost	**$ 346,012**	**$ 79,789**	**$ 1,301,956**	**$ 302,939**	**$ 750,570**	**$ 3,997,155**	**$ 4,829,366**	**$ 604,199**	**$ 1,300,140**	**$ 173,070**	**$ 284,642**	**$ 170,299**

* Actual and forecast (as per price submission)

Icon Water's heavy vehicle fleet data also indicates that over 85% of its fleet will reach 10 years of age or greater by the end of the next regulatory period, consistent with the historical expenditure. Icon Water has indicated that it largely relied on lease extensions in the current regulatory period to manage its heavy vehicle fleet, creating a need for additional expenditure in the 2023-2028 regulatory period. While we don't agree a blanket renewal period is the most efficient way to manage fleet of this nature, fleet that is 10 years or older is in excess of Icon Water's guiding renewal period of 84 months and indicates there is a need to renew a large proportion of its heavy vehicle fleet in the 2023-28 regulatory period.

Option assessment

No options assessment was provided by Icon Water however, Icon Water's approach to managing its heavy vehicle fleet, historical expenditure, number of heavy vehicles in the fleet and the age, condition, and kilometres of each have been provided so an assessment could be made on the reasonableness of Icon Water's proposed expenditure.

Cost estimate

Icon Water's submission detailed expenditure of $12.9 million over the 5-year regulatory period from 2023-2028. It provided a Fleet Forecast Model to support this cost estimate containing heavy vehicle fleet data, extensions and renewals data, reconciliations and assumptions that underpin the forecast.

This model indicates 39 of its 48 heavy vehicles will require renewal during 2023-2028. Icon Water was able to provide additional evidence to support the need for these renewals.

During our consideration of Icon Water's proposal, and in response to our requests for further information, Icon Water identified two errors in the model that were overstating the cost estimate:

- The original forecast for heavy vehicles included light commercial vehicles
- The model included an inbuilt price escalation factor of 2.5%.

These errors overstated the capital expenditure required for the 2023-28 regulatory period by $0.86 million ($2021-22).

An average of $0.28 million to replace each heavy vehicle is not inconsistent with Icon Water's other data provided throughout the review.

Delivery

Icon Water proposes to continue leasing heavy vehicles through a fleet management provider.

The fleet management provider is responsible for providing vehicle options that meet Icon Water's technical specifications.

The contract with Icon Water's current fleet management provider expires in March 2023 and Icon Water intends to approach the market for a new fleet management contract, meaning the costs of this program will be market tested in 2023, with Icon Water seeking to achieve the most efficient fleet costs at that time.

Use of a fleet management provider for sourcing and leasing ensures Icon Water is able to access the most up-to-date industry knowledge and secure bulk-buyer efficiencies. This is not core business for Icon Water and it is reasonable to expect it will gain efficiencies by outsourcing this activity to a body for whom this is core business, and under a competitive tender process, has won the contract to provide these services to Icon Water.

Icon Water advised its proposed approach is usually to stagger vehicle replacements to provide it with the opportunity to undertake ongoing reviews of the delivery model and emerging technologies to ensure the fleet continues to be sustainable and fit for purpose. Given over 85% of its heavy vehicle fleet requires replacement in the 2023-28 period, staggering renewals will be a challenge for Icon Water over the next few regulatory periods and it will need to demonstrate it is managing its fleet contract as effectively as possible, to ensure the most efficient costs.

4.9.6 Recommendation

It is our recommendation that the allowance for heavy vehicle fleet renewals in 2023-2028 is reduced from $12.9 million[54] to $12.0 million in line with the errors identified in the proposed forecast.

Table 86: Vehicle Lease Renewals for Heavy Vehicle Fleet recommendation, $million, $2021-22

Vehicle lease renewals	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Proposed Capex	6.32	3.72	2.29	0.56	0.00	12.89
Adjustment	-0.21	0.12	-0.48	-0.29	0.00	-0.86
Recommended Capex	6.11	3.84	1.81	0.27	0.00	12.02

It is also recommended that Icon Water note its process for preparing this forecast does not rely as heavily on individual vehicle condition and performance data as it should. In a fleet of 49 heavy vehicles, it's expected actual vehicle condition and performance would inform renewals expenditure more directly than was observed in our review.

However, it is evident Icon Water has underspent on the heavy vehicle fleet over the last 5 years, and age and kilometre data on the heavy vehicles indicates it is reasonable to expect 39 of the 48 heavy vehicles should be replaced during the 2023-28 regulatory period.
Icon Water should also note, despite the 2-month holdover period during COVID19 lockdowns, the number of water truck jobs over the last 3 years indicates a declining trend in jobs requiring water trucks. The number of water trucks maintained by Icon Water has remained consistent at 25. We would expect to see Icon Water review its need for heavy fleet in conjunction with the water mains renewals and asset performance going forward because there may be an opportunity to decrease the fleet if the asset performance is maintained. This should be a multi-faceted analysis between mains renewals, operating costs and fleet costs.

4.10 CX11366 Asset Management Information System

4.10.1 Project Overview

Despite the delivery of Project AXLE in the current regulatory period, Icon Water advised that its AMIS landscape remains slightly disjointed, and a clear strategic pathway and holistic view is needed to develop a renewed AMIS solution.

This is a key deliverable of Icon Water's Digital Strategy.

