

Rural Irrigation Capital Expenditure Review

Sunwater



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Sunwater

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Glossary

Term	Definition
AMP	Asset Management Plan
AMS	Asset Management System
ANCOLD	Australian National Committee on Large Dams
ASX	Australian Securities Exchange
BOM	Bill of Materials
CPR	Commonwealth Procurement Rules
CPT	Central Procurement Team
FY	Financial Year
HUF	Headworks Utilisation Factor
IAC	Irrigator Advisory Committee
ICT	Information and Communications Technology
ISO	International Organization for Standardization
MCA	Multi Criteria Analysis
ML	Mega litre (1 million litres)
NSP	Network Service Plan
P3MF	Project, Program and Portfolio Management Framework
PCR	Procurement Compliance Review
QCA	Queensland Competition Authority
RAB	Regulatory Asset Base
Rfi	Request for Information
SAMP	Strategic Asset Management Plan
SAP	Systems, Applications and Products in Data Processing (an Enterprise Resource Planning system by SAP AG)
SEQ	South East Queensland
SFM	Sunwater Financial Model
SOA	Standing Offer Arrangements
The price path period	The period 1 July 2020 to 30 June 2024
The referral	the referral for the review issued by the Queensland Government to the QCA under section 23 of the QCA Act
The review	the QCA's review of irrigation prices for the period 1 July 2020 to 30 June 2024
The historical transitional period	The period 1 July 2018 to 30 June 2020
ToR	Terms of Reference
TOTEX	Total Expenditure
WAE	Water Access Entitlements
WMS	Work Management System

Executive Summary

Sunwater is a government owned corporation that owns and manages a regional network of bulk water supply infrastructure throughout Queensland that supports irrigated agriculture, mining, power generation, industrial and local government. Sunwater's water storage and distribution infrastructure includes 19 major dams, 64 weirs and barrages, 79 pumping stations, and more than 2500 kilometres of pipelines and water channels.

The Queensland Government has directed the QCA to conduct an investigation into pricing practices relating to the monopoly business activities of Sunwater (bulk water storage and water distribution). A key objective of the investigation is to recommend prices to be charged by Sunwater to irrigation customers in 22 specified water supply schemes (WSSs) and seven specified distribution systems for the price path period from 1 July 2020 to 30 June 2024.

AECOM was engaged by the QCA to provide advice and guidance to assist the QCA to determine the prudence and efficiency of Sunwater's historic and forecast renewals expenditure in specific WSSs and distribution systems, as well as forecast capital expenditure on dam safety upgrades.

The scope of our review of Sunwater's renewals expenditure related to 22 WSSs and five of the seven distribution systems and covered:

- Review of Sunwater's submission on proposed renewals and dam safety upgrade capital expenditure
- Review of Sunwater's policies and procedures for renewals expenditure
- Assessment of the prudence and efficiency of proposed renewals and dam safety upgrade capital expenditure including:
 - Renewals expenditure in previous price path periods until 30 June 2020, which in this report is expressed as historical actuals from 1 July 2012 (FY13) to 30 June 2018 (FY18) and historical transitional period from 1 July 2019 (FY19) to 30 June 2020 (FY20) Forecast renewals expenditure over Sunwater's proposed planning period from 1 July 2020 to 30 June 2053, which in this report is expressed as price path period starting from 1 July 2020 (FY21) to 30 June 2024 (FY24) and beyond price path period starting from 1 July 2024 (FY25) to 30 June 2053 (FY53)
 - Forecast capital expenditure by Sunwater on dam safety upgrades over the price path period from FY21 to FY24

AECOM has applied a team of specialist staff for this review, including engineers of various disciplines, cost management specialists and analysts coordinated by its Advisory group.

This review has primarily been a desktop review based on the documentation requested through an initial round of requests for information, with several rounds of requests for additional documentation to clarify particular issues. Where the documentation did not provide sufficient clarity, AECOM conducted a number of in-person interviews with key Sunwater staff to understand the practical applicability of policy and procedures and obtain evidence that would further support a recommendation. To ensure consistency of approach, each technical reviewer used a standard template for the review, designed to address all items required by the terms of reference for the review and constructed to ensure that all issues that could influence a decision on prudence or efficiency were included.

We assessed renewals project expenditure by reviewing a representative sample (in consultation with the QCA), focusing on material renewal items while seeking to ensure that any inferences drawn from the sample assessment were applicable across un-sampled renewals expenditure (for example any adjustments due to observed systemic issues could be applied to the wider renewals program).

While there are a number of conclusions and recommendations made as result of the tasks under the scope of this review, this executive summary summarises the material conclusions made in relation to deductions to Sunwater's submitted values.

Historical Renewals (FY12-FY18)

Sunwater's submission included more than 2,200 individual projects for the schemes under review, for the historical FY12-FY18 period. We observed significant variation between Sunwater's actual expenditure and both Sunwater's proposed capital expenditure for the period and the QCA's accepted allowance for the period, including instances of substantial exceedances. The primary driver of overspend appears to be flood damage repair costs associated with major weather events across the period. Given this and the unique nature of flood repair projects, we separately identified flood damage projects from other historical renewal projects for sampling purposes.

There were 11 flood damage projects reviewed. Of these, we recommend adjusting two projects for \$0.3 million or 0.6% for prudence and efficiency reasons. Due to the innate urgency of flood damage projects, we have treated these adjustments as project-specific. Six projects also received proceeds from insurance claims and settlement thereby reducing the net cost of these projects. Of the non-flood damage related historical projects, we reviewed 17 projects representing approximately 10.6% of the total value of the projects (in \$FY19). For these projects, we recommend a deduction of 2.9% as an adjustment. This deduction is related to observed systemic issues and could potentially be extrapolated to the full historical project portfolio.

Transitional (FY19-FY20) and Future Renewals (FY21-FY53)

Over 14,000 projects in Sunwater's original submission had expenditure occurring between FY19 and FY53, with 2000 of these projecting expenditure in the transitional (FY19-FY20), and price path (FY21-FY24) periods.

65 projects representing 4.8% of NPV (FY19\$) were reviewed. It is to be noted that a number of these projects have expenditure occurring over several years and therefore can fall under one or more of the three periods.

32 projects with expenditure in the transitional and price path periods were included in the final review sample, representing 10.7% of the total present value (FY19\$) of projects over this period (21.0% of water supply scheme projects and 1.4% of distribution schemes projects). Many of these projects have expenditure recurring throughout the long-term renewals period and therefore can fall under one or more of the three periods.

The total recommended deduction for systemic issues identified in the transitional years (FY19-FY20) not captured by the annuities assessment is 6.7%. The total project-specific adjustment is \$571,000 and reflects adjustments to three projects.

The total recommended deduction for systemic issues identified in the price path period (FY21-FY24) not captured by annuities assessment is 1.6%. This adjustment is based on one project in this period, however this deduction has been recommended as a systemic adjustment due to systemic cost estimation issues which have been observed in four other projects in the transitional period and beyond price path period. We have also recommended project-specific adjustments totalling \$452,000, reflecting adjustments to four projects.

The total recommended deduction for systemic issues identified in the beyond price path period (FY25-FY53) not captured by annuities assessment is 3.0%. The total project-specific adjustment is \$942,000 and reflects an adjustment to one project.

Stakeholder Submissions Post QCA's Draft Report

Stakeholders responded to QCA's draft report with a number of submissions related to scope and costs for projects in the historical, transitional, price-path and beyond price path periods. Most of these projects were not in the assessed sampled projects, and therefore a number of additional reviews were conducted and detailed responses to the issues raised in these submissions are contained in this report. As a result of the additional assessments, we recommend an additional deduction for the project "(0000018910) Replace 1 Cumec Flygt Submersible Pump" in the Moura Off-stream Storage (MOSS) of \$0.34 million.

Transitional Year Projects with Costs in Historical Years

Sunwater revised its previously submitted costs for 16BAL12 – Beardmore Dam – Thuraggi Channel Repair in FY19 from \$1.34 million for FY19 to \$3.58 million in FY19 and an additional \$2.70 million to

be incurred in FY20. This project was included in the assessed sample for transitional period (FY19-FY20) projects. AECOM also noted costs incurred and claimed by Sunwater in the historical years FY16-18 of \$874,315. Documentation reviewed in response to RFI FR52 suggests an agreement by Sunwater to claim only half of these historical costs due to identified inefficiencies. We therefore recommend a project specific deduction of \$423,658 for costs incurred for the project 16BAL12 in the historical period FY16-18.

Dam Safety Upgrade Projects

Two projects were sampled for review based on materiality, accounting for 73% of the \$540.8 million expenditure for dam safety upgrade works over the FY20 to FY28 period. The review of the dam safety upgrade projects in sample generally show project prudence and efficiency has been appropriately justified and no adjustments have been proposed.

Annuities

Sunwater's original submission of November 2018 (\$1092.9 million in \$FY19) for transitional and future renewals expenditure (i.e. the FY19-FY53 period), was revised through an updated submission in June 2019 (\$1043.3 million in \$FY19). As a result, AECOM were required to redo much of the analysis undertaken on the annuities, as well as comparing the original submission with the updated submission.

Following the release of the QCA's draft report, Sunwater provided actual cost data for FY19 renewals of \$20.4 million¹ while June 2019 submission contained \$21.7 million.

Sunwater's revised submission presented to the QCA in June 2019 includes more than 12,000 individual projects for the schemes under review, for the period from FY21 to FY53. The updated value of annuities in Sunwater's June 2019 submission in FY19 dollars is \$65.9 million and \$932.0 million for the price path period and beyond price path period respectively.

Our approach to the prudence and efficiency review of annuities involved investigating several questions related to Sunwater's renewal planning practices, the accuracy of data provided and by testing the hypothesis that the timing of asset renewals was overly conservative, i.e. assets were scheduled to be renewed earlier than was required. To ensure a robust assessment, we used an investment planning tool to investigate the timing of asset renewals.

Our analysis has suggested that asset renewals timing was conservatively estimated, and we therefore propose a 10% increase in life expectancy across all asset renewals to indicate the potential impact of applying a higher tolerance for risk of failure. In practice, a prudent and efficient infrastructure operator would have developed failure curves based on history for each asset class. The increase in life expectancy is only applicable to replacement activities rather than the identified refurbishment or inspection activities.

Noting that a greater degree of planning is expected to occur in the price path period (as opposed to the beyond price path period), delays to renewals within the price path period have only been allowed to occur where renewal activities are not supported by projected asset condition using Sunwater's investment planning strategies.

In addition to this renewals adjustment, we have applied an adjustment to account for issues associated with high value refurbishment projects in bulk water schemes.

On the basis of adjustments to asset lives (and the resulting delay to renewal activities) and adjustments to specific bulk water scheme refurbishments; we recommend that, the value of annuities (in \$FY19) for the price path period be reduced from \$65.9 million to \$59.7 million, a reduction of \$6.2 million or 9.4% and the value of annuities (in \$FY19) for beyond price path period be reduced from \$932.0 million to \$664.4 million, a reduction of \$267.6 million or 28.7%. This adjustment is primarily a prudence adjustment to account for overly-conservative renewals timing, and issues associated with 'Replace/Refurb: Grout Anchors, Drains, Concrete' refurbishment projects.

¹ QCA Information Request FR42_Attachment 1_2018-19 renewals expenditure by project

1.0 Introduction

Sunwater is a government owned corporation that owns and manages a regional network of bulk water supply infrastructure throughout Queensland that supports irrigated agriculture, mining, power generation, industrial and local government.

Sunwater's water storage and distribution infrastructure includes 19 major dams, 64 weirs and barrages, 79 pumping stations, and more than 2,500 kilometres of pipelines and water channels.

The Queensland Government has directed the QCA to recommend prices to be charged by Sunwater and Seqwater (the businesses) to irrigation customers in specific water supply schemes (WSSs) and distribution systems² for the period 1 July 2020 to 30 June 2024. A copy of the Minister's referral notice (the referral) is available on the QCA's website.³

The referral requires that prices allow the recovery of prudent and efficient costs associated with operational, maintenance and administrative activities and renewing existing assets. The allowance for renewals should also account for prudent and efficient expenditure incurred in the previous price path periods. Both businesses are intending to recover renewals expenditure using a rolling renewals annuity calculated with either a 20-year or 30-year planning period.

Costs recovered should include those required to meet regulatory obligations and deliver agreed service levels, where costs to deliver agreed service levels are not materially higher than the costs of like-for-like replacement or modern equivalent replacement.

In relation to dam safety upgrade capital expenditure, the referral requires the QCA to provide two sets of prices: one set that excludes dam safety upgrade capital expenditure, and an additional set that includes an appropriate allowance for dam safety upgrade capital expenditure that is forecast to be incurred from 1 July 2020 onwards.

The QCA engaged AECOM to undertake a desktop review to assist the QCA in determining the prudence and efficiency of Sunwater's historic and forecast renewals expenditure in specified water supply schemes (WSSs), and of forecast capital expenditure on dam safety upgrades.

We experienced numerous information related challenges during the review including delays in receipt of information, wide-ranging changes to data over the course of the project, significant information gaps and generally poor quality of provided information. As a result, interpretation, manual data manipulation and professional judgement were required to make an assessment of prudence and efficiency.

1.1 Scope of the Review

The scope of the review is defined in the Terms of Reference (ToR), which is available on the QCA's website.⁴ The following is a summary of the tasks required by the ToR.

The consultant is required to identify the data, information and access requirements to the businesses' personnel required to undertake the specified tasks, as well as any other tasks the consultant considers may be of benefit.

The tasks required include:

a. A Review of Policies and Procedures

The businesses' policies and procedures as relevant to renewals expenditure, including unit rates adopted and the determination of renewals timing, will be reviewed to determine whether they are likely to ensure a prudent and efficient outcome.

The way in which the businesses addressed the policy and procedures recommendations of QCA's previous irrigation reviews in 2012 (Sunwater) and 2013 (Seqwater) will be reviewed.

² These are set out in Schedule 1 of the referral.

³ <http://www.qca.org.au/Water/Rural/Irrigation-price-investigations>

⁴ <http://www.qca.org.au/Water/Rural/Irrigation-price-investigations>

Opportunities for improvement will be identified and expected cost savings quantified.

b. Prudence and Efficiency Assessment

The prudence and efficiency of the businesses' historic and forecast renewals expenditure will be reviewed at the scheme/system level and be applicable to each of the schemes / systems. The approach taken should:

- *Consider uncertainty around projects at an early stage of development, and propose suitable methods for dealing with risk and uncertainty (recognising that such projects will have relatively lower levels of documentation than projects at a later stage of development)*
- *Assess the appropriateness of cost escalation methods proposed by the businesses*
- *Assess the potential for efficiency gains and provide appropriate justification*
- *Clearly identify the nature and value of any proposed renewals expenditure considered not prudent or efficient and recommend an alternative timing or cost estimate where necessary.*

On-site assessment of sampled assets is expected and written reasoning, justification and conclusions from the findings are required.

c. Assessment of Renewals Expenditure

For the schemes/systems, assess the prudence and efficiency of:

- *Historical renewals expenditure from previous price path periods up until 30 June 2020, to ensure the opening renewals annuity balances as at 1 July 2020 are based on prudent and efficient expenditure*
- *Forecast renewal expenditure over the proposed planning period.*

This will be done using a representative sample of the renewals expenditure, where the sample will focus on material renewal items and seek to ensure that any inferences drawn from the sample assessment are applicable across un-sampled renewals expenditure.

For each item in the sample, an assessment will be made to:

- i. *Conclude whether the proposed expenditure is prudent by reviewing:*
 - *The timing of asset replacement or refurbishment, commenting on the standard run-to-failure asset life and risk-adjusted asset life determined or proposed by the business, explaining any material variations in expected asset lives.*
 - *The condition assessments carried out, including the frequency of assessments and results of most recent assessments, and noting any reason to revise condition assessments (with reference to photographic evidence where available).*
- ii. *Assess whether the proposed expenditure is efficient by reviewing:*
 - *The proposed refurbishment/replacement cost, commenting on the Bill of Materials, specifically details of item specification (scope and scale), volumes/quantities of key inputs (materials etc.), unit rates for inputs, and the level of indirect cost allowances. Technological change and process redundancy should be taken into account, as well as costs associated with improving general business performance.*
 - *Options proposed, and procedures used by the business for determining the least cost or preferred option and commenting on whether the business' approach is appropriate that delivers efficient and least cost outcomes.*

The nature and value of any proposed renewals expenditures considered not prudent or efficient must be identified, and recommendations made to generalise findings across a particular asset class (in all schemes/systems) or to other asset classes.

d. Forecast Dam Safety Upgrade Capital Expenditure during the 2020-24 period

The assessment of the prudence and efficiency of Sunwater's forecast dam safety upgrade capex should consider whether:

- There is a demonstrated need for the expenditure (prudence), including meeting compliance and regulatory requirements
- The proposed design meets technical and regulatory standards and requirements in relation to timing
- Sunwater's proposed designs and costings meet the efficiency criteria outlined above.

1.2 Report Structure

The structure of this report is outlined in Table 1.

Table 1 Report Structure

Main Report	
Section 1	Introduction
Section 2	Summary of Capital Submission
Section 3	Assessment Methodology
Section 4	Policies and Procedures Review
Section 5	Historical Renewal Assessments (2012-2018)
Section 6	Transitional and Forward Renewal Assessments
Section 7	Annuities Assessment
Section 8	Dam Safety Upgrade Project Assessments
Section 9	Summary of Conclusions and Recommendations
Appendices	
Appendix A	Project Reviews for Historical Renewals
Appendix B	Project Reviews for Transitional and Forward Renewals
Appendix C	Impact on Annuity by Scheme
Appendix D	Project Reviews for Dam Safety Upgrades
Appendix E	Assessment Forms for Historical Renewals
Appendix F	Assessment Forms for Transitional and Forward Renewals
Appendix G	Assessment Forms for Dam Safety Upgrades

2.0 Summary of the Capital Submission

2.1 Sunwater's submission

Sunwater's Irrigation Price Review Submission details its proposed costs for the price path period for the service contracts that serve irrigation customers. Relevant to this review are Sunwater's proposed 'non-routine' costs which are made up of renewals expenditure. During the process of the QCA's investigation, Sunwater has made additional submissions to the QCA. A summary of the relevant submissions made to the QCA by Sunwater is provided in Table 2.

Table 2 Summary of Sunwater Submissions to the QCA

Title	Referred to in this document as	Date submitted
Sunwater: Irrigation Price Review Submission	Original or initial submission	6 November 2018
Revised submission and regulatory model presented to the QCA (not published)	Resubmission or June 2019 submission	17 June 2019
Response to the QCA's Draft Report	Response to QCA's Draft Report or November 2019 submission	4 November 2019

2.2 Renewals

This section summarises Sunwater's historic and forward renewals expenditure.

2.2.1 Historical Actuals (FY12-FY18)

Sunwater's submission includes more than 2,200 individual projects for the schemes under review, for the historical FY12-FY18 period. Sunwater's historic renewals expenditure over the FY12-FY18 period, amounting to \$158.1 million, is summarised in Figure 1.

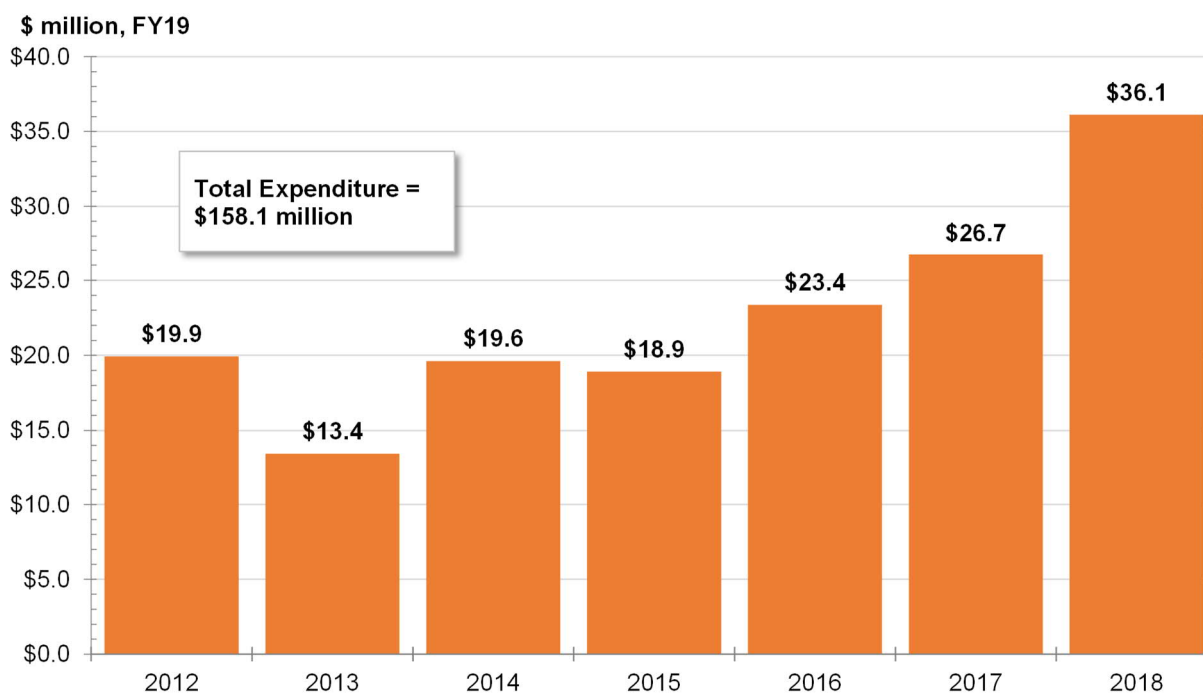


Figure 1 FY12-FY18 Actual Renewals Expenditure (\$ million)

2.2.2 Transitional and Forward Renewals (FY19-FY53)

Sunwater first presented its transitional and forward renewals submission to the QCA in November 2018. That submission was analysed until June 2019, when Sunwater submitted its revised submission for transitional and forward renewals.

Sunwater's revised submission includes more than 12,000 individual projects for the schemes under review, for the FY19-FY53 period.

Sunwater's forward renewals expenditure over the price path period is presented in Figure 2. The value of works is presented separately for the transitional (FY19-FY20), price path (FY21-FY24) and beyond price path (FY25-FY53) periods in \$FY19.

Following the release of the QCA's draft report, Sunwater, in December 2019, provided actual cost data for FY19 renewals of \$20.4 million⁵ while the June 2019 submission contained \$21.7 million. Given the small overall difference of \$1.3 million, we have not sought to update the comparison analysis of November 2018 and June 2019 submissions. Individual project costs within the sample set were updated to reflect FY19 actual costs.

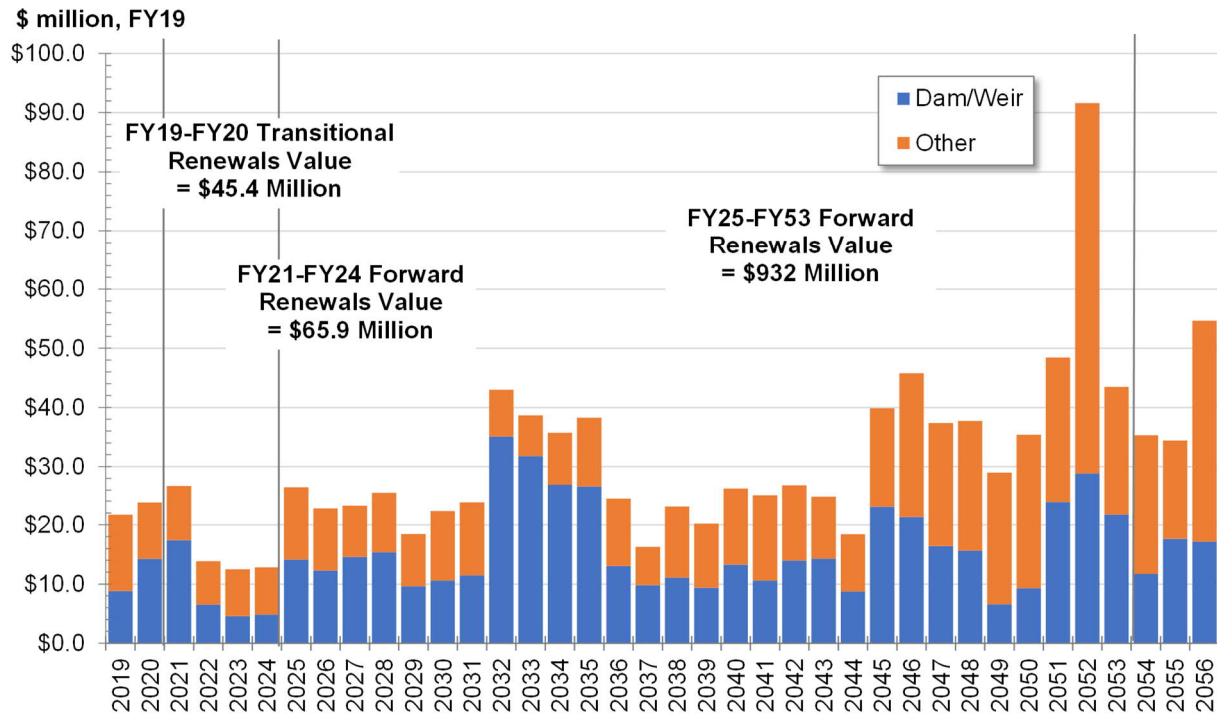


Figure 2 Sunwater's Revised Transitional and Forward Renewals Submission (\$ million, FY19)

There is a significant upward trend observed in forward renewals over time, driven by renewal activity of long-lived assets. A comparison of Sunwater's revised June forward renewals submission to the original November submission is presented in Figure 3.

⁵ QCA Information Request FR42_Attachment 1_2018-19 renewals expenditure by project

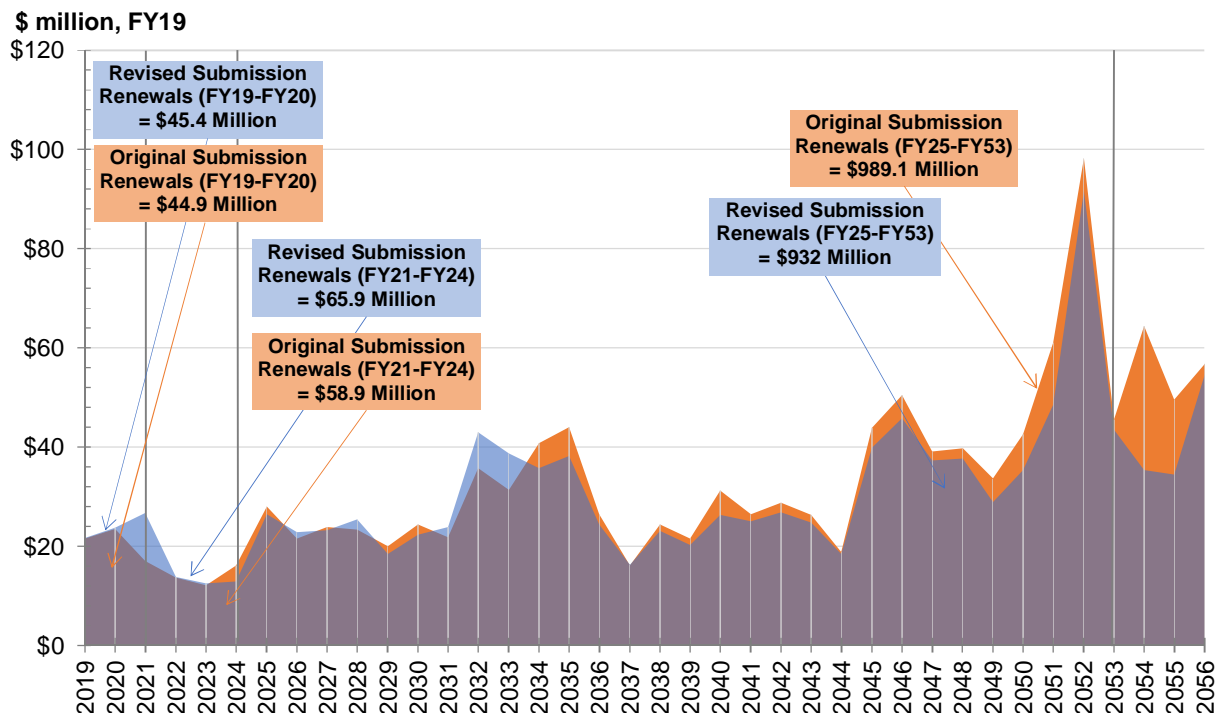


Figure 3 Comparison to Sunwater's Original Transitional and Forward Renewals Submission (\$ million, FY19)

Overall, the value of all projects included in Sunwater's transitional and forward renewals submission over the FY19-FY53 period (in \$FY19), has decreased from \$1,092.9 million in the November 2018 submission to \$1,043.3 million in the revised June 2019 submission. For each respective period, the changes are as follows:

- The value of renewals in the transitional (FY19-FY20) period has increased from \$44.9 million to \$45.4 million (in \$FY19)
- The total value of forward renewals in the FY21-FY24 period has increased from \$58.9 million to \$65.9 million (in \$FY19)
- The total value of forward renewals in the FY25-FY53 period has decreased from \$989 million to \$932 million (in \$FY19)

Table 3 outlines the top five years of expenditure within the revised submission (and the top project within that year) by value.

Table 3 Top Five Years and Projects by Value (\$million, FY19)

	Total FY Value	FY	Project Value	Asset	Project
1	\$91.6	2052	\$11.7	PETER FAUST DAM	Replace/Refurb: Grout Anchors, Drains, Concrete - stage 2
2	\$54.7	2056	\$7.4	SOUTH WALSH DISTRIBUTION	Replace Concrete
3	\$48.5	2051	\$11.7	PETER FAUST DAM	Replace/Refurb: Grout Anchors, Drains, Concrete - stage 1
4	\$45.8	2046	\$13.5	REDGATE DIVERSION PIPELINE	Replace: Redgate Pipeline (Install & Commission)
5	\$43.5	2053	\$3.6	EJ BEARDMORE DAM	Replace Gantry Crane 36 T

2.3 Dam Safety Upgrade

Dam safety upgrade works for regulated schemes amount to \$540.8 million (in \$FY19 terms) over the FY20 to FY28 period. As presented in Figure 4, the two most significant schemes by project value are Burdekin WS and Nogoia WS.

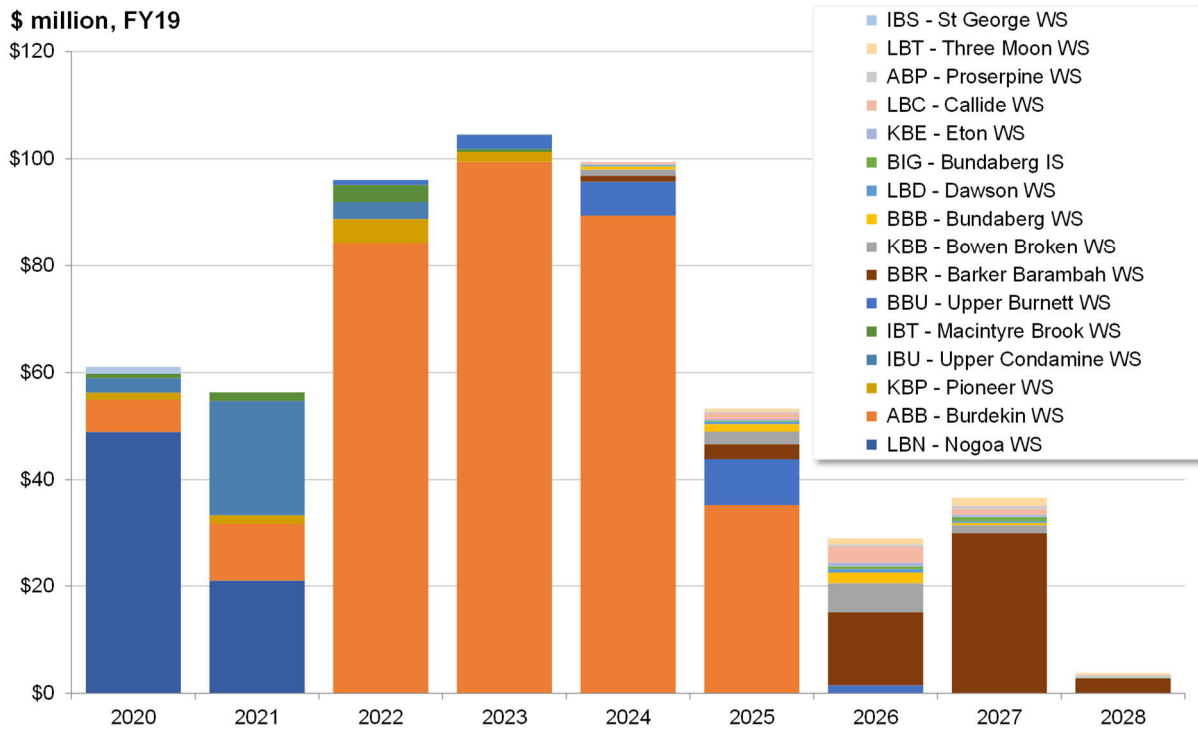


Figure 4 Dam Safety Improvement Upgrade Works by Scheme, FY20-FY28 (\$ million, FY19)

3.0 Assessment Methodology

This section outlines the assessment methodology, including the objectives of the review, the approach to the review, priority areas reviewed, a description of the project sample, our project assessment approach, and options for extrapolation of findings.

3.1 Objective

The QCA engaged AECOM to undertake a desktop review to assist the QCA in determining the prudence and efficiency of Sunwater's historic and forecast renewals expenditure in specified water supply schemes (WSSs), and of forecast capital expenditure on dam safety upgrades.