In addition to improving Icon Water's asset management information, the mobility function from Project Axle will be unsupported by 2025 – this was not known at the time Icon Water selected the

[54] It is noted that Icon Water's program documentation quotes $13.3 million in 2023 dollars for this program, but the submission model indicates $12.9 million. Our adjustment is from the $12.9 million to $11.4 million identified in the Icon Water model as proposed costs pre 2.85% escalation to 2023 dollars.

preferred solution for Project Axle and forms part of that projects learnings that has informed change at Icon Water in the way it plans and manages IT projects.

It also needs to be extended to an enterprise-wide mobility function, not limited to the groups afforded it during Axle.

Icon Water proposes to spend $12.7 million in the 2023-2028 regulatory period to:

- Upgrade the current on-premises version of Works and Asset Management (WAM) to the Cloud SaaS version (WACS), in line with the AMIS strategy
- Implement a mobility solution that aligns to the Workforce Mobility strategy and AMIS strategy to cover the total required workforce
- Leverage out-of-the-box capabilities in latest software versions to reduce manual workarounds and streamline process, and
- Integrate with other key systems at Icon Water, improving asset management data across the organisation.

4.10.2 Current Status

The CX11366 Asset Management Information System project is currently in the ENVISAGE stage of Icon Water's IPAD project delivery process.

4.10.3 Documents reviewed

- Stream 2 Wed 130 - 315 AMIS
- IS07-Asset Management Information System_Final
- 220225 Icon Water - AMIS Roadmap Discovery Phase and Next Steps_Final Report (1)
- Detailed Project Costing for Resourcing-09MAR2022 (1) AIMS – check which one is the latest
- RFI C101

4.10.4 Prudence

Driver/Benefit

Icon Water does not currently have an integrated asset information system in place, and limited mobility functionality which will be unsupported in 2025.

As part of its digital strategy, it proposes to renew this capability, in line with developing technologies to better enable its staff in managing and monitoring core infrastructure.

Risk

As part of its assessment of this project, Icon Water assessed its corporate risks. The outcome of that risk assessment is set out below.

Table 87: Risk assessment for AMIS

Risk no.	Risk description	Likelihood	Consequence	Current Risk Rating
1	Failure to optimally integrate organisation systems (FIMS, Aurion, Customer (eg Satisfy), Sharepoint etc.) and Asset Information Systems (GIS, WAN, MWM, SCADA, Permits) leads to disparate data sets, inability to analyse information and unclear responsibilities, resulting in failure to achieve multiple significant aspects all strategic objectives.	Almost Certain	Major	Very High
2.	Failure to invest in upgrading to modern and sustainable technology platform and products for Asset Systems means that current product versions fall out-of-date and vendor support ceases leads to security vulnerabilities, system downtime, technical debt, resulting in a major impact to ongoing business operations.	Almost Certain	Major	Very High
3	Poor data integrity (maintenance, assurance, accuracy and consistency) over data life-cycle (capture, store, process, use and dispose) leads to business investment inefficiencies, resulting in major financial impact.	Almost Certain	Major	Very High
4	Lack of single view of asset due to disaggregated AIM systems (WAM, SCADA, MWM, SharePoint, GIS) leads to ongoing poor whole of life cost assessments and inadequate intervention planning, resulting in a moderate financial impact.	Almost Certain	Moderate	High

Timing

The key driver for the timing of this project is the lack of support for the mobility function of the current solution from 2025. There is an efficiency in carrying out additional ICT upgrades in addressing that one issue. Given that Icon Water has a need for an asset management information system upgrade at the same time it needs to address a lack of support for its mobility solution, it makes sense to carry out these two solutions together.

4.10.5 Efficiency

Option assessment

Given the learnings from Project Axle, Icon Water intends to carry out the solution development of this project in line with the below approach.

Figure 32 Solution development process for AMIS

The preliminary options assessment included analysis of:

- Maintaining the current AMIS system
- Uplifting the capability of the current Oracle solution from Project Axle to meet the additional needs
- Replacing the Oracle solution with a new AMIS solution.

Preliminary cost estimates indicated replacing the current Oracle solution will cost in the order of $28 million, while uplifting its capabilities will cost in the order of $12 million – however, it carries some of the risks of Project Axle.

Given the learnings from Project Axle, the uplift in internal capability and the reduced risk of some of the external issues, as well as the significant cost differential, Icon Water is proposing to uplift the current capabilities of the Oracle solution from Project Axle to meet its AMIS and mobility needs into the future.

Cost estimate

Icon Water provided an internal spreadsheet of project costings totalling $15.8 million, in excess of the $12.3 million across 2023-2028 that it proposed in its price submission. The spreadsheet lacked substantiating information to support the additional cost.

Delivery

Given the learnings from Project Axle, Icon Water is approaching this investment with caution. It proposes a two-stage procurement strategy to reduce design risk and ensure prudency and efficiency of the chosen solution as well as the support of a systems integrator vendor with Oracle expertise to support the ultimate integration and practical functionality of the solution within the Icon Water environment.

4.10.6 Recommendation

We deem the project prudent. There is very little supporting information to deem the project efficient, but it is clearly more efficient than replacing the current Oracle solution. We therefore recommend the original proposed sum of $12.3 million be allowed for Icon Water to deliver the uplift in Oracle capability it requires to create a cohesive and beneficial asset management information landscape with mobility functionality that is stable and supported into the future.

We expect Icon Water to put its learnings from Project Axle into place in order to properly scope the solution with the vendor, ensure it is supported into the future, ensure project funds are not wasted during periods of downtime and ensure optimal solution, integration and functionality for Icon Water employees to carry out core business as efficiently and effectively as possible.

Table 88: CX11366 Asset Management Information System recommendation $million, $2021-22

	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Proposed Capex	0.00	1.68	6.51	4.14	0.00	12.33
Adjustment	0.00	0.00	0.00	0.00	0.00	0.00
Recommended Capex	0.00	1.68	6.51	4.14	0.00	12.33

4.11 CX11312 Water Main Renewals

4.11.1 Project Overview

Water main renewals are an integral part of Icon Water's approach to managing the ongoing integrity of the water reticulation network. The program developed for delivery is derived from a number of factors including monitoring of water main breaks and leaks, pipe condition and performance, the customer experience, in particular the instances of repeat interruptions and the impacts of changing weather conditions that can lead to changes in the experienced level of main breaks.

The approach taken by Icon Water to identify the scale of the program each year is based on balancing risks associated with customer interruptions against the cost and long-term performance of the water system. The extent of the program is determined through PARMS modelling which identifies the investment level and likely future performance of the network.

It should be noted that the level of investment proposed for this submission has increased when compared with the total program of work on water main renewals delivered in the last regulatory period. This is primarily because an alteration to the program of works was made which led to less investment in traditionally identified main failures and more investment into resolving water mains that did not meet the hydraulic requirements as dictated by the Deed of Agreement with the ACT Fire and Rescue.

4.11.2 Current Status

The Water Mains Renewals project is as the Envisage stage of the IPAD process.

4.11.3 Documents reviewed

- AMP Water Distribution Reticulation and Metering AMP 2022 – 2043, 8 July 2022
- CX11312 – Project Envisage Stage – Concept Development Statement Water Mains Replacement 2023-28
- CX11065 – Water Main Renewals Stage 3 ESR Endorsed 29.6.2020

- CX11065-Water Mains Renewal Program – Develop Stage Proposal" 2018
- CX11338 Water Main Augmentation (Fire Flow Non-Compliance) CDS 27 April 2022
- CX11312 CDS Cos Calculator – Internal Cost Estimates
- Australian Bureau of Meteorology, "Urban National Performance Report 2020-21: Complete Dataset," 2022
- ICON Water Attachment 3 – Service Standards 2022

4.11.4 Prudence

Driver/benefit

The water main renewals program is designed to meet the expectations of the customer experience as well as ensure the efficient replacement of the network as required, whilst maintaining an expected level of service. Its objective is to "deliver sustainable value to our community and stakeholders and enhance the customer experience".

Icon Water's customers were consulted as part of the development of the customer experience outcomes which are defined in Table 89 below.

Table 89: Water main renewals customer outcomes

Item	Description
Water Network Reliability	Ensure reliable water supply to our customers with an average duration of an unplanned water interruption of 111 – 150 minutes
Environmental Compliance	100% compliance with environmental flow requirements, environmental authorisations and agreements.
Customer Satisfaction	90% of annual survey participants are satisfied with our overall service

To achieve the above customer outcomes Icon Water has set a target of 20-25 bursts per 100 kilometres of water main per year over the long term. In addition, the Customer Protection Code provides Guaranteed Service Levels of no more than 9 unplanned interruptions (sewer and water) per financial year per customer.

Icon Water participates in industry benchmarking which provides relevant comparative data in the National Performance Report. The most recent results for Icon Water are presented below.

Table 90: Summary of National Performance Report Benchmarking Results

National Performance Report dataset	2016-17	2017-18	2018-19	2019-20	2020-21	Average
Number of water mains breaks, bursts and leaks, per 100km of water mains	14.3	16.3	14.7	13.6	12	**14.2**

Icon Water's 5-year average performance of 14.2 main breaks, bursts and leaks is ahead of the utility benchmark average of 21.7 breaks, bursts and leaks per 100kms. There are a number of factors that impact pipeline failure including ground conditions and variations in weather. This, in addition to the current performance against Icon Water's own long-term target of 20-25 breaks per 100km per year, indicates it would be prudent to pursue a lower level of targeted investment. This investment would be aimed at addressing customer disruptions in higher risk areas where poor service standards are observed, whilst balancing the longer-term risk of underinvesting in the renewal of the asset base.