AECOM was required to:

- Review Sunwater's submissions on proposed renewals and dam safety upgrade capex, and assist the QCA in identifying additional information required
- Review the Sunwater's policies and procedures for renewal expenditure
- Assess the prudence and efficiency of proposed capital projects including
 - Renewals expenditure in previous price path periods up until 30 June 2020
 - Forecast renewals expenditure during each business' proposed planning period
 - Sunwater's dam safety upgrades during the period 1 July 2020 to 30 June 2024

The ToR includes the following definitions of prudence and efficiency to be used in the review:

Prudence Expenditures are considered prudent when there is an identified need or cost driver (agreed service levels, a legal or compliance obligation or a regulatory obligation). Prudence of project timing will also be assessed in order to determine whether the least whole-of-life cost approach has been taken to deliver the required levels of service.

Efficiency Expenditures are efficient if they represent the least-cost means of providing the requisite level of service. This assessment includes determining whether:

- The scope of the works is the best means of achieving the desired outcomes
- The standard of the works conforms with technical, design and construction requirements in legislation, industry and other standards
- The cost of the defined scope and standard of works is consistent with conditions prevailing in the markets for engineering, equipment supply and construction.

3.2 Priority Areas

In conducting the assessment, AECOM addressed the following priority areas across the major asset categories:

- Confirmation that asset renewal strategies were implemented appropriately
- Separation of dam safety upgrade projects from asset renewals
- Separation of flood damage related projects from asset renewals
- Identification and separation of legacy costs for dam safety upgrade projects (for example costs related to addressing original design defects)
- Stronger emphasis of review on projects in the price path period
- Lesser emphasis on projects beyond the price path period (relative to projects in the price path period) due to the inherent uncertainty in the project scope and cost

- Assessment of the adequacy of asset management and planning, taking into account the extent to which the QCA recommended improvements from the previous review have been implemented
- Identification of systemic issues that necessitate adjustments to the broader renewals program, particularly in relation to flood damage projects.

3.3 Approach

We adopted a sampling approach for our assessment of Sunwater’s capital expenditure due to the high number of projects contained in Sunwater’s submission and the limited number of projects able to be reviewed at the required level of depth in the available time frame. Our sampling approach and the resulting sample are outlined in Section 3.9.

The selected sample of projects was evaluated using the methodology summarised in Figure 5.

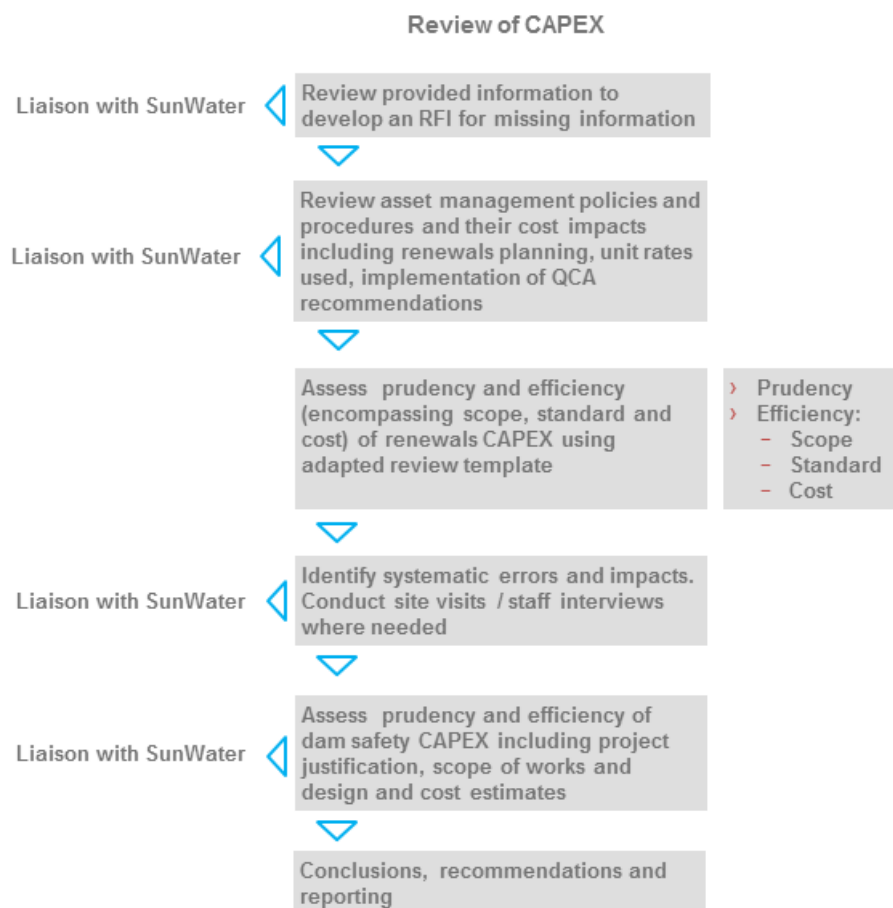


Figure 5 Outline of Methodology

3.4 Project Assessment

A standard project assessment template was developed for use by our team of reviewers to ensure consistency of the technical assessment by all reviewers. The template was structured to address all items required by the terms of reference for the review and to ensure that all issues that could influence a decision on prudence or efficiency were included.

The template included questions on technical topics, questions on cost estimating and cost control, and questions on project governance and implementation, each subject intended to be addressed by a relevant, qualified assessor (as indicated in the tables below).

The templates themselves were reviewed by the core study team with a view to extracting any themes or common issues that could represent systemic issues.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Prudency

Were/are the works reasonably required to continue to deliver agreed service levels?

Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?

Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?

Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?

Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

3.5 Information Sources

This review has primarily been a desktop review, with requests for additional documentation to clarify issues in relation to the policies, procedures and projects being reviewed. Each of the projects in the review sample has been evaluated for prudence and efficiency in terms of scope, standard and cost, and recommendations made based on:

- Review of project documentation provided by Sunwater and supplemented by request for information (RFI) process
- Interviews with Sunwater staff to obtain evidence to further support a recommendation where documentation did not provide sufficient clarity and where deemed necessary
- The professional judgement of the technical reviewers.

The use of project documentation to inform our recommendations is the preferred and best practice, but not the sole means of evaluating project prudence. In general, the type of information reviewed for historical or ongoing projects included, but was not limited to:

- Documents identifying project needs such as business cases
- Documents identifying selection of appropriate scope such as feasibility studies, options assessments

- Documents identifying selection of appropriate standards of work such as concept design reports, detailed design reports
- Documents showing quality of project execution such as project scoping documents, project management plans, risk assessments
- Documents showing how works were procured such as procurement plans, bid evaluations, offer recommendation reports
- Cost documentation at all stages of the project
- Documents showing how the project was executed including as-built drawings, photographs, and project closeout reports.

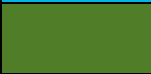


In general, the type of information reviewed for forward projects included, but was not limited to:

- Early planning documents such as business cases, options studies, cost estimates, etc.
- Policies and planning documentation such as asset renewal strategies, asset management plans, maintenance strategies
- Data from the asset register such as asset type, start-up date, and asset replacement cost
- Condition and risk assessments.

We have assessed the suitability (in terms of quality and range) of the documentation provided by Sunwater for each project in the sample. A colour-coded scoring system (using shades of green) is used to easily indicate the degree to which existing documentation has enabled an assessment to be made on each project; and highlight where documentation could be improved for future reviews and for better internal project controls (Table 4). In summary:

- The quality of documentation is high where the documentation alone was sufficient to make sound recommendations. This rating indicates that all information required to make the recommendation was documented and available, to a sufficient level of quality.
- The quality of documentation is medium where there was insufficient quantity and range, but when supplemented by interviews, informal documentation and/or professional judgement, supported a conclusion of prudence.
- The quality of documentation is low where the documentation provided was inadequate in range or quality, and our reviewers were reliant on professional judgement to make sound recommendations.

Table 4 Project Documentation Assessment

Quality and range of documentation	Legend	Description
High		Sufficient documentary evidence to support and demonstrate a recommendation
Medium		Incomplete documentary evidence, but interviews, informal documentation and/or professional judgement support a recommendation
Low		Limited documentary evidence, but professional judgement supports a recommendation.

3.6 Escalation Rates

To allow effective analysis and reporting of the forward renewals expenditure, we have adjusted the nominal dollar values provided by Sunwater into \$FY19 using the CPI escalation rates outlined in Table 5. Dam safety costs, which are incurred across both the historical and forward period have also been escalated for ease of analysis. All other historical costs are reported as actual costs.

Table 5 Escalation Rates

Year	Capex CPI	Year	Capex CPI
2013	1.99%	2020	2.00%
2014	3.22%	2021	2.37%
2015	1.51%	2022	2.37%
2016	1.49%	2023	2.37%
2017	1.83%	2024	2.37%
2018	1.71%	2025 and beyond (annually)	2.50%
2019	1.75%		

3.7 Interpreting this Report

An example of a review summary for a project is provided in Table 6. The prudence assessment, and efficiency assessment comprising of scope, standard and cost are denoted by ticks or crosses. The colours of the cells indicate the level of documentation quality for the assessment.

Table 6 Sample Project - Interpreting the Report

Project	Prudence Assessment	Efficiency Assessment			Claim (\$ millions)		
		Scope	Standard	Cost	Claim	Adjust.	Accepted
Review summary	✓	✓	✓	✗	\$0.64	\$0.04	\$0.6

In the example, the project is found to be:

- Prudent, supported by a high level of documentation quality
- Efficient in scope supported by a medium level of documentation quality
- Efficient in standard supported by a medium level of documentation quality
- Not efficient in cost supported by a medium level of documentation quality

In addition, the inefficient project cost has resulted in a recommendation for \$0.4 million to be removed from the accepted value of the claim.

3.8 Extrapolating Findings

If systemic issues are found in the review, these issues may be able to be extrapolated to the wider population of projects. A summary of the types of inefficiencies that may be encountered, and how they may be extrapolated is provided in Table 7.

Table 7 Possible Forms of Inefficiency

Type of Inefficiency Identified	Examples	Extrapolation
<i>Organisation-wide</i> – inefficiencies that are found within the organisation’s policies or processes which will likely impact the population of projects.	Procurement process Cost estimating processes Capital planning model	Organisation wide inefficiencies should be applied to the whole population of projects.
<i>Scheme-wide</i> – inefficiencies found within the planning for a certain scheme or schemes.	Differences found in the planning processes between schemes. (considered unlikely as most planning is performed from central location)	Scheme wide inefficiencies to be applied to the specific scheme/s.
<i>Asset type-wide</i> – Inefficiencies found within the planning documentation for a certain type of asset.	ACP for Pipes - planning or delivery processes. Design issues	Asset type related inefficiencies should be applied to the same asset types in the population.
<i>Project type</i> – inefficiencies found that are linked to the type of project.	For example, metering replacements, dam inspections Design issues	Project type related inefficiencies should be applied to the project type, e.g. metering replacements.
<i>Specific project</i> – specific issues associated with an individual project.	Cost overruns due to project management (historical projects). Over-scoped project.	No extrapolation. Project application only

3.9 Sample of Projects Selected for Assessment

This section outlines the sample of projects selected for assessment and methodology employed in selecting project sample.

3.9.1 Historical Sample

Sunwater’s submission includes more than 2,200 individual projects for the schemes under review (consolidated by project ID), for the historical FY12-18 period.

We observed significant variation between Sunwater’s actual expenditure and both Sunwater’s proposed capital expenditure and the QCA’s allowance for the period, including instances of substantial exceedances, the primary driver of overspend appears to be flood damage repair costs associated with major weather events across the period. This, along with flood damage works representing a different nature of project, led us to separately identify flood damage projects from other historical renewal projects for sampling purposes.

Sample Review - Flood Damage Projects

The historical period saw flood damage affect a number of schemes:

- Boyne Supply
- Bundaberg Supply
- Upper Burnett Supply
- Callide Supply
- And to a lesser extent (in order of project value); Bundaberg Distribution, Three Moon Supply, St George Supply, Barker Barambah Supply, Dawson Supply, Lower Fitzroy Supply, Nogoia Supply, St George Distribution, Proserpine Supply, Bowen Broken Supply, Pioneer Supply, Burdekin

Distribution, Lower Mary Supply, Eton Distribution, Upper Condamine Supply, Lower Mary Distribution, Emerald Distribution, Eton Supply, Dawson Distribution and Burdekin Supply.

To identify systemic issues in the flood damage projects, we sought to review Sunwater's management of the flood works to identify any inefficiencies with the process and extrapolate these findings where appropriate.

The objectives of our sampling approach are:

- The sample should focus on those schemes most affected by flood damage
- The sample should show sufficient representation of value of the total flood damage costs.

In developing the sample, we developed an initial short list of 11 projects representing high value projects at schemes that incurred significant flood damage costs.

Table 8 demonstrates the percentage of each scheme's value sampled for the historical period, for the final flood damage project sample. Figure 6 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects. Flood damage projects have been identified from the historical submission as those projects with a program description of 'Flood Damage'⁶, and consolidated by project ID.

Table 8 Short-Listed Historical Flood Damage Repairs Sample by Scheme (\$'000s, actual)

Scheme	Number of Projects	Number of Projects in Sample	FY12-FY18 Total	FY12-FY18 Total of Selected Projects	Percentage Sampled
WABB Burdekin Supply	2		\$17		
WABP Proserpine Supply	2		\$225		
WBBB Bundaberg Supply	18	1	\$14,279	\$8,313	
WBBL Lower Mary Supply	6		\$123		
WBBR Barker Barambah Supply	8	1	\$760	\$387	
WBBU Upper Burnett Supply	17	1	\$3,115	\$2,332	
WBBY Boyne Supply	6	2	\$38,921	\$37,220	96%
WIBH Chinchilla Weir Supply					
WIBM Maranoa Supply					
WIBN Cunnamulla Weir Supply					
WIBS St George Supply	4	1	\$962	\$639	66%
WIBT Macintyre Brook Supply					
WIBU Upper Condamine Supply	7		\$104		
WKBB Bowen Broken Supply	6		\$173		
WKBE Eton Supply	4		\$49		
WKBP Pioneer Supply	5		\$171		
WLBC Callide Supply	13	1	\$2,876	\$2,080	
WLBD Dawson Supply	5	1	\$713	\$165	
WLBF Lower Fitzroy Supply	3	1	\$679	\$494	73%
WLBN Nogoia Supply	6	1	\$451	\$229	51%
WLBT Three Moon Supply	5	1	\$1,009	\$589	
WMBM Mareeba Supply					
WAIE Burdekin Distribution	9		\$154		
WBIC Lower Mary Distribution	6		\$89		
WBIG Bundaberg Distribution	11		\$1,098		
WIIS St George Distribution	5		\$387		
WKIA Eton Distribution	6		\$106		
WLIT Dawson Distribution	5		\$44		
WLIW Emerald Distribution	7		\$71		
WMIM Mareeba Distribution					
Total	166	11	\$66,576	\$52,448	

⁶ Projects with a program description of 'FD Flood Damage', 'NR FLO Flood Damage Repairs', 'NR FLO Flood Damage Inspection' and 'NR FLO Flood Damage Operations' classified as flood damage projects.

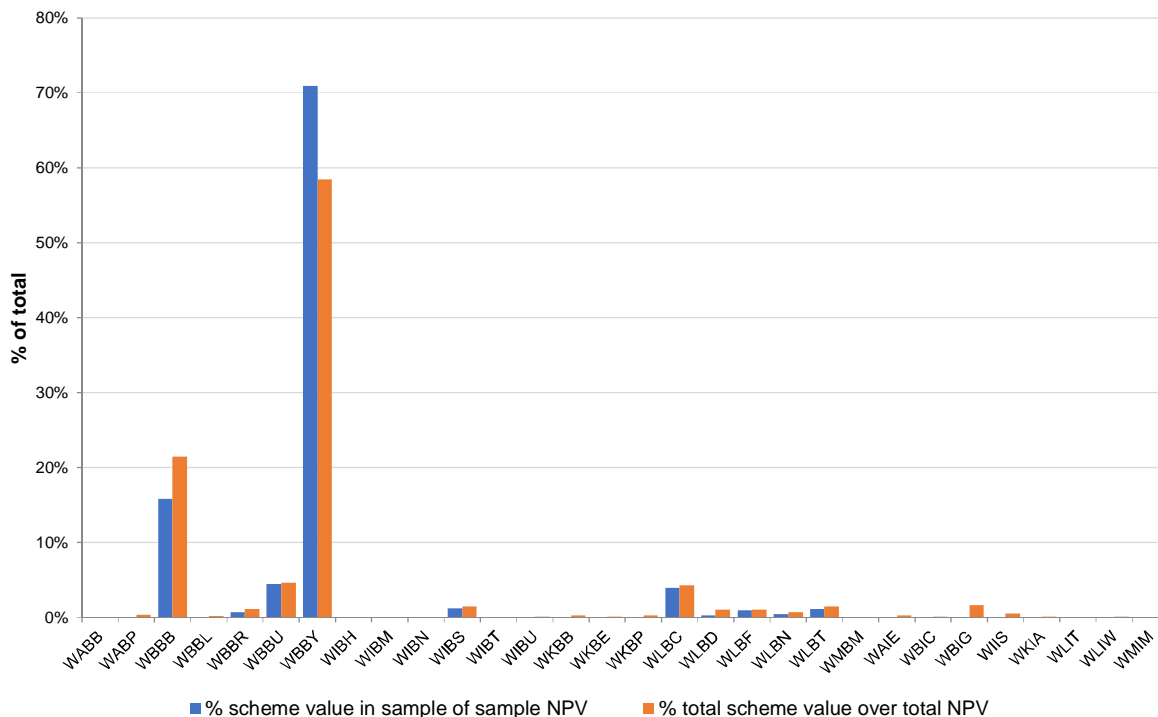


Figure 6 Short-Listed Historical Flood Damage Project Sample by Scheme (\$'000s, actual)

Sample Review - Remaining (Non-Flood Damage) Historical Projects

The historical period saw some schemes significantly exceed the amounts recommended by the QCA, while others’ costs were within or very close to the budgeted amounts. It is important for the focus to be placed on those schemes which exhibited substantial cost increases.