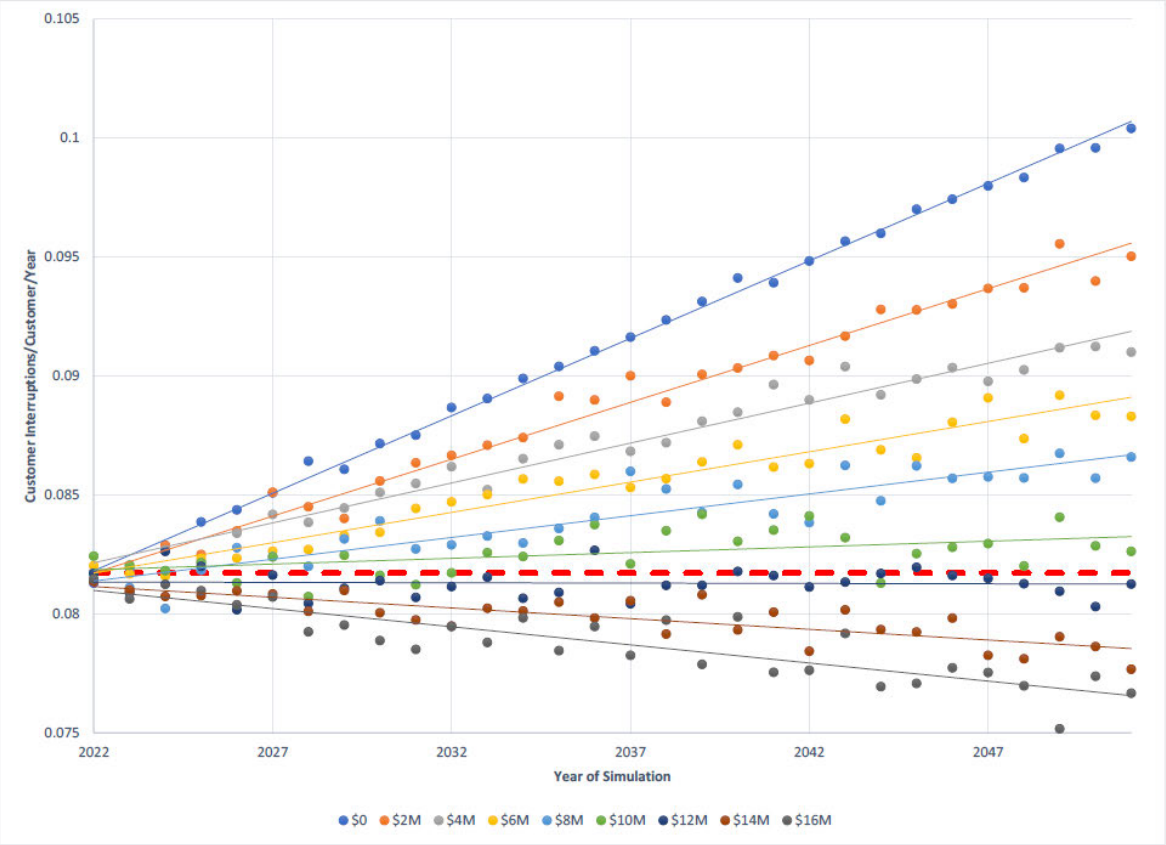
Icon Water instigated a Wiser Analysis in January 2022, with the purpose of identifying an appropriate level of investment suited to the 2023-28 pricing period. The following recommendations are highlighted from the Wiser Analysis[55]:

- *Given the results relating to structural deterioration and renewal policies, it is NOT recommended that Icon Water invest to maintain network reliability over the next five years, because this will almost certainly lead to replacement of assets before the end of their service life, delivering poor cost effectiveness (dollars spent on renewal per burst removed).*
- *Instead, a pragmatic policy in the medium term appears to be to target failing CI and AC pipe while supporting service provision obligations for other customers. For example, this may involve targeting some CI and AC at 2 failures in 12-months, combined with a general service level driven trigger of three unplanned interruptions in 12 months. As noted below, in practice such renewals should be considered on a case-by-case basis considering risk and other factors.*
- *In terms of the next delivery period (from 2024), such an overarching policy (as modelled in the simulation) would involve renewing around 3.8 km of pipe per year, equating to an average annual renewal budget of $3.4M across the five years.*

The following figure from the PARMS analysis highlights the expected performance of the water reticulation network based on varying levels of investment.

[55] Investment Planning for Water Reticulation Pipes (Wiser Analysis), Jan 2022, ICON Water

Figure 33: Network Response: Customer Interruptions/Customer against Investment[56]



The level of investment proposed by Icon Water over the regulatory period is less than the recommended levels identified in the PARMS assessment. Icon Water proposed an investment equal to $12.2 million over the five-year period, or equivalent to around $2.5 million per year and 2.5kms/per year of water main replaced (equating to 0.07% of the assert base)[57].

From the above analysis, the level of investment proposed by Icon Water rests between the orange and grey projected performance lines. It indicates that the proposed investment is likely to lead to increased failures over time. At a very high level, the model predicts a reduction in performance of 5% over 10 years. Considering the current performance against the corporate target of 20-25 Breaks per 100 kms, a program that allows a controlled easing of network performance is reasonable.

Risk

A risk assessment has been undertaken as part of the CDS which is presented below in Table 91.

[56] Investment Planning for Water Reticulation Pipes (Wiser Analysis), Jan 2022, ICON Water
[57] 2023-28 Water & Wastewater Price Proposal Water Main Renewals (CX11312) presentation, July 2022

Table 91: Water Main Replacement Program Risk Assessment[58]

Risk no.	Risk description	Current Risk Rating
RSK-2649	Loss of hydraulic capacity of water mains from corrosion leads to decreased pressure and flow that does not meet firefighting requirements, resulting in a **severe safety** incident.	Medium (Rare/Severe)
RSK-2650	Degraded water mains leads to increased water main failures as well failing customer and network KPIs, resulting in **moderate operational** impacts.	Low (Rare/Moderate)

The above assessment supports the PARMS analysis that the risk rating for the degradation of water mains is low, indicating that a reduced investment in water main renewals is in alignment with the corporate risk profile and is appropriate.

Timing

The program is forecast to be delivered evenly over the period with a target level of investment of 2.5 kilometres of water main renewed per year.

An annual program of expenditure is appropriate because the candidate pipelines for replacement are unlikely to be known early in the five-year program. Pipes are identified for renewal based on the frequency of failure and the subsequent customer experience. An even allocation of the delivery of water main renewals is reasonable providing capacity for the organisation to develop the most effective program year on year.