The objectives of our sampling approach are:

- The sample should focus on those schemes most affected by cost overruns
- These schemes should see sufficient representation.

We identified schemes that saw significant cost exceedances to the QCA-recommended amounts for the period. We sought to ensure that these schemes were adequately represented, which meant that there would be under-representation in some of the other schemes.

Table 9 demonstrates the percentage of each scheme’s value sampled for the historical period, excluding flood damage projects. Figure 7 shows the representation of each scheme (i.e. percentage of the scheme sample’s value over the total NPV of the sample), against the representation of the schemes within the population of projects.

Table 9 Sample Analysis by Scheme, Other Historical Projects (\$'000s, actual)

Scheme	Number of Projects	Number of Projects in Sample	FY12-FY18 Total	FY12-FY18 Total of Selected	Percentage Sampled
WABB Burdekin Supply	76		\$4,582		
WABP Proserpine Supply	39	1	\$1,653	\$607	37%
WBBB Bundaberg Supply	99		\$3,463		
WBBL Lower Mary Supply	16	1	\$621	\$387	62%
WBBR Barker Barambah Supply	53		\$897		
WBBU Upper Burnett Supply	73		\$2,193		
WBBY Boyne Supply	33		\$777		
WIBH Chinchilla Weir Supply	10		\$127		
WIBM Maranoa Supply	2		\$5		
WIBN Cunnamulla Weir Supply	5	1	\$61	\$26	43%
WIBS St George Supply	76		\$4,953		
WIBT Macintyre Brook Supply	53	1	\$2,059	\$283	14%
WIBU Upper Condamine Supply	86		\$2,750		
WKBB Bowen Broken Supply	65	1	\$2,009	\$408	20%
WKBE Eton Supply	58		\$3,108		
WKBP Pioneer Supply	77	2	\$4,498	\$1,428	32%
WLBC Callide Supply	63	1	\$5,840	\$1,546	26%
WLBD Dawson Supply	63	1	\$2,117	\$261	12%
WLBF Lower Fitzroy Supply	15	1	\$467	\$139	30%
WLBN Nogoia Supply	95	1	\$6,047	\$732	12%
WLBT Three Moon Supply	28		\$581		
WMBM Mareeba Supply	33	1	\$1,976	\$480	24%
WAIE Burdekin Distribution	270	1	\$11,676	\$767	7%
WBIC Lower Mary Distribution	27		\$894		
WBIG Bundaberg Distribution	271	1	\$9,494	\$1,273	13%
WIIS St George Distribution	44		\$3,843		
WKIA Eton Distribution	147	1	\$3,636	\$968	27%
WLIT Dawson Distribution	39		\$1,682		
WLIW Emerald Distribution	59		\$3,463		
WMIM Mareeba Distribution	149	2	\$6,052	\$1,313	22%
Total	2124	17	\$91,524	\$10,618	

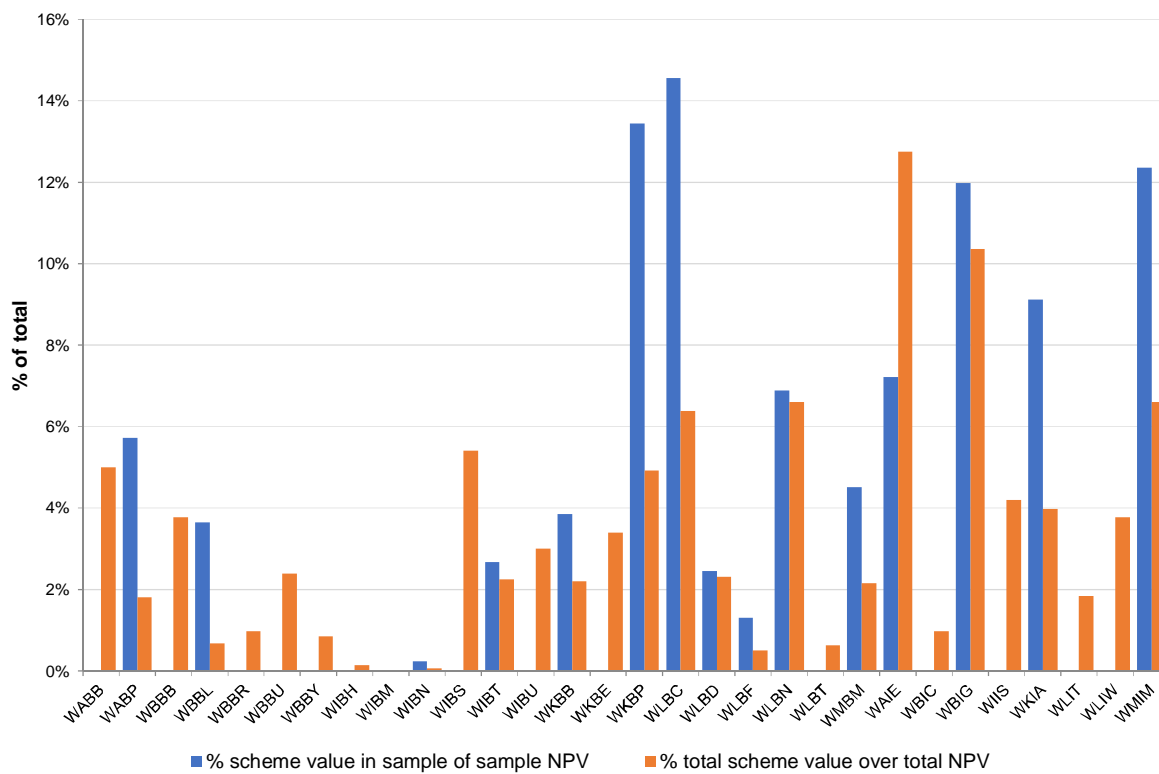


Figure 7 Sample Analysis by Scheme, Other Historical Projects

A total of 28 historical projects (11 flood damage and 17 other projects) were included in the historical review sample. These represent 78.8% of flood damage and 11.6% of other historical expenditure over the FY12-FY18 period (Table 10).

Table 10 Summary of Historical Sample (\$'000s, actual)

Flood Projects		Non-Flood Projects	
Number of Projects in the Planning Period	166	Number of Projects in the Planning Period	2124
Number of Projects in Sample	11	Number of Projects in Sample	17
% Projects by Number	6.63%	% Projects by Number	0.80%
FY12-FY18 Total	\$66,576	FY12-FY18 Total	\$91,524
FY12-FY18 Total of Selected Projects	\$52,448	FY12-FY18 Total of Selected Projects	\$10,618
% By value	78.78%	% By value	11.60%

The list of projects included in the sample is provided in Table 11.

Table 11 Historical Project List

Project	FY12-FY18 Total (\$ million, actual)
Flood Damage Projects	
13BIA47 - FD01 (2013) Flood Damage Repairs at Ben Anderson Barrage	\$8.31
13BBA04 - FD01 (2013) Flood Damage Repairs at Bjelke-Petersen Dam	\$0.39
13UBP04 - FD01 (2013) Claude Wharton - Flood Repairs	\$2.33
12BYR17 - FD01 (2011) - Spillway Repairs - Boondooma Dam	\$36.63
12SGA24 - FD01 (2012) - Moolabah Weir - Dam Break & Upgrade Construction	\$0.64
13CVA02 - FD01 (2013) Flood Damage Repairs at Callide Dam - left gate (floating chamber)	\$2.08
13DVA06 - FD01 (2013) Flood Damage Repairs at Neville Hewitt Weir	\$0.16
13LFZ07 - FD01 (2012) Eden Bann Repair and Desilt the Fishlock to make it operable after February 2012 flood	\$0.49
12NMA08 - FD01 (2011) Tartus Weir Flood Damage Repairs - Erosion & Protection Works	\$0.23
13TMC04 - FD01 (2013) Flood Damage Cania Spillway	\$0.59
16BYR07 - Boondooma Dam Spillway Repairs Project Insurance Claim	\$0.59
Bulk Water and Irrigation Scheme Projects	
16PRO03 - Investigate Spillway Chute Floor - Peter Faust Dam	\$0.61
16MVA01 - Reinstate Down Stream Rock Protection - Mary River Barrage (Options/Design 2016)	\$0.39
16CUW02 - Allan Tannock weir - Refurbish Outlet Works Gate	\$0.03
14MAB05 - Coolmunda Dam: Refurbish Float Wells (Float Guides, Ropes, Tie Rod Ends)	\$0.28
17BBR04 - Plug the River Conduit Inlet Tower Base Permanently - Eungella Dam	\$0.41
07PIO05 - Replace Regulating Valve RV01 - Palmtree Creek Pipeline	\$0.96
15PIO06 - Teemburra - Replace Control System including SCADA for Teemburra Dam, Palmtree Ck & Tannalo Valves - Teemburra Dam	\$0.47
15CVA16 - Callide Flood Review	\$1.55
15DAW01 - Upgrade PLC and SCADA System - MOSS Pump Station (Drawings/Spec/Cost Estimate 2015, Supply/Install/Commission 2016)	\$0.26
12LFZ12 - Replace Control Equipment - Eden Bann Fishway (Scope/Options/Design 2014, Procure/Install/Commission 2015)	\$0.14
13NMA04 - Spillway Seepage Investigations - Fairbairn Dam	\$0.73
12MDA57 - Replace lighting system at the Tinaroo Falls Dam Gallery	\$0.48
Distribution Scheme Projects	
13BIA48 - FD01 (2013) Flood Damage Repairs - Don Beattie PSTN	\$1.27
11ETO06 - Replace Switchboards and Control Equipment - Brightley Pstn 1 & 2	\$0.97
14MDA13 - Implement Findings: Strategic Plan for MDWSS I&D SCADA - Stage 2	\$0.88
17BRI31 - Install STG II Functional Outlet Works - Giru Weir	\$0.77
11BRI47 - Rising groundwater mitigation	\$0.50
14MDA33 - Study Copper Sulphate Research Project - West Barron Main Channel	\$0.44

3.9.2 Transitional and Forward Renewal Sample

This section presents the adopted sampling methodology and profile of the projects selected for review. Figures presented in this section reflect Sunwater's original November renewals submission, as this was used in determining the review sample. All figures presented in this section are in present value terms, discounted using a nominal WACC of 6.33%⁷.

Critical to the selection of projects to be sampled over the transitional, price path period and beyond price path period is the contribution of those projects to the prices charged at a scheme level.

With this in mind, we adopted the following guiding principles in our sampling approach:

- The sample should represent, at a scheme level, an appropriate proportion of the value of each scheme's projects, i.e. all schemes should be represented

⁷ The WACC determined by the QCA in the Seqwater Bulk Water Price Review 2018–21 final determination was 6.33%

- The sample should be weighted more heavily towards the transitional and price path period
- Those schemes where there are projected increases in costs (and therefore prices) should be appropriately represented
- The sample should represent an appropriate proportion of the value of the total population of projects
- The sample should allow for identification of systemic inefficiencies and extrapolation of these

An NPV approach was adopted to determine material projects for consideration in the review sample.

Sample Review – Transitional and Price Path Periods

We expect that the nearer term projects (transitional and price path period) will have a higher level of documentation allowing for a more in-depth review and will provide a higher contribution to the NPV.

With this in mind, we aimed to weight the sample towards the transitional and price path period for irrigation and bulk water systems. The sample selection was guided by project materiality, however was manually developed in consultation with the QCA giving consideration to:

- Achieving appropriate representation at the scheme level
- Achieving appropriate representation of different asset types
- Achieving appropriate representation in the type of project assessed (and considering projects for inclusion in the review sample where there are numerous other similar projects in the submission)
- Including projects in the sample where project-specific feedback has been made by stakeholders
- Avoiding potential conflicts of interest

Over 2,000 projects in Sunwater's original submission had expenditure occurring in the transitional and price path periods. Of these, 32 projects were included in the final review sample, representing 10.7% of the total present value of projects over period (21.0% of water supply scheme projects and 1.4% of distribution schemes projects).

Table 12 demonstrates the percentage of each scheme's value sampled for the transitional and price path period. Figure 8 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects.

We note that for distribution systems, the sample is less weighted toward the transitional and price path periods, due to significant spikes occurring in outer-year expenditure, as discussed at section 3.9.3.

Some changes in the number of projects with expenditure occurring in the transitional and price path period may be observed in our final conclusions presented in Section 6.0 due to Sunwater's submission of a revised program in June, wherein changes in project timing occurred.

Table 12 Sample Analysis by Scheme, Transitional and Price Path Period (NPV, \$'000s)

Scheme	Number of Projects	Number of Projects in Sample	Total NPV	NPV of Selected Projects	Percentage sampled
WBBR Barker Barambah bulk	25		\$1,452		
WKBB Bowen Broken Rivers	30	3	\$1,799	\$634	35%
WBBY Boyne River & Tarong	15	1	\$977	\$335	34%
WBBB Bundaberg bulk	62	1	\$2,473	\$297	12%
WABB Burdekin Haughton bulk	51	2	\$1,975	\$246	12%
WLBC Callide Valley	41	2	\$2,217	\$674	30%
WIBH Chinchilla Weir	9	1	\$479	\$64	13%
WIBN Cunnamulla	4	1	\$62	\$47	76%
WLBD Dawson Valley bulk	26	1	\$1,699	\$460	27%
WKBE Eton bulk	35	1	\$834	\$107	13%
WLBF Lower Fitzroy	2	1	\$46	\$42	91%
WBBL Lower Mary River bulk	5		\$83		
WIBT Macintyre Brook	24	2	\$658	\$248	38%
WIBM Maranoa River	4		\$165		
WMBM Mareeba-Dimbulah bulk	23	2	\$1,287	\$418	32%
WLBN Nogo Mackenzie (bulk)	60		\$2,227		
WKBP Pioneer River	37	1	\$1,283	\$116	9%
WABP Proserpine	13	2	\$2,179	\$464	21%
WIBS St George bulk	41		\$1,144		
WLBT Three Moon Creek	16	3	\$859	\$577	67%
WBBU Upper Burnett	35	1	\$1,695	\$323	19%
WIBU Upper Condamine	40	3	\$1,229	\$572	47%
WBIG Bundaberg distribution	472		\$9,211		
WAIE Burdekin Haughton distribution	340		\$8,245		
WLIT Dawson Valley (Theodore) distribution					
WLIW Nogo Mackenzie (Emerald) distribution	87		\$1,849		
WKIA Eton distribution	179	2	\$2,981	\$219	7%
WBIC Lower Mary River distribution	78	1	\$2,838	\$191	7%
WMIM Mareeba-Dimbulah distribution	286	1	\$4,896	\$22	0%
WIIS St George distribution					
Total	2040	32	\$56,840	\$6,057	

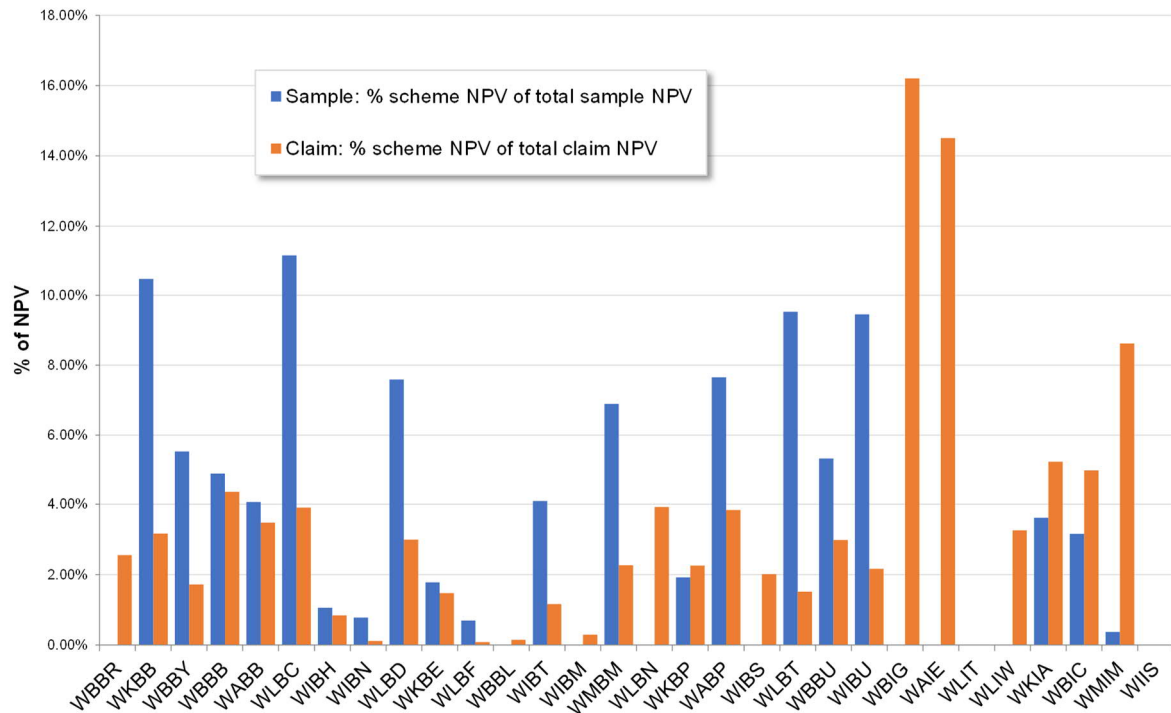


Figure 8 Sample Analysis by Scheme, Transitional and Price Path Period

In undertaking the manual manipulation of the sample in this period, it was important also to ensure appropriate representation at an asset class level. The sample’s asset level representation (by value) over the transitional and price path period is presented in Figure 9.

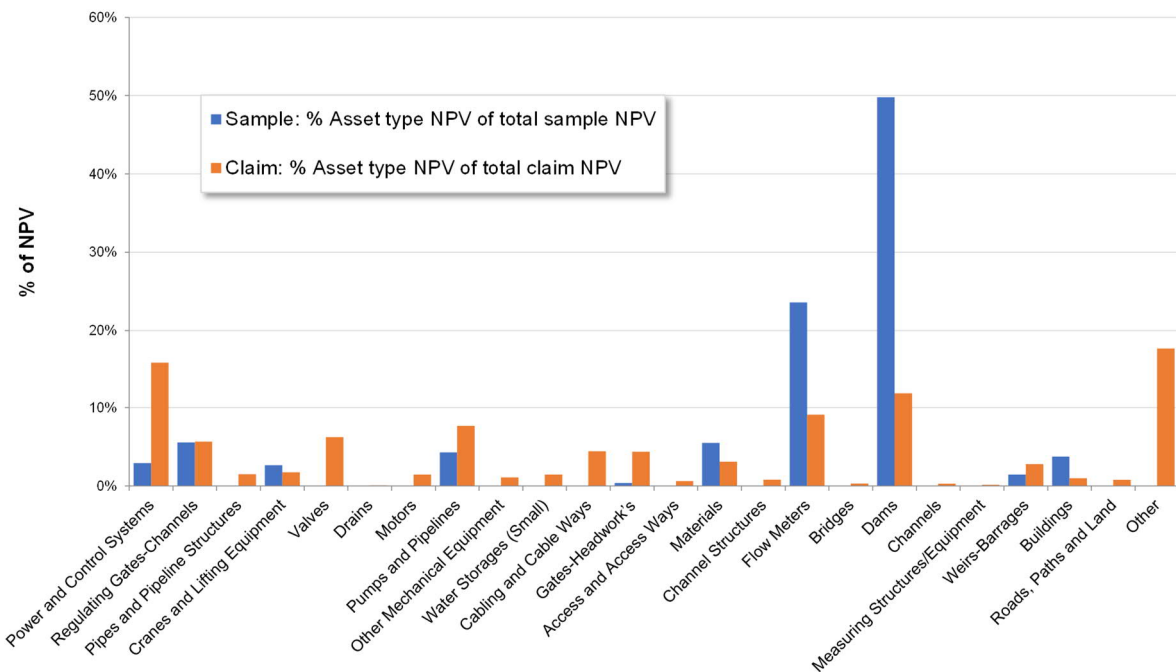


Figure 9 Sample Analysis by Asset Type, Transitional and Price Path Period

The over representation or under representation of particular schemes or asset classes within this period is attributed to the various conflicting considerations in constructing the sample, and the limited number of projects able to be reviewed at the required level of depth in the required time frame.

Sample Review – Transitional, Price Path Period and Beyond Price Path Period

It is noted that Sunwater's planning for projects within the beyond price path period is performed at a portfolio level. We understand that Sunwater uses a business model that determines a long-term capital program based on remaining useful life of its assets. Based on this, it was anticipated that little information or justification will be able to be provided around the scope of works for these projects. For this reason, the assessment of projects in the longer-term planning period was driven by a review of the *process* used by Sunwater to determine this program of works. The sample determined is a means of firstly checking that the process documented is being correctly implemented, and secondly that this process is prudent and efficient.

Another consideration for sampling in the beyond price path period is that some schemes are seeing significant cost rises over this period, whereas others are remaining relatively stable. We have identified those schemes using colour coding below (orange for those seeing costs trending upwards in the long-term period). For schemes where upward trends in renewals costs were identified, we have attempted to ensure adequate representation in those schemes across the period, with a focus on the projects and asset types which appear to contribute to those cost increases.

Over 14,000 projects in Sunwater's original submission had expenditure occurring in the transitional (FY19-FY20), price path (FY21-FY24) and beyond price path (FY25-FY53) periods. 65 projects representing 4.8% of NPV (\$FY19) were reviewed. It is to be noted that a number of these projects have expenditure occurring over several years and therefore can fall under one or more of the three periods.

Table 13 shows the make-up of the total sample. Figure 10 shows the representation of each scheme (i.e. percentage of the scheme sample's value over the total NPV of the sample), against the representation of the schemes within the population of projects.

Table 13 Sample Analysis by Scheme FY19-FY53 (NPV, \$'000s)

Scheme	Number of Projects	Number of Projects in Sample	Total NPV	NPV of Selected Projects	Percentage Sampled
WBBR Barker Barambah bulk	280	3	\$19,031	\$129	1%
WKBB Bowen Broken Rivers	267	5	\$11,158	\$1,071	10%
WBBY Boyne River & Tarong	137	1	\$10,552	\$497	5%
WBBB Bundaberg bulk	475	3	\$41,166	\$383	1%
WABB Burdekin Haughton bulk	692	5	\$32,639	\$791	2%
WLBC Callide Valley	386	2	\$17,181	\$1,583	9%
WIBH Chinchilla Weir	25	2	\$1,417	\$276	20%
WIBN Cunnamulla	15	1	\$436	\$47	11%
WLBD Dawson Valley bulk	376	1	\$16,346	\$1,688	10%
WKBE Eton bulk	312	2	\$14,130	\$535	4%
WLBF Lower Fitzroy	67	1	\$2,206	\$185	8%
WBBL Lower Mary River bulk	49	1	\$1,945	\$43	2%
WIBT Macintyre Brook	176	2	\$7,344	\$991	13%
WIBM Maranoa River	17		\$689		
WMBM Mareeba-Dimbulah bulk	172	2	\$9,027	\$1,319	15%
WLBN Nogo Mackenzie (bulk)	573	2	\$22,028	\$86	0%
WKBP Pioneer River	307	2	\$14,246	\$555	4%
WABP Proserpine	162	2	\$8,836	\$1,066	12%
WIBS St George bulk	231	1	\$10,444	\$43	0%
WLBT Three Moon Creek	240	3	\$10,663	\$1,704	16%
WBBU Upper Burnett	297	2	\$12,775	\$522	4%
WIBU Upper Condamine	343	3	\$16,363	\$1,522	9%
WBIG Bundaberg distribution	2839	4	\$58,237	\$1,492	3%
WAIE Burdekin Haughton distribution	1982	5	\$59,287	\$2,443	4%
WLIT Dawson Valley (Theodore) distribution	38		\$1,632		
WLIW Nogo Mackenzie (Emerald) distribution	433		\$13,084		
WKIA Eton distribution	910	3	\$14,523	\$410	3%
WBIC Lower Mary River distribution	331	2	\$8,707	\$408	5%
WMIM Mareeba-Dimbulah distribution	2111	5	\$51,025	\$3,628	7%
WIIS St George distribution	23		\$988		
Total	14,266	65	\$488,105	\$23,418	

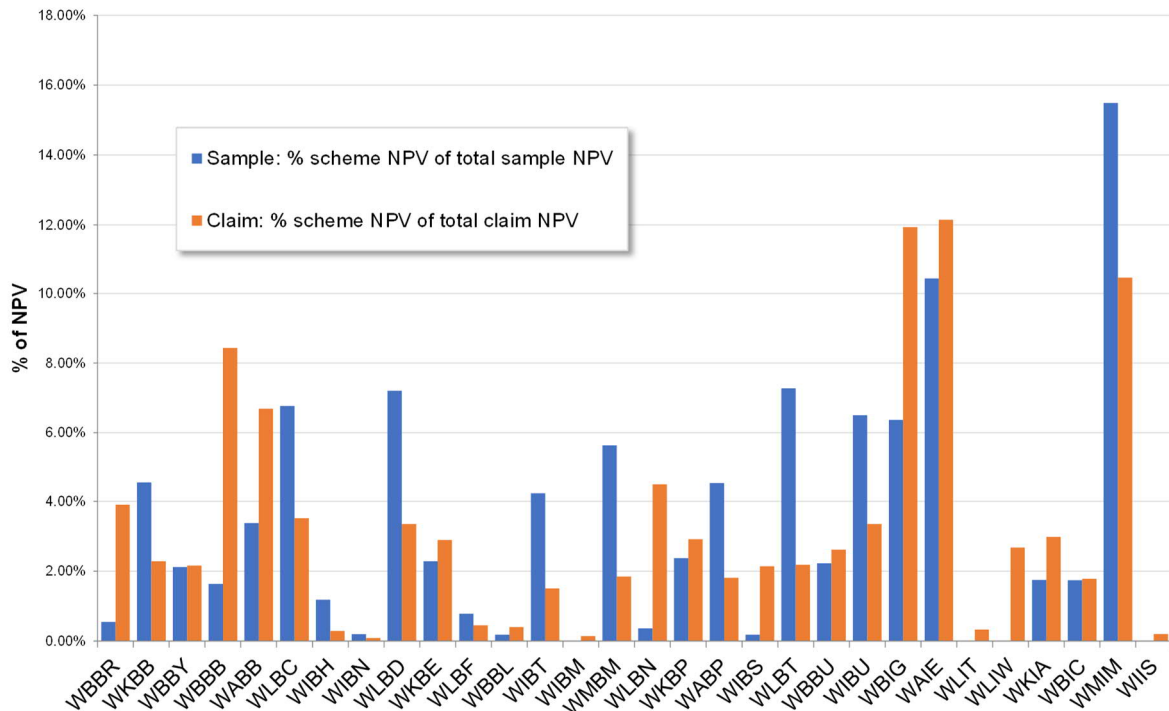


Figure 10 Sample Analysis by Scheme, FY19-FY53

In undertaking the manual manipulation of the sample in this period, it was important also to ensure appropriate representation at an asset level, particularly those assets which appeared to drive increases in costs for the different schemes. The sample’s asset level representation (by value) over the transitional and price path period is presented in Figure 11.

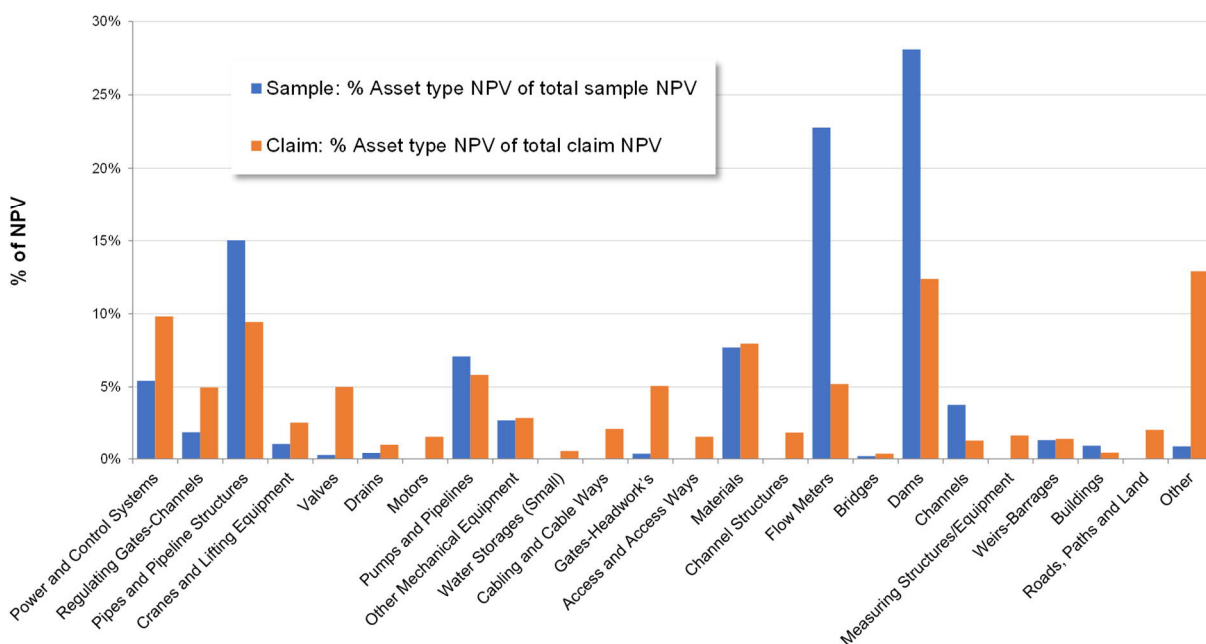


Figure 11 Sample Analysis by Asset Type, FY19-FY53

Similar Projects

One thing to note about Sunwater's list of projects is that there are a number of projects which are very similar in nature and costs. For example, in the Bundaberg bulk Scheme, there are 12 individual projects where the scope of works is '*Build & install 10 new shutters at Ben Anderson Barrage*'.

Where instances like this appear, we have included in the sample only a few of these projects. This has meant that the total value of the sampled projects may appear to be understated. Distribution systems in particular have many similar projects occurring in outer year periods (such as pump and pipe replacements) which collectively represent high value.

A summary table of some notable instances of this is provided at Table 14, and their impact on the total value sampled.

Table 14 Similar Projects to those in the Forward Renewal Sample

Project Type	Approximate value of Projects in Original Submission	Scheme	Included in Review Sample	Indicative Remaining Value (NPV)
20yr Dam Safety Review	23 projects at an NPV of \$5.4 million	Various Bulk Water Schemes	8 projects at an NPV of \$3.4 million	\$2.0 million
5yr Dam Comprehensive Inspection	45 projects at an NPV of \$11.6 million	Various Bulk Water Schemes	7 projects at an NPV of \$3.3 million	\$8.3 million
Build& install 10 new shutters at Ben Anderson Barrage	12 projects at an NPV of \$0.8 million	Bundaberg bulk	2 projects at an NPV of \$0.3 million	\$0.5 million
Meter replacement	400+ projects at an NPV of \$13.7 million	Various	9 projects at an NPV of \$6.0 million	\$7.7 million
Refurbish pump (Centrifugal Pump (Pipe size >150mm))	51 projects at an NPV of \$3.6 million	Various	1 project at an NPV of \$0.4 million	\$3.2 million
Replace pump (Centrifugal Pump (Pipe size >150mm))	59 projects at an NPV of \$7.3 million	Various	1 project at an NPV of \$0.4 million	\$6.9 million
Replace Concrete Lining	11 projects at an NPV of \$3.2 million	Various Distribution Schemes	1 project at an NPV of \$0.4 million	\$2.8 million
Replace Pipe (Reinforced Concrete)	99 projects at an NPV of \$14.6 million	Various Distribution Schemes	2 projects at an NPV of \$8.1 million	\$6.5 million
Replace Pipe (High Density Poly Pipe)	32 projects at an NPV of \$3.2 million	Various Distribution Schemes	1 project at an NPV of \$0.4 million	\$2.8 million
Replace Synthetic Channel Lining	14 projects at an NPV of \$2.4 million	Various Distribution Schemes	1 project at an NPV of \$0.7 million	\$1.6 million
Replace Earth Drain	22 projects at an NPV of \$1.1 million	Mareeba-Dimbulah distribution	1 project at an NPV of \$0.1 million	\$0.9 million
Replace Scour Valve	180+ projects at an NPV of \$1.9 million	Various Distribution Schemes	1 project at an NPV of \$0.1 million	\$1.8 million
Total Indicative Remaining Value				\$45 million

Summary

The total sample includes 65 projects representing 4.8% of the total present value of Sunwater's renewals project. This includes 32 projects within the transitional and price path period representing 10.7% of the present value of this period (Table 15). A full list of projects is provided at Table 16.

Some changes in the number of projects with expenditure occurring in the transitional and price path period may be observed in our final conclusions presented in Section 6.0 due to Sunwater's submission of a revised program in June, wherein changes in project timing occurred.