4.11.5 Efficiency

Option assessment

The PARMS modelling above, and the risk assessment of investment levels represents the various options analysed for program expenditure.

Cost estimate

The cost estimate for the delivery of the program has been derived from the costs to complete similar works in the previous period. There are current contracts in place that will be relied on for the delivery of the program on a schedule of rates basis.

Table 92: Water main renewals cost estimate 2023-28 ($million, $2021-22)

Water Main Renewals	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Annual Capital spend	2.39	2.42	2.42	2.49	2.50	12.17

Delivery

Icon Water currently has standing agreements with two contractors for the provision of service based on a schedule of rates, determined through a competitive tender process. It is understood for the proposed investment for 2023-28, based upon the workload, a single contractor will be engaged via competitive tender process, based on an agreed schedule of rates.

It has been highlighted that it is likely that there exists an opportunity to drive efficiencies by amalgamating the delivery of CX11338 Water Main Augmentation (Fire Flow Non-Conformance) with the water mains renewal program.

4.11.6 Recommendation

Based on the current levels of performance, the PARMS modelling of the level, the reduction of the investment in recognition of the current performance and impact of investment, the proposed level of water main renewals is assessed as prudent.

The proposed level of expenditure is prudent to address network performance issues and meet customer expectations.

We see no material reason to decrease the estimate on the basis of efficiency however, we do make the observation that the potential efficiencies identified in the CDS with the amalgamation of CX11338 Water Main Augmentation (Fire Flow Non-Conformance) should form part of the approval at the program at the Evaluate stage to ensure full benefit of potential efficiencies are realised.

Table 93: CX11312 Water Main Renewal Program Expenditure Recommendation, $million, $2021-22

	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Proposed Capex	2.39	2.42	2.42	2.49	2.50	12.17
Adjustment	0.00	0.00	0.00	0.00	0.00	0.00
Recommended Capex	2.39	2.42	2.42	2.49	2.50	12.17

4.12 CX11337 Office Expansion Space Utilisation

4.12.1 Project Overview

CX11337 Office Expansion Space Utilisation is a project proposed by Icon Water to relocate approximately 40 staff from current premises [redacted] 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 proposes 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.

4.12.2 Current Status

The project is currently in the EVALUATE stage of Icon Water's IPAD project delivery process. The scope has not yet been defined and detailed business case has not yet been developed.

4.12.3 Documents reviewed

- [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)