Table 15 Summary of Transitional and Forward Renewals Sample (NPV, \$'000s)

FY19-53 Period		Transitional and Price Path Period (FY19-FY24)	
Number of Projects	14,266	Number of Projects	2,040
Number of Projects in Sample	65	Number of Projects in Sample	32
% Projects by Number	0.5%	% Projects by Number	1.6%
Total NPV (\$'000s)	\$488,105	Total NPV (\$'000s)	\$56,840
NPV (\$'000s) of Selected Projects	\$23,418	NPV (\$'000s) of Selected Projects	\$6,057
% By value	4.8%	% By value	10.7%

Table 16 Transitional and Forward Renewals Sample Project List

Project	Scheme	FY19-FY53 NPV (\$'000s)
000001060 - BURDEKIN FALLS DAM - Study: 20yr Dam Safety Review -Burdekin Falls Dam	Burdekin Haughton bulk	\$211
000001332 - BURDEKIN FALLS DAM - Study: 5yr Dam Comprehensive Inspection (by 1 June, includes \$5k for elec. insp.), see notes.	Burdekin Haughton bulk	\$451
000002872 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).	Three Moon Creek	\$547
000004935 - BOONDOOMA DAM - Study: 20yr Dam Safety Review - Boondooma Dam (See Notes)	Boyne River & Tarong	\$497
000004992 - WURUMA DAM - Study: 20yr Dam Safety Review - Wuruma Dam	Upper Burnett	\$479
000006363 - OAKENDEN MAIN CHANNEL DISTRIB - 19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)	Eton distribution	\$103
000006501 - EUNGELLA DAM - Study: 20yr Dam Safety Review including anchor pullout test and intrusive inspection (by 30 June 2020)	Bowen Broken Rivers	\$499
000006888 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020)	Pioneer River	\$512
000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec, See notes.)	Mareeba-Dimbulah bulk	\$615
000008682 - WEST BARRON DISTRIBUTION - 22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)	Mareeba-Dimbulah distribution	\$83
000008908 - UPPER CONDAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy (\$41,595 / yr) (P2)	Upper Condamine	\$796
000009475 - COOLMUNDA DAM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020) -Large cost associated with draining dissipator	Macintyre Brook	\$525
000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	Upper Condamine	\$470
000014241 - MILLAROO IRRIGATION DISTRIB - Replace Concrete Lining	Burdekin Haughton distribution	\$419
000015177 - TOM FENWICK PUMP STATION 1 - Replace H V Switchboards	Burdekin Haughton distribution	\$420
000015210 - TOM FENWICK PUMP STATION 2/3 - Replace Pump No.2	Burdekin Haughton distribution	\$581
000015276 - TOM FENWICK PUMP STATION 4/5 - Replace Reduction Gearbox	Burdekin Haughton distribution	\$588
000015726 - CLARE IRRIGATION DISTRIBUTION - Replace Pipeline 1352.0 - 4307.0	Burdekin Haughton distribution	\$436
000025738 - MONDURAN PUMP STATION - Replace Pump	Bundaberg distribution	\$449

Project	Scheme	FY19-FY53 NPV (\$'000s)
0000030670 - ISIS DISTRIBUTION - Replace Pipe From 1535.00 To 5250.74M	Bundaberg distribution	\$503
0000030689 - DON BEATTIE PUMP STATION - Replace Common Control System STG I	Bundaberg distribution	\$497
0000042132 - WEST BARRON DISTRIBUTION - Replace Scour Valve 1275.59M	Mareeba-Dimbulah distribution	\$66
0000042159 - WEST BARRON DISTRIBUTION - Replace Pipe Cherry Ck Siphon	Mareeba-Dimbulah distribution	\$2,578
0000042409 - WEST BARRON DISTRIBUTION - Replace Syn/Lin Chnl 38142.67-40917.1M	Mareeba-Dimbulah distribution	\$794
0000045622 - ARRIGA DRAINAGE - Replace Earth Drain 1845.00-3765.00M	Mareeba-Dimbulah distribution	\$108
0000048336 - PETER FAUST DAM - Study: 20yr Dam Safety Rview (by 1 Dec 2023) incl. tasks mentioned in notes	Proserpine	\$433
0000048820 - EDEN BANN WEIR - 15LFZ01 Study: WEIR PROGRAM - 5yr Dam Comprehensive Inspection	Lower Fitzroy	\$185
0000055946 - VICTORIA PLAINS PUMP STATION - 19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - Options Study Review Report' Doc Ref #2242568 Option #4	Eton distribution	\$264
0000056272 - TINAROO DAM - Testing of post tensioning permanent strand anchors	Mareeba-Dimbulah bulk	\$704
0000056393 - OWANYILLA PUMP STATION - 20LOW13 Owanayilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy (#956033)	Lower Mary River distribution	\$365
0000057410 - ALLAN TANNOCK WEIR - Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervios fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)	Cunnamulla	\$47
0000058091 - SYSTEM - Study: 20yr Dam Safety Review (by 1 Dec 2019)	Three Moon Creek	\$340
0000064409 - KROOMBIT DAM - 20 Dam Safety Review (to be done by 1st June 2020)	Callide Valley	\$335
0000064557 - KINCHANT DAM - Carry out 5 yearly dam safety inspection - Kinchant dam	Eton bulk	\$492
0000064960 - LESLIE DAM - Replace Crane Control Equipment	Upper Condamine	\$256
0000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	Three Moon Creek	\$817
0000065103 - DAWSON RIVER DISTRIBUTION - Meter Replacement - Dawsons Valley (7 per year) (P2)	Dawson Valley bulk	\$1,688
0000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	Callide Valley	\$1,248
0000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	Proserpine	\$634
0000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 (\$24,052/yr) (P2)	Macintyre Brook	\$466
0000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBHStrategy	Chinchilla Weir	\$234
0000067246 - BEN ANDERSON BARRAGE - Reinstate 10 refurbished and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	Bundaberg bulk	\$297
0000069873 - GATTONVALE PUMP STATION - Refurbish Pump 1 - Gattonvale PSTN	Bowen Broken Rivers	\$258
0000070052 - EUNGELLA DAM - 19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)	Bowen Broken Rivers	\$228
0000072774 - TEEMBURRA DAM - Stabilise bed and banks of the spillway discharge channel subject to dam safety review	Pioneer River	\$43
0000073006 - KINCHANT DAM - Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake	Eton bulk	\$43
0000074061 - CLARE WEIR - Refurbish Hydraulic System and cylinders - Stage 3	Burdekin Haughton bulk	\$43
0000075186 - EUNGELLA DAM - 17BBR04 Eungella Dam - Permanently Isolate River Conduit Intake Tower Base - Refer Opt Sty #2039445 & Cst Est #2301154	Bowen Broken Rivers	\$43
0000075187 - GATTONVALE OFF STREAM STORAGE - 17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Conditon Based (Rfr DS Insp Rpt #2288631)	Bowen Broken Rivers	\$43

Project	Scheme	FY19-FY53 NPV (\$'000s)
0000075493 - OAKENDEN MAIN CHANNEL DISTRIB - 21ETO10 Oakenden MC - Replace - ETO-OMC-FMTR - Replace Meter - Material Project (QCA) Control Equip Option Analysis AM11_G04	Eton distribution	\$43
0000075973 - BURDEKIN FALLS DAM - 18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)	Burdekin Haughton bulk	\$43
0000075990 - OWANYILLA PUMP STATION - 24LOW03 Owanyilla PSTN - Replace - ELEC-SWB2 - SWITCHBOARD 2 - Repl & Ref Life Sty (#956033) & Irrig Com Strat (Item 1.1)	Lower Mary River distribution	\$43
0000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	Bundaberg bulk	\$43
0000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	Upper Burnett	\$43
0000076177 - BEN ANDERSON BARRAGE - Reinstate 10 refurbished and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	Bundaberg bulk	\$43
0000076200 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 1	Barker Barambah bulk	\$43
0000076201 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 2	Barker Barambah bulk	\$43
0000076265 - BURDEKIN FALLS DAM - 18BDK08 - Study: 20yr Dam Safety Review - Burdekin Falls Dam (2018-2020 Project)	Burdekin Haughton bulk	\$43
0000076329 - SYSTEM - 24BIA20 Isis System - Refurbish - BIA-ISIS - ISIS - Irrigation Common Strategy Concrete Ch (30Yr Pln) (Item 2.0)	Bundaberg distribution	\$43
0000076370 - FAIRBAIRN DAM - Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.	Nogoa Mackenzie (bulk)	\$43
0000076381 - SYSTEM - 16BAL12 Beardmore Dam - Thurrugi Channel Repair	St George bulk	\$43
0000076554 - CHINCHILLA WEIR - Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir	Chinchilla Weir	\$43
0000076580 - FAIRBAIRN DAM - Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)	Nogoa Mackenzie (bulk)	\$43
0000076581 - BJELKE-PETERSEN DAM - Study: Bathymetric survey of BjelkePetersen Dam (ELT directive - see notes)	Barker Barambah bulk	\$43
0000076609 - MARY BARRAGE - 16MVA01 Reinstating D/S Rock protection - Mary Barrage	Lower Mary River bulk	\$43

3.9.3 Dam Safety Upgrade Project Sample

Dam safety improvement works occurring in regulated schemes over the FY2020 to FY2028 period amount to \$540.8 million, as presented in Figure 12. Two sample projects have been selected for review based on materiality, which amount to 73% of dam upgrade works over the period by value.

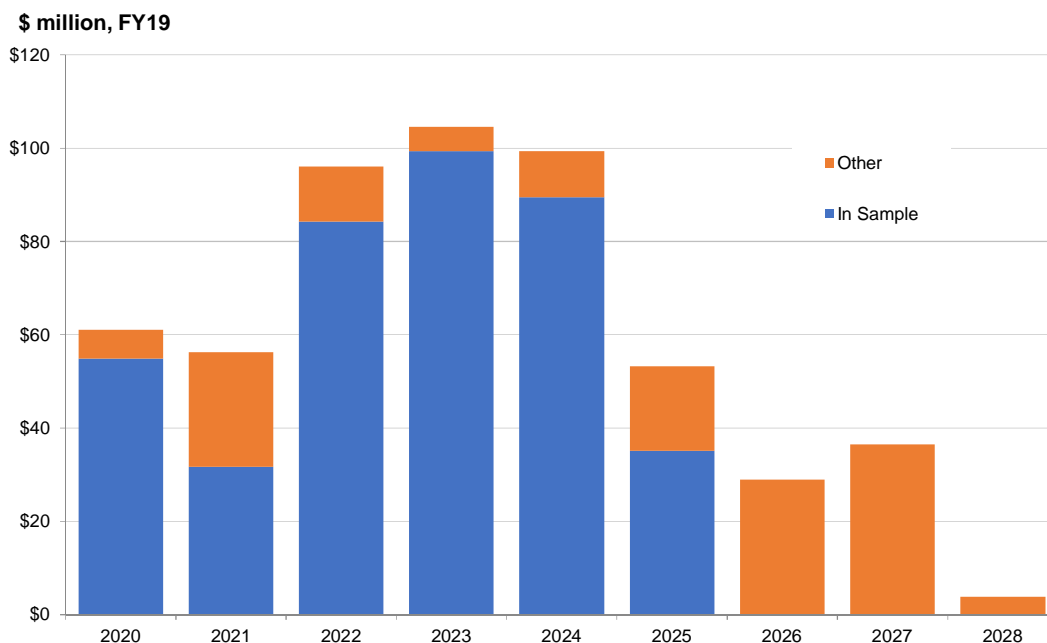


Figure 12 Dam Safety Upgrade Projects, FY20-FY28 (\$ millions, FY19)

Burdekin (Burdekin WS) and Fairbairn (Nogoa WS) dam upgrade works are outlined separately in Figure 13.

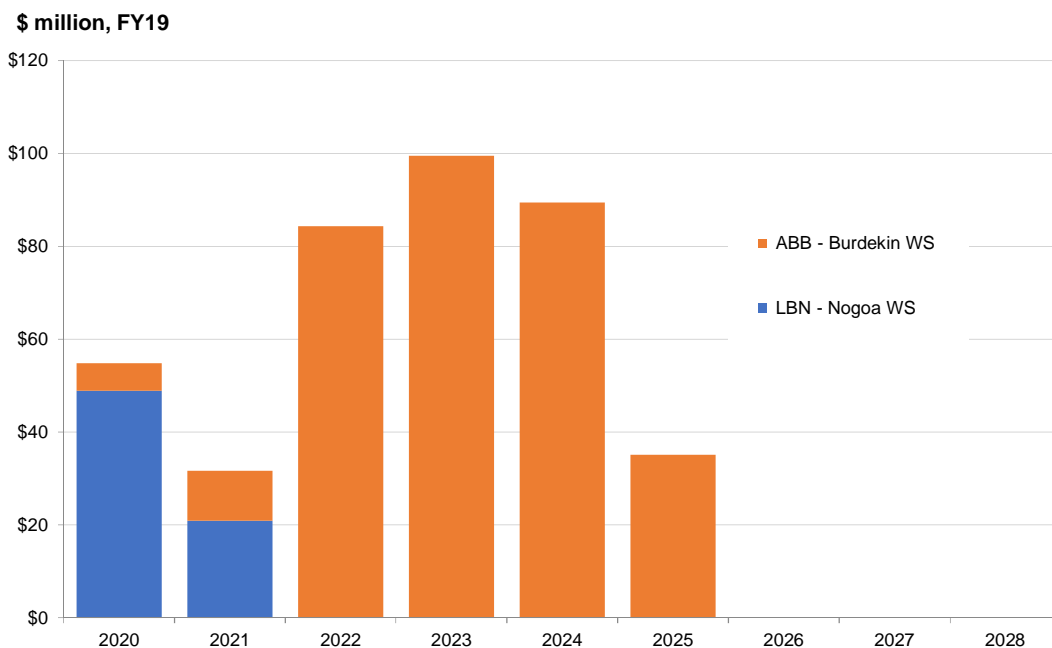


Figure 13 Dam Safety Upgrade Sample Profile (\$ millions, FY19)

4.0 Policies and Procedures Review

This section reviews Sunwater's policies and procedures as relevant to renewals expenditure, to determine whether they are likely to result in prudent and efficient outcomes. This section considers Sunwater's current policies and procedures in relation to recommendations related to policies and procedures made by the QCA in its review of Sunwater's Irrigation Prices in 2012 and associated issues identified by the QCA's consultants at that time.

4.1 Review of Recommendations from the 2012 Review

A summary of the recommendations related to policies and procedures made by the QCA in its review of Sunwater's Irrigation Prices in 2012 is outlined in Table 17⁸.

Table 17 Recommendations made by the QCA in its 2012 Review Relating to Capital Expenditure

Topic	Recommendation
Improved Planning	1.1 Options analysis for material renewals expenditure (p161)
	1.2 A review of the renewals planning process (p161)
	1.4 Renewals planning period
Annual publication of and consultation on improved NSPs	2.1 Inclusion of the renewals options analysis (p178)
	2.2 Variance reporting and re-forecasting of renewals (p178)
	2.4 Customer consultation on the annual NSPs (p178 & 260)
Improved Cost Allocation	3.4 More appropriate allocation of fixed costs in distribution systems

Sunwater developed an Implementation Plan to address the QCA's recommendations and provided progress reports to outline the status of actions taken in relation to this plan.⁹ Its current position in relation to the recommendations is outlined in its Irrigation Price Review Submission.¹⁰

These recommendations are considered throughout the review of policies and procedures.

4.2 Sunwater's Renewal Planning Processes

Infrastructure assets are intended to deliver one (or more) specified service(s) (such as water storage) and are designed to satisfy specific performance specifications, including statutory or regulatory outcomes (such as safety) as well as level of service requirements (including capacity, reliability, delivery capability, etc.).

The majority of these assets deteriorate with use or age, and the risk of failure to meet the required service levels increases as a result, to a point where the risk of failure becomes unacceptable. A competent infrastructure manager will attempt to predict when assets in each of its asset classes will reach that point, and plan for refurbishment or replacement as appropriate so that minimum service level targets continue to be met.

In the 2012 review, the QCA outlined numerous issues related to Sunwater's renewals planning process and recommended that Sunwater review its renewals planning process in light of these. The full recommendation, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 18.