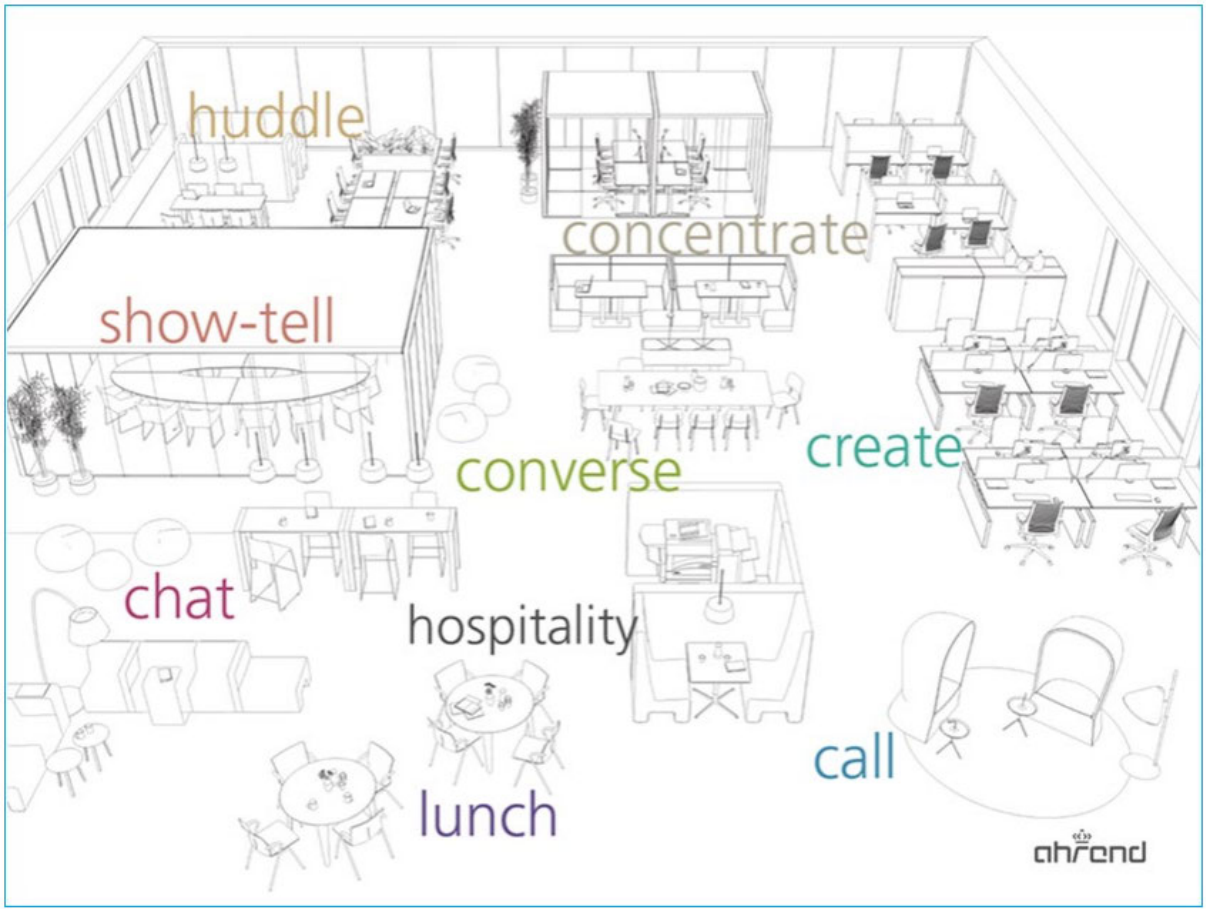
4.12.4 Prudence

Driver/benefit

Icon Water has advised that without forward planning, it will have accommodation shortages for its staff as of December 2024. It has also advised that as office accommodation needs have permanently changed (from work from home arrangements implemented during the COVID19 response) it has a decreased need for space and an increased need for collaborative workspaces and improved business resilience for remote working capability.

Icon Water has been investigating the 'hybrid mobile workforce' model – a post-pandemic version of activity-based work) – shown in the image below.

Figure 34: The 'hybrid mobile workforce' model



It has also stated it hopes to achieve the following from this project:

- Drive cultural change
- Consolidate office accommodation
- Improve space utilisation
- Address capacity constraints
- Include flexible work, mobility and collaboration in the way it works, and
- Centralise office locations to create efficiency and a sense of cohesion.

Risk

When considering this project, Icon Water assessed its corporate risks. The outcome of that risk assessment was a medium rated risk against "failure to plan for future Icon Water staff accommodation requirements means that there is inadequate capacity for office-based staff post 2024, resulting in a minor impact to business operations". It was assessed as "possible" with a moderate consequence.

Timing

Driving the timing for this project is the expiry of the lease for [redacted] which currently houses up to 40 Icon Water staff. This lease expires in December 2024.

4.12.5 Efficiency

Option assessment

Detailed options analysis has not yet occurred, but Icon Water advised it will likely consider:

- A 'do minimum' base case option – renewal the existing lease for [redacted]
- Options to align with the Land and Buildings Strategy and consolidate staff at Mitchell Offices including an assessment of the following options:
  - Compress – increase the density of existing occupancy, maintain current desk sharing or hybrid mobile workforce model arrangements, renovate existing floor space but do not expand
  - Flexible work – maintain current density, increase desk sharing and hybrid mobile working, renovate existing floor space but do not expand
  - Expand – maintain current density, maintain current desk sharing or hybrid mobile workforce model arrangements, expand floor space
  - Balance – moderately increase density, moderately increase desk sharing or hybrid mobile workforce model arrangements, moderately expand floor space.

Icon Water also advised it could investigate leasing additional office space elsewhere if any of the above options did not align with the Land and Buildings Strategy.

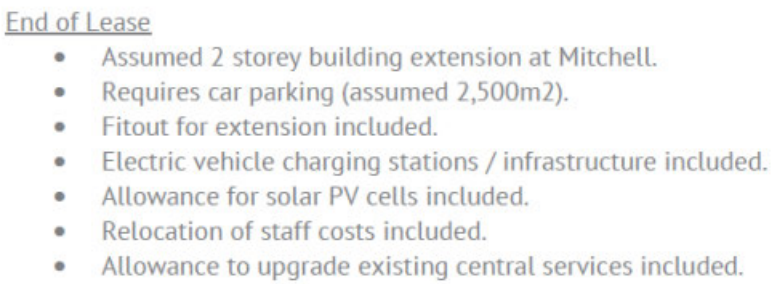
Cost estimate

Icon Water advised it does not yet have a detailed cost breakdown aligned to the submission costs and timing – it will be prepared as part of the detailed business case.

Icon Water provided an independent cost estimate by WT Partnership setting out a base estimate for this project of $18,006,325 and a P50 estimate of $22,058,396.

This report was based on the following assumptions set out below.

Figure 35: CX11337 Office Expansion Space Utilisation cost estimate assumptions



The internal Project Envisage Stage – Concept Development Statement proposed a total project cost of $12.2 million as at February 2022, with $1.65 million set out for development funds (from evaluate to develop).

C [redacted]

management which will be vital to the success of the project – and avoiding the need for future expenditure post project implementation as observed in other case studies across the industry.

Additionally, it is recommended that Icon Water clarify how savings in corporate capital expenditure from not extending the lease for [redacted] have been included in its 2023-28 price proposal.

Table 94: CX11337 Office Expansion Space Utilisation recommendation, $million, $2021-22

Office Expansion Space Utilisation	2023-24	2024-25	2025-26	2026-27	2027-28	Total Program Forecast
Proposed Capex	7.62	4.32	0.00	0.00	0.00	11.94
Adjustment	-6.18	-4.32	0.00	0.00	0.00	-10.50
Recommended Capex	1.44	0.00	0.00	0.00	0.00	1.44

4.13 CX11082 Lower Red Hill Reservoir Tank B (East)

4.13.1 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.

4.13.2 Current Status

The project is currently at the Evaluate stage of the Icon Water IPAD process.

4.13.3 Documents reviewed

- 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)

4.13.4 Prudence

Driver/benefit

The driver for the project is renewal based on the risk of structural failure of the tank.

Icon Water noted in its presentation on the project that although there is in the order of 36% growth in peak day demand forecast for the system by 2043, this project is not driven by growth requirements and no allowance has been made for increased demand.