⁸ Queensland Competition Authority (2012). *Final Report – Sunwater Irrigation Price Review: 2012-17*. [http://www.qca.org.au/getattachment/5fad8dc9-2101-4097-bdc8-d90d25fbfbbb/Sunwater-Irrigation-Price-Review-2012-17-Volum-\(1\).aspx](http://www.qca.org.au/getattachment/5fad8dc9-2101-4097-bdc8-d90d25fbfbbb/Sunwater-Irrigation-Price-Review-2012-17-Volum-(1).aspx)

⁹ Sunwater (2012). *QCA Pricing Practices Recommendations: Sunwater Implementation Plan*

¹⁰ Sunwater (2018). *Irrigation Price Review Submission: Appendix C 2012 QCA recommendations and other issues*

Table 18 Review of the Renewals Planning Process

<p>QCA Recommendation</p> <p><i>The Authority recommends that Sunwater undertake a review of its renewals planning process (taking into account the Authority's consultants' suggested improvements).</i></p> <p>The suggested improvements made by the Authority's consultants are considered throughout this section, and included recommendations that (amongst other things):</p> <ul style="list-style-type: none"> • Sunwater adopt decay curves for different asset types, instead of a standard decay curve. As outlined in Section 4.2.1, decay curves are used to determine the timing of asset refurbishment or renewal based on a prediction of the time in the asset's lifecycle where the risk (or frequency) of failure becomes unacceptable. • Sunwater improve condition its assessment methods and the quality of condition assessment data • Sunwater give consideration to the inclusion of options analysis in the planning process • Sunwater improve its cost estimation methodology and review data contained in its Bill of Materials (BOM) <p>Original Action Proposed/Taken by Sunwater</p> <p>Sunwater proposed to review the existing renewals planning framework in light of the improvements made through the options analysis process, customer consultation on NSPs and incorporating appropriate improvements from the suite of suggestions from the QCA's consultants.</p> <p>In light of recommendations, Sunwater proposed to:</p> <ul style="list-style-type: none"> • Continue to use a portfolio approach to estimate long term renewals, and a detailed 12-month works delivery plan at each budget cycle. • Improve the quality of condition and risk data within Sunwater's Works Management System (WMS). • Review and develop additional decay curves. • Continue use of non-invasive testing methods in condition monitoring • Ensure that condition assessments are completed within the specified maximum frequencies prior to each price review • Train employees on the administration of refurbishment and enhancement, and condition assessment processes and monitor compliance. • Train employees on material projects identification and options analysis and implement review processes. • Address technological improvements for material projects through options analysis • Update the Bill of Materials (BOM) valuations used in the Works Management System (WMS) • Apply QCA-approved method of determining and allocating indirect costs and overhead • Assess operating cost implications as part of the options analysis process • Amend NSP prototypes to take into account customer feedback in relation to real versus nominal cost reporting, clearer reporting of renewals expenditure and renewals project churn. <p>Sunwater's Current Position</p> <p>Changes to Sunwater's proposed approach include:</p> <ul style="list-style-type: none"> • Sunwater investigation revealed that there was insufficient information on asset decay to generate additional decay curves. • Sunwater reported the development of a Workflow Root Cause Analysis Report to identify causes of program changes. <p>Notable milestones/outcomes include:</p> <ul style="list-style-type: none"> • Condition assessments for the majority of bulk water assets were updated in 2015 (80% of assets reported to have an assessment complete, compared to 25% prior). • Sunwater undertook a revaluation of irrigation system assets in 2016. • The Cost Allocation Manual was updated in 2018 to increase the transparency of local overhead costs and allocation of corporate support costs to direct expenses. • NSP prototypes amended to: <ul style="list-style-type: none"> - Present QCA cost targets - Express values in nominal terms.
--

This review of Sunwater's renewals planning processes takes this recommendation, the issues identified by the QCA's consultant's and Sunwater's actions into account.

4.2.1 Best Practice

Some assets are more significant than others to an organisation (in terms of their criticality in providing the required services), and generally the organisation will have a lower tolerance of risk for these, and they will therefore be refurbished or replaced earlier than less critical assets.

Non-critical assets may be allowed to deteriorate further before being replaced. In practice, a competent infrastructure manager will attempt to avoid having critical assets by investing in redundancy or having contingency planning in place to minimise the impact of asset failure on service delivery.

Best practice renewal planning is designed to identify the economic optimum for a critical asset, where the total cost of ownership of the asset and the risk cost (due to asset failure) are minimised via an asset management plan that specifies asset maintenance requirements and the service life. This represents an optimisation of level of service requirements, the assessed risk of failure to achieve those, and the funding required and represents the most prudent, cost-effective way to manage the asset.

The timing of asset refurbishment or renewal is based on a prediction of the time in the asset’s lifecycle where the risk (or frequency) of failure becomes unacceptable. Projecting asset performance into the future is done by deriving an expected risk of failure of each asset type based on experience gained (and informed by the manufacturer, other users or industry experience), and assuming an ongoing degradation of asset condition reaching an unacceptable condition (risk of failure) at the end of its expected service life.

An example of the risk-based approach is shown in Figure 14, which presents a typical failure curve for cast iron pipes based primarily on history. It should be noted that:

- The life expectancy for the asset class is set at 154 years, which is the median (the age at which 50% of the class is considered to have failed)
- The asset manager uses two standard deviations (in advance of the median) to define the end of life for critical assets, which in this case is 127 years (implying a maximum acceptable risk of failure in this case of approximately 5 in 1000)

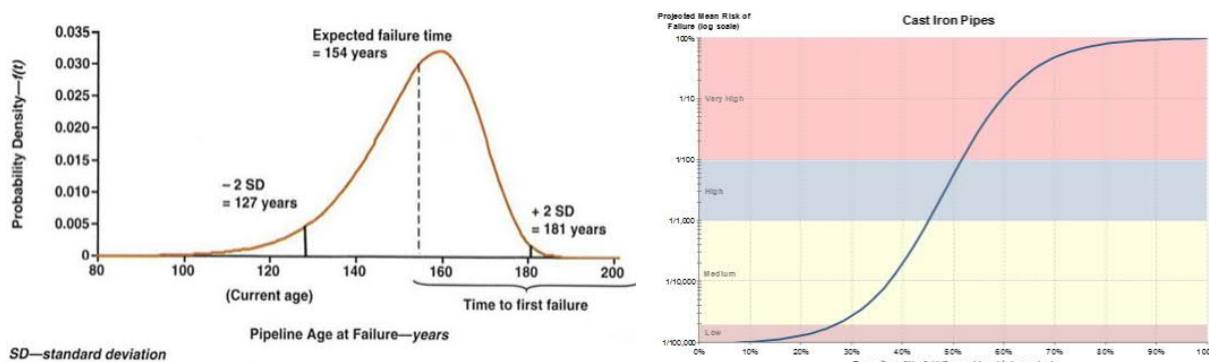


Figure 14 Failure Distribution and Risk of Failure of Cast Iron Pipes

Service life and the rate of deterioration (increase in the risk of failure) typically varies considerably site to site, and curves derived from experience elsewhere are only indicative – there is no substitute for local experience. In the absence of useful local experience, however, the failure curve is often assumed initially to be a normal distribution, and procedures are put in place to revise that assumption based on experience.

Best practice for critical assets (those that have a lower tolerance of failure for business or compliance reasons than others) is that an inspection and maintenance regime is implemented to understand actual performance of the assets, and procedures put in place to adjust the expected age of asset failure (the point where the risk of failure becomes intolerable) based on established condition at points during the asset lifecycle.

If a specific asset is established on inspection as being in better condition than expected, the planned service life of the asset will be increased (the renewal will be deferred). As the asset moves through its lifecycle, the accuracy of the planned renewal time should increase as its performance becomes better understood.

The renewal of an asset is allocated to a particular financial year for accounting purposes, but it should be noted that the allocation is based on an assessment of probability, so the actual renewal may occur in another year.

4.2.2 Renewal Planning by Sunwater

This section examines Sunwater's policies, procedures and practice for renewal planning, with reference to best practice as summarised in Section 4.2.1.

Asset Management Policy Sunwater's current policy¹¹ includes statements that refer to customer needs and that require use of a Total Expenditure (TOTEX) approach, defined as the sum of capital and operational expenditures over the whole of the asset life:

- *Manage our assets ... considering customer needs and their future requirements*
- *Set asset management procedures ... which align to the service targets agreed with our customers ...*
- *Ensure asset management is undertaken cost effectively by implementing procedures to cover a TOTEX approach within the asset lifecycle ... giving due consideration to the cost of water for our customers, return on assets and margin growth.*

The policy document does not explicitly refer to risk (to service levels) although that is implied by the statements quoted, and there is no reference to the cost of risk (the cost to customers of service interruption). The policy does not refer to or specify a requirement to optimise TOTEX by including the impact of failure on customers and makes no reference to the concept of criticality.

Strategic Asset Management Plan The requirement under the *Water Act 2000* to prepare a Strategic Asset Management Plan (SAMP) was repealed in 2008, but Sunwater has attempted to remain aligned with industry good practice as defined by ISO55001:2014 and continued to maintain a SAMP. In its SAMP, Sunwater provides asset management objectives in support of its policy document and its strategic objectives and outlines its Asset Management System (AMS).¹²

In the Executive Summary (page 2), the SAMP summarises Sunwater's asset management objectives, and includes these statements:

- *Our assets will be fit for purpose and optimally managed throughout their lifecycle to deliver customer and shareholder value.*
- *We will continually optimise our asset lifecycle and processes to provide efficient delivery of services to customers.*
- *We will fully leverage asset opportunities and realise value improvement across the asset management value chain.*

These are expanded into asset management principles (in Section 4.2), which include (among others):

- *We manage assets to provide value to our customers, stakeholders and shareholders.*
 - *We understand our assets including their purpose, criticality, capability, performance, condition and history ...*
-

¹¹ Asset Management Policy (doc 1139079), issued February 2019.

¹² Strategic Asset Management Plan, July 2019 – June 2023, dated 6 November 2018

- *We collect and store accurate asset data and make it readily available to all those that require access to it.*
- *We plan for the management of our asset portfolio over the short, medium and long term, to ensure we can deliver on our service commitments into the future, as required.*
- *We consistently manage our assets to have a risk profile that aligns with the Sunwater risk appetite.*
- *We will service, monitor, maintain and replace assets to ensure the ongoing operational performance and service capacity required to meet service standards.*
- *Assets will be refurbished through their service lives, as necessary, to extend service lives as long as economically feasible.*

These statements provide a clear intent to define and adopt the criticality concept, to plan to meet future service commitments, to satisfy a specified risk appetite, and to achieve extended service lives where economically feasible. They also provide intent to achieve a comprehensive understanding of the assets.

The AMS specified in Section 5 has been designed to use a lifecycle approach to asset management which considers whole-of-life implications in relation to customer service targets. On page 17 Sunwater also notes:

Sunwater has developed whole of life strategies around the maintenance and replacement of its asset portfolio which is based on the concept of optimised life-cycle cost. Key inputs to the approach are the risk and condition of each asset. The current condition of an asset drives an estimate of the future work required to ensure an asset continues to be able to provide the required level of service into the future, at an acceptable risk. Sunwater maintains a program of asset inspections and condition assessments which continually updates our knowledge of asset condition. This information feeds into the annual review of the renewals program ...

Although there is no specific reference to the use of the cost of risk (the cost to customers of service interruption), we consider that the principles do describe an intent to achieve prudent and cost effective (optimised over whole-of-life) asset management.

Section 6 of the AMS defines roles and responsibilities in relation to asset management. These are listed in some detail, but there appears to be no specific responsibility for optimisation of TOTEX.

Asset Management Plans

Sunwater has developed tactical asset management plans (AMPs) for each service contract that are intended to provide a clear line-of-sight from customer service targets through asset strategies to works programs planned for the service contract. There are also Network Service Plans for each service contract that include financial projections based on the AMP.

The AMPs include minimum acceptable service standards. For example, the Barker Barambah Supply AMP includes a service statement to the effect that *no customer will experience more than 10 unplanned interruptions per water year*.¹³ There is no statement of maximum duration of an interruption.

In Section 3.1.2 which addresses non-routine works, Sunwater states that its asset planners consider several factors in developing a set of projects for the next financial year, including.

- *Is the work really required? Can it be deferred? Will deferring it result in [an unacceptable] risk of failure or poorer customer service?*
-

¹³ Asset Management Plan – Barker Barambah Supply, dated October 2018

- *What is the best option for the work? Refurbishment, replacement or modified maintenance?*
- *Can the work be aggregated into a larger project for the facility or an asset type program to deliver economies of scale?*
- *Does the work generally align with the lifecycle strategy for the asset?*
- *Can the project or aggregate of projects be achieved within the financial year?*
- *Does the overall expenditure forecast align with the agreed QCA price path? Rationalisation of projects may be required to fit within the price path.*

Sunwater also notes that works planned for more than two years ahead are typically not translated into projects ahead of time, because major weather events and unplanned failures are frequent enough and often significant enough to require major changes to near-future works programs.

Long-Term Renewal Planning Methodology

Sunwater has provided a summary of the methodology used for renewal planning.¹⁴ We note that despite actions taken/proposed by Sunwater, the 'Asset Management Planning Methodology Paper' is dated February 2011 and has not been updated since.

The methodology includes reference to a 'standard asset condition decay curve' (as shown in Figure 15), for which a formula is provided (with a note to the effect that it was developed in 2006). In 2011, SKM recommended that Sunwater adopt decay curves for different asset types, instead of a standard decay curve.¹⁵

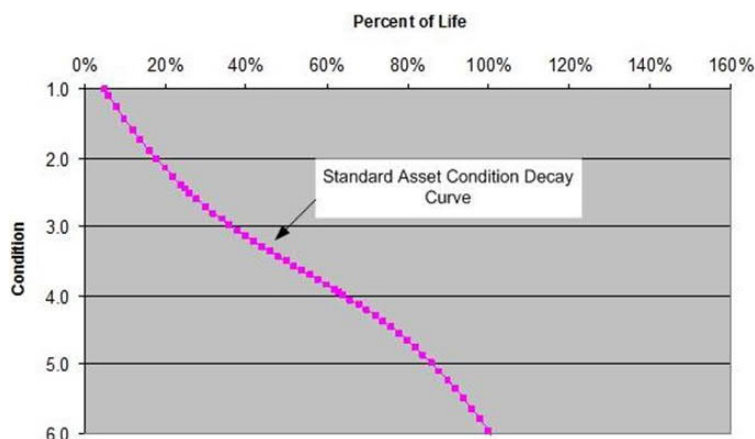


Figure 15 Sunwater's 'Standard' Decay Curve

The paper notes that Sunwater, presumably in FY10-FY11, intended to undertake a detailed analysis of historic condition and maintenance data to develop a family of standardised decay curves for different classes in recognition that different asset types decay in different ways (Section 4.1.3).

The paper proceeds to outline a planning approach based on failure distribution, and also demonstrates a risk-based approach for renewal planning of critical assets. In Section 4.3.4 the paper demonstrates an approach to revising the decay curve based on updated condition assessments. The methodology outlined is very similar to the summary of best practice presented in Section 4.2.1 above.

It appears, however, from our review of Sunwater's documents and subsequent interviews of asset management staff, that the intention to develop a family of decay curves was never acted on, and that Sunwater is still using the original curve to predict

¹⁴ Asset Management Planning Methodology Paper, February 2011

¹⁵ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

the lifecycle (and the end of life) of all its assets. The curve as presented is not a 'standard' in current use, and there is no indication that it was developed from analysis of asset failures, nor of the particular asset classes it was intended to represent.

Relating to the timing of works, in 2011 SKM noted that Sunwater's procedures are well defined for instances where an asset should be replaced before its standard run to failure asset life. However, SKM recommended that Sunwater further develop its processes for evaluating life extension.¹⁶

Sunwater defined asset lives and asset management strategies for bulk water assets and notes a change of strategy for many classes of assets that generally provides for an increase in planned service life, in some cases into perpetuity.¹⁷ These changes are likely to have a significant impact on the annuity, by delaying some renewal timing and eliminating other renewals entirely.

The documents provided do not provide any rationale for the life extension specified, and there has been no evidence provided to indicate that asset failure rates have been assessed and used to develop an informed assessment of asset service life. This point was raised in interview with Sunwater's asset management staff, who confirmed that there has been very little (if any) use of failure data in developing asset decay curves and predicting future renewal of assets.

Current best practice planning for asset renewal usually involves derivation or adoption of a family of Weibull curves, with a specific curve used to represent the failure risk of a specific asset type derived from actual failure records. There are a variety of tools in common use to support this approach, but there is no evidence that they are used by Sunwater. The life extensions provided for in the 'new' strategies included in the Overall Strategy documents imply that the assets concerned have not been failing as predicted by Sunwater's default decay curve, and since no justification has been provided for the increase in service life, we are inclined to assume that the increases provided are arbitrary.

Sunwater's 'standardised' approach to renewal of critical assets in advance of the standard curve (using a fixed multiplier) is also unlikely to be realistic, since it is being used as an indicator of risk of failure based on a curve that itself is suspect (Sunwater's methodology as documented suggests that it is intended to represent two standard deviations in advance of the median, but there is no evidence to support either the median or the standard deviation of the sample used, and therefore no evidence that either figure is applicable to the asset concerned).

Asset Management Systems and Processes

The key steps in Sunwater's non-routine activities planning cycle include:¹⁸

1. Development of draft non-routine project plans (including asset renewal projects) by asset planners

Asset planners examine asset condition data including the results of recent inspections, risk data, asset refurbishment dates and replacement dates within SAP WMS to identify non-routine projects expected to be undertaken over the next five years.
 2. Review of the draft non-routine projects plan by Regional Asset Planning Managers
 3. Presentation of the draft non-routine projects plan to local staff and other key stakeholders
-

¹⁶ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

¹⁷ Overall Strategy Common to all Bulk Water / Irrigation Schemes by Object Type.