Wire-Wrapped Circular Prestressed Concrete Tanks are a common form of construction of water tanks and offer the benefit of the tank wall remaining in a state of permanent compression, which prevents cracking and leaking when loaded. As the tanks age and deteriorate they risk a unique mode of failure where water can enter behind the shotcrete, corroding the wires, resulting in failure of the post tensioned wires and this can result in subsequent failure of adjoining elements with sudden, progressive collapse of the structure. This risk is compounded by the difficulties in detecting corrosion as it is largely hidden behind the shotcrete.

Due to this failure mode and the difficultly in detecting the corrosion, Icon Water has a program of periodic tank inspections.

Condition assessments of Lower Redhill Tank B were completed in 2005 and (GHD) and 2017 (SAS TTI JV). Both of these inspections identified deterioration of the tank which ultimately resulted in the tank being taken out of service in September 2021.

The removal of the tank from service has resulted in a 20% reduction in storage capacity for the South Canberra Pressure Zone.

Due to the level of contingency in the storage network, Icon Water is able to maintain service levels for customers both in terms of preventing service interruption and reduced pressure. Having the tank out of operation has effectively removed contingency from the network and this has the effect of:

- Increasing the frequency of interventions from operations to maintain continuity of service and pressure
- Reducing the ability to take remaining reservoirs out of service for inspection, cleaning or to address water quality issues, and
- Removing the ability to take other similar aged tanks off-line for inspection or repair.

This shortfall in storage capacity is not sustainable over the long term and as other tanks reach the end of life or need refurbishment this contingency will need to be replaced in order to maintain service levels.

Risk

The driver for the project, being the renewal of assets, is linked to, and in part quantified by, the risk assessment. The risk assessment provided by Icon Water was out of date as it predated the tank being taken offline and its driver was structural failure, refer to Table 95 below.

Table 95: CX11082 Lower Red Hill Reservoir Tank B (East) risk assessment

Risk No.	Risk description	Likelihood	Consequence	Current Risk Ranking
1	Deteriorated structural condition leads to Lower Red Hill Tank B reservoir suddenly failing, resulting a moderate public safety incident.	Possible	Moderate	Medium
2	Loss of Lower Red Hill Reservoir Tank B leads to adverse community reaction, resulting in major damage to reputation and stakeholder dissatisfaction.	Possible	Major	High

Risk No.	Risk description	Likelihood	Consequence	Current Risk Ranking
3	Sudden loss of storage water at Lower Red Hill Tank B leads to inadequate water supply to South Canberra Pressure Zone, resulting in a major impact to the continuity of water supply.	Possible	Major	High

Since removal of the tank form service the risk would now be linked to maintaining service with lower system contingency and the inability to tank other tanks offline for inspection etc and still maintain service levels.

As Icon Water is yet to update the risk assessment no formal assessment has been completed to determine the level of these risks. Based on a high-level understanding of the Icon Water system it is considered that, based on service interruption this risk would be Medium (possible and Moderate) and would increase over time.

Timing

The timing of this project is driven by the need to restore the system storage contingency ahead of the need to remove other tanks from service. The only timing information provided to date is:

- Concept design and business case - 2023
- Detailed design and construction - 2024-2026

Although this is limited information, the fact that the tank is already offline and the need to restore the storage contingency means that the project should proceed without delay and Icon Water's proposed expenditure from 2023 to 2025 is deemed reasonable.

4.13.5 Efficiency

The project is still at a relatively early stage of development with options assessment not yet complete and only indicative costing provide.

Option assessment

The options for this project are yet to be developed in detail. As part of preparing the business case Icon Water is considering the following options:

1. Demolition of Lower Red Hill Tank B – (base case) [This does not address the project need]
2. Construction of a replacement reservoir at the existing site
3. Construction of a replacement reservoir at an alternative site

4. Network configuration changes to interconnect South Canberra Pressure Zone with existing reservoirs outside the pressure zone.

Options assessment will include modelling of bulk supply failure scenarios to assess the resilience of systems with different emergency storage capacities. A multi criteria analysis will be conducted for each option as well as assessment of lifecycle costs.

Cost estimate

The proposed capital expenditure for the project is $12.6 million with $11.9 million to occur in the 2023-28 period.

In seeking clarification on the details and method of establishing the project cost, Icon Water advised the cost estimate is yet to be developed and will be included as part of the business case to be developed in 2023.

Icon Water has proposed the capital expenditure for the 2023-28 period based on the recent construction of Oddie Reservoir with adjustments made for escalation and capacity differences. The capital expenditure estimated based on the Oddie Reservoir has since been provided and is summarised in Table 96.

Table 96: Lower Red Hill Reservoir Tank B cost estimate, $million, $2021-22

Description	Cost estimate
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Description	Cost estimate
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
Total cost	**12.35**

Without a preferred option it is difficult to assess if the costs in Table 96 are representative of the efficient cost or whether a network configuration could have a very different cost to tank replacement. It is also noted that Icon Water's information contained cost discrepancies: the estimate had a total cost of $11.0 million, although, the individual components in the estimate totalled $12.4 million, and the proposed total figure in the submission is $12.6 million.

Cost discrepancies have been a common theme across the project and program reviews we have undertaken which has made it difficult to confidently make efficiency assessments throughout.

Using the estimate information provided in Table 96 and benchmarking these costs against similar volume concrete water storage tanks across the Australian water sector the costs appear to be on the high end of efficient expenditure. Assuming the construction of a tank at the existing location, it is estimated that this project is likely to cost in the order of $9 million, based on the following reasoning:

- Reduction to the allowance of Icon Water project and design management, stakeholder review based upon the level of external support
- Reduction to the allowance for site access based upon the existing site access and proximity to roadways
- Reduction to the allowance for landscaping as this is on an existing site and would not need major works
- Removal of the 30% contingency at the estimate is based upon the full cost of a recent similar project and also external cost benchmarking.

These adjustments are provided in Table 97.

Table 97: Lower Red Hill Reservoir Tank B (East) proposed cost adjustment, $million, $2021-22

Description	Icon Water proposal	Revised expenditure	Proposed Adjustment
[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]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
Total cost	**12.35**	**8.89**	**(3.46)**

No information has been provided in relation to the opex impact of replacing the tank. Noting the current increased frequency of interventions from Icon Water's operations teams to maintain continuity of service and pressure, it is likely that replacing the tank will reduce this need, with efficiency benefits. Without further detail it is not possible to quantify this benefit.

Delivery

As noted above this project is still at an early stage of development and no information has been provided as to the delivery model or approach.

Without this information it is not possible to assess if the delivery model is efficient.

4.13.6 Recommendations

Based on the need to replace the tank to restore the storage contingency, this project should proceed without delay, and the timing of the project is deemed prudent.

Without details of the project option, cost estimate or delivery approach assumptions were required as the efficiency of the proposed project capital cost. Using the assumption of constructing a 9ML concrete storage tank at the same location, and benchmarking to similar projects in the water sector, the proposed capital cost for the 2023-28 regulatory period of $12.6 million ($2021-22) is regarded as on the high side of efficient costs. Based on benchmarking these costs against similar volume concrete water storage tanks across the Australian water sector, it is estimated that this project is likely to cost in the order of a total cost of $8.9 million, with $8.5 million for the regulatory period ($2021-22). It is recommended a capital cost of $8.5 million be allowed for this project.

The assessment of capital expenditure is provided in Table 98.

Table 98: Lower Red Hill East Tank B (east) capital expenditure recommendation, $million, $2021-22

	2023-24	2024-25	2025-26	2026-27	2027-28	2023 - 28 Total
Proposed Capex	4.82	7.04				11.87
Recommended Adjustment	-1.41	-2.11				-3.51
Recommended Capex	3.40	5.10	0.00	0.00	0.00	8.50

4.14 Summary of Recommendations

Overall, we have found much of the Icon Water capital planning to be very early in nature, often lacking scope development and robust options or risk analysis. This means many of the cost estimates are difficult to deem efficient.

However, we have reviewed Icon Water's information and our additionally requested information in detail and made an assessment of the prudence and efficiency of Icon Water's submission on that basis.

In the case of the Icon Water proposal, the general expenditure excluding the top 10 projects or programs has been addressed via reprofiling the expenditure based upon stage of development in the IPAD process. For each of the ten projects individually reviewed, where the project is deemed prudent but there is uncertainty about the cost and timing estimate exists, this could be dealt with via 'ex-post' review of the expenditure at the time of the 2028 Determination.

In relation to the specific projects and programs we reviewed, and what that indicates about the rest of the capital plan, we set out our recommendations below.

Table 99: Recommended capital expenditure forecasts, $million, $2021-22

Capital expenditure adjustment	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Icon Water proposal	**147.31**	**118.73**	**129.22**	**136.52**	**141.72**	**673.51**
Adjustments						
LMWQCC Secondary Treatment Bioreactors Capacity Upgrade	-	-	-	-	-	0.00
LMWQCC Biosolids Management Renewal	4.52	2.22	16.67	(3.16)	(16.36)	3.89
Sewer Mains Renewal Program	-	-	-	-	-	0.00
Water Meter Renewals	1.25	1.25	1.25	1.25	1.25	6.24
Cotter Pump Station Upgrade	(0.91)	(0.09)	-	-	-	(1.00)
Vehicle Lease Renewals for Heavy Vehicle Fleet	0.21	(0.12)	0.48	0.29	-	0.86
Asset Management Information System	-	-	-	-	-	0.00
Water Main renewals (structural failures)	-	-	-	-	-	0.00
Office Expansion Space Utilisation	6.18	4.32	-	-	-	10.50
Lower Red Hill Reservoir Tank B (East)	1.41	2.11	-	-	-	3.51
Reprofiled capital expenditure (Excluding top ten projects)	33.09	29.42	5.11	(19.02)	(24.32)	24.29
Subtotal of adjustments	*45.75*	*39.11*	*23.50*	*(20.64)*	*(39.43)*	*48.29*
Revised total	**101.56**	**79.62**	**105.72**	**157.16**	**181.15**	**625.21**

Capital expenditure adjustment	2023-24	2024-25	2025-26	2026-27	2027-28	Total 2023-28
Catch up Efficiency target - 1% pa (Excluding top 10 projects)	0.31	0.71	1.37	2.39	3.15	7.94
Continuing efficiency target - fixed 2%	2.03	1.58	2.09	3.10	3.56	12.35
Total of adjustment	*48.08*	*41.40*	*26.96*	*(15.15)*	*(32.72)*	*68.58*
Revised total inc. efficiency targets	**99.23**	**77.33**	**102.26**	**151.67**	**174.44**	**604.93**

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