¹⁸ Rfl A1: Approach to non-routine works and documentation, January 2019

4. Assessment of project complexity (to initiate specific workflows)
5. Data integrity checks
6. Transfer of data from WMS to the Sunwater Financial Model (SFM) to produce a draft budget
7. Presentation of the draft non-routine projects plan to customers and other stakeholders via NSPs
8. Final approval by the Chief Executive Officer and/or Board
9. A final data extract from WMS is loaded in to the SFM and final budgets are calculated
10. Creation of projects in the project governance module of WMS for delivery

Sunwater uses SAP PM to manage its asset register and to maintain its work management system and has recently introduced Viziya to optimise work schedules. Whole of life asset management planning is carried out using WMS, a SAP module (Figure 16). A GIS system is used to provide a spatial record.

These systems are primarily managed from Head Office but are accessible in the regions and are in daily use by regional staff.

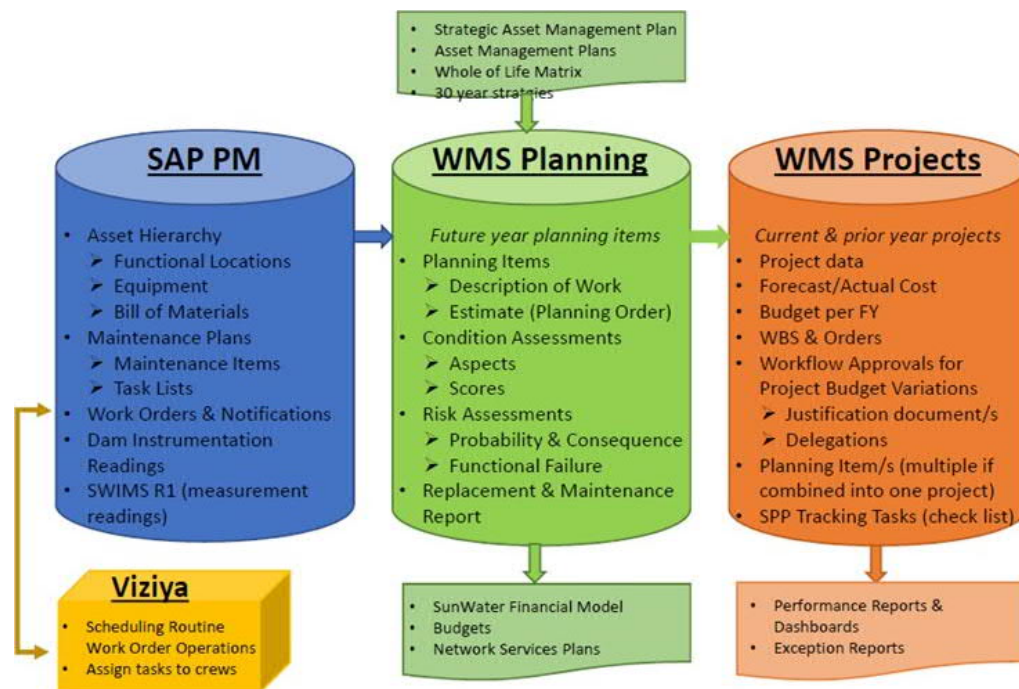


Figure 16 Sunwater's Asset Management Systems

The processes and procedures used to identify, qualify and plan for asset renewal are well documented and comprehensive.¹⁹ User manuals for each major asset class have detailed descriptions of inspection requirements, including the definitions used for condition rating to ensure a consistent approach and rating.²⁰

¹⁹ Asset Refurbishment Planning: Methodology for Condition Assessment of Assets, Sept 2012

²⁰ User Manual for Assessing Electrical / Mechanical / Civil / Headworks Assets

There are a range of templates used for project initiation, depending on potential project size,^{21,22} and guidelines for defining non-routine project scope and developing a delivery management plan,²³ for risk assessment²⁴ and for defining and analysing renewal options as part of the business case development.²⁵

Examples of all these documents have been reviewed.

**Asset
Condition
Assessment**

Condition assessment informs renewals planning over the entire planning period, however has a particularly significant role in the short-term in terms of validating expected works and identifying unplanned works.

In the previous review, the QCA's consultants identified issues relating to Sunwater's condition assessment methods and the quality of condition assessment data. In relation to Sunwater's condition assessment methods:

- SKM noted that Sunwater's use of asset age as an input into condition assessment may bias asset replacement to earlier than required.²⁶
- Halcrow and SKM found that condition assessments are not always undertaken by Sunwater in accordance with procedural timelines, noting that the condition assessments on a number of assets were out of date.^{27,28}
- SKM recommended that a condition assessment for major assets is performed within five years (as opposed to 10 years) of the development of a renewals submission.²⁹
- SKM recommended that Sunwater should adopt condition assessment methods that extend beyond visual/operational based inspections, such as insulation breakdown tests and earth impedance tests for electrical/cable assets.³⁰

In relation to the quality of condition assessment data, SKM noted that the completion of the condition reports and subsequent transfer of that data into Sunwater's WMS was of variable quality and on occasions ambiguous. It was recommended that Sunwater formalise the transfer of information from its condition assessments into its WMS, including data and data entry validation.³¹

Sunwater reported that condition assessments for the majority of bulk water assets were updated in 2015 (and report that 80% of assets have an assessment complete), consistent with prior consultant recommendations that asset condition inspections should be carried out within five years of the renewals submission. The condition assessment data improvements are expected to have improved the accuracy of the renewals planning.

However, Sunwater continue to use non-invasive testing methods in condition monitoring. We also note that the document '*Asset Refurbishment Planning: Methodology for Condition Assessments of Assets*' indicates that age is still used as an assessment parameter.³²

It appears that Sunwater has adopted a more formal process for the transfer of condition data into its WMS, with condition assessment procedures outlined in '*AM21*

²¹ Non-Routine Work Initiation Justification (template)

²² Business Case for Renewal Projects (3 templates)

²³ Non-Routine Project Scope and Delivery Management Plan

²⁴ Methodology for Risk Assessment of Infrastructure Assets

²⁵ Renewals Detailed Options Analysis

²⁶ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

²⁷ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

²⁸ Halcrow (2011). Sunwater - Biloela Water Supply Schemes ("Cluster 3") Review of Price Paths 2011 – 2016.

²⁹ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

³⁰ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

³¹ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

³² Asset Management Planning Methodology Paper, February 2011

P01 - Asset Condition User's Manual and guidelines for transferring condition data into the WMS Planning outlined in *'User Manual for WMS with Condition and Risk Assessments'*.

4.2.3 Options Analysis

As discussed in Section 4.2.2, during the 2012 review the QCA's consultants found deficiencies relating to Sunwater's renewals planning process. This included the undertaking of options analysis in Sunwater's renewals planning process.

The QCA's recommended that Sunwater undertake options analysis according to cost materiality. The full recommendation, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 19.

Table 19 Options Analysis for Material Renewals Expenditure

<p>QCA Recommendation</p> <p><i>The Authority recommended that Sunwater undertake:</i></p> <ul style="list-style-type: none"> • <i>High-level options analysis for all material renewals expenditures expected to occur over the Authority's recommended planning period, with a material renewal expenditure being defined as one which accounts for 10% or more in present value terms of total forecast renewals expenditure;</i> • <i>Detailed options analysis (which also take into account trade-offs and impacts on operational expenditures) for all material renewals expenditures expected to occur within the subsequent five-year regulatory period, with a material renewal expenditure being defined as one which accounts for 10% or more in present value terms of total forecast renewals expenditure over that period.</i> • <i>The costs of consultation provided by Sunwater (\$445,000 p.a.) be incorporated in non-direct costs to cover consultation regarding both renewals and scheme specific operating costs (and that these then be allocated to irrigators and non-irrigators on the same basis as are other non-direct costs)</i>
<p>Original Action Proposed/Taken by Sunwater</p> <p>The following actions were taken by Sunwater:</p> <ul style="list-style-type: none"> • Incorporation of the options analysis cost allowance into the non-direct cost pool. • Sunwater undertook options analyses for projects in FY14 and FY15 that met the 10% materiality threshold recommended by the QCA. • Sunwater developed guidelines for options analyses and incorporated the new options analyses procedures for material projects into the renewals planning process. <p>Sunwater also expressed concern relating the efficiency of the recommended options analysis process. Sunwater contended that conducting options analysis for all material projects would result in inefficiencies, due to uncertainty relating to longer-term projects. Sunwater proposed (but did not yet implemented) an alternative approach to analyse material projects as close as practicable to the point in time that they impact annuity balances or the annuity price calculations. As such, Sunwater proposed an approach of:</p> <ul style="list-style-type: none"> • Completing detailed options analyses for projects within the current price path on a year-to-year basis for the following financial year • Completing options analyses required for the next price review at the time of the review.

Sunwater's Current Position

After conducting the proposed options analysis approach, Sunwater reviewed its approach in 2018. Sunwater contended that conducting options analysis for all material projects would result in inefficiencies as:

- Many options studies were deemed of limited value, as outcomes were usually known beforehand based on engineering experience.
- Many options analyses took a week to prepare at a cost of \$5k to \$10k.
- Preparing options analyses up to 10–20 years in advance resulted in out-of-date solutions, due to technological change.
- Projects may be removed from the annuity period, incurring unnecessary work.

Following consultation with Irrigator Advisory Committees (IACs), Sunwater decided to implement a new procedure for options assessments. Sunwater proposes to continue to prepare options analysis and supporting investigation where:

- There is no obvious solution
- The current maintenance strategy is changing
- Technology has changed significantly, or
- There is a high risk in the project execution.

For less complex (more routine) non-routine projects with fewer practical outcomes, Sunwater will use its engineering knowledge and experience to determine the optimum solution.

This approach is intended to take the emphasis off the value of the renewals project and focuses on solutions and risk.

Sunwater generally assumed like-for-like replacement in its renewals planning. Detailed planning was generally only undertaken by Sunwater within the coming 12-month period. Halcrow noted that water utilities in other states (NSW and Victoria) are typically required to complete detailed options analysis of renewals expenditures three to four years in advance.

Instead of undertaking options analysis for renewals which met the 10% materiality threshold recommended by the QCA, Sunwater has proposed to continue to undertake options analysis and supporting investigation where:

- There is no obvious solution
- The current maintenance strategy is changing
- Technology has changed significantly, or
- There is a high risk in the project execution.

The approach of conducting options analyses based on complexity, rather than cost materiality, does not align with the original QCA recommendation. While reasonable in logic, the specific considerations guiding the decision to implement options analysis are not measurable. For instance, there is no quantifiable measure to gauge whether a 'significant' change in technology has occurred. This approach has the potential to lead to inconsistent completion of options analysis, as compared to the recommended materiality threshold.

We therefore consider use of a materiality threshold (as recommended by the QCA) to be a more appropriate approach. Alternatively, at minimum, more detailed guidelines should be provided by Sunwater with the aim of ensuring greater consistency. For instance, Sunwater could consider a standardised assessment policy document where each qualification is clearly defined, and thresholds are more clearly specified.

Sunwater states that customers will be provided an opportunity to provide feedback on the selection of projects for options analysis. However, a formal process for incorporating customer feedback is in option the selection decisions has not been sighted. This is discussed in Section 4.4.1.

We note Sunwater's concern that '*preparing options analyses up to 10–20 years in advance resulted in out-of-date solutions, due to technological change... [and that] Projects may be removed from the annuity period*'. We consider this to be a reasonable concern for outer term years, however note that this issue does not preclude the requirement to conduct options analysis for the five-year regulatory period.

However, in relation to Sunwater's statement that the outcomes of options '*were deemed of limited value, as outcomes were usually known beforehand*', we consider that this may partially be due to the analysis approach taken. Based on sighted examples of options analyses and the findings of Sunwater's internal review, many options analyses appear to be of limited value due to the nature of the options considered, where options often are restricted to 'do nothing', 'replace' or 'refurbish'. The value of this process may be increased if more realistic, analytical options are considered, for instance giving consideration to alternative technological solutions or alternative timing.

We also note that justifications of the values/ratings used in options assessments have not been made available for review. For example, the approach to calculating the 0-5 values used in the multi-criteria options analysis (MCA) are not documented. It appears that a clearer (definitive) link could be established between the MCA inputs and the other assessment methodologies employed (such as a matrix relating the low, medium, high, extreme risk assessment rating to the 0-5 risk rating used in the MCA).

We recommend that Sunwater review the options selection process with the intent of ensuring greater consistency and ensuring that material projects within the five-year regulatory period are accounted for and review the quality of the options analysis in terms of the nature of the options considered and the formal assessment methodology.

4.2.4 Sunwater's Planning Period

The renewals annuity is calculated over a specified planning period with a view to smoothing the significant variation in capital expenditure that is typical for large infrastructure owners. A 30-year price path was adopted for the 2006-11 price path period. However, in its submission for the 2012-17 price path period Sunwater proposed a 20-year planning period in order to minimise uncertainties associated with estimating expenditures over longer periods, stating that there is a high degree of uncertainty as to the precise need for and timing of expenditure between 20-30 years.

In 2012, the QCA recommended that Sunwater undertake a 20-year planning period. This, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 20.

Table 20 Renewals Planning Period

<p>QCA Recommendation <i>The Authority recommends that a 20-year planning period be adopted, as proposed by Sunwater.</i></p> <p><i>The Authority also recommends that the length of the planning period be revisited in subsequent price reviews (or as a result of a price trigger) should problems of intergenerational equity arise as a result of significant capital expenditure proposals.</i></p>
<p>Original Action Proposed/Taken by Sunwater</p> <ul style="list-style-type: none"> • Sunwater initially proposed a 20-year planning period.
<p>Sunwater's Current Position</p> <ul style="list-style-type: none"> • Sunwater has proposed that the annuity be extended to 30 years.

Halcrow noted that industry benchmarks, standards and practices in other jurisdictions suggest that a higher degree of forward planning for capital (including renewals) expenditure is generally undertaken.³³ However, in the 2012 review the QCA accepted the proposed planning period of 20 years in preference to 30 years due to concerns that:

- Sunwater did not apply high-level options analysis to forecast renewals expenditure in the early out-years, let alone in the period beyond 20 years. This exacerbates the uncertainty of taking account of expenditures beyond 20 years.
- For many schemes, there was substantial expenditure planned for the 20-30 year period (which remains relatively uncertain) which made a material difference to the proposed annuities.

³³ Halcrow (2011). Sunwater - Biloela Water Supply Schemes ("Cluster 3") Review of Price Paths 2011 – 2016.

Concerns expressed about adopting a shorter period include increased volatility in between pricing periods, and intergenerational equity issues as a result of significant capital expenditure spikes (arising due to long-asset lives).

Sunwater has proposed that the annuity be extended to 30 years and stated that it has improved its approach to forecasting non-routine expenditure. We have identified similar issues to those identified in the 2012 review, including the accuracy of the long-term renewals planning approach, shortcomings relating to whole-of-life cost optimisation and the incorporation of options analysis into renewals planning, but consider that the purpose and value of the annuity approach is better achieved if the period of the annuity is similar to the service life of the assets included.

4.3 Cost Estimation

This section reviews Sunwater's cost estimation process in relation to long-term renewals and short-term non-routine works.

Sunwater states that the asset replacement costs listed in the SAP Works Management System (WMS) are the basis for long-term renewal costs.³⁴ Sunwater also states that cost estimates for non-routine works are informed by the review of similar completed tasks, experience and advice from project managers and technical staff.³⁵ These preliminary cost estimates are reviewed in detail when the scheduled project falls within the next five-year period, when a business case is required for the proposed investment. Halcrow and SKM noted that Sunwater used 'like-for-like' replacement as the basis for calculating replacement costs, a method which may result in overestimation of replacement costs for asset types where technological advancement has reduced costs.^{36,37} Modern equivalent asset value was proposed as an alternative calculation methodology for replacement value.

Sunwater reported that a revaluation of irrigation system assets was conducted in 2016. Sunwater report in the *'Irrigation Systems Asset Revaluation Project Final Report'* that assets replacement values were calculated as modern equivalent asset replacement values where possible.³⁸ However, we note that not all assets have been valued on this basis, and that no indication has been provided on the extent of those that were. Despite this, we expect the asset revaluation to have improved the accuracy of the renewals planning.

In 2011, SKM noted that compared to publicly available data, the escalation rates used to estimate renewal costs from the Bill of Materials appeared to be high. Sunwater has since undergone a revaluation process for both bulk water and distribution system assets and undergoes a review of escalation rates applied year on year.

In 2011, Arup stated that there may be potential for over-estimation of future renewals costs in some instances due to Sunwater's automated approach of identifying works and estimating costs, specifically as economies of scale could be achieved where multiple works are undertaken at the same site.

Sunwater continue to prepare detailed works forecasts on a 12-month basis. We have not seen evidence of renewals validation occurring outside of the 12-month period. We have also not sighted evidence of scheduling (or other) efficiencies being provided for outside of the 12-month period.

³⁴ RfI A3 Cost Estimation Process.

³⁵ RfI A3 Cost Estimation Process.

³⁶ Halcrow (2011). Sunwater - Biloela Water Supply Schemes ("Cluster 3") Review of Price Paths 2011 – 2016.

³⁷ SKM (2011). Sunwater Price Regulation - Review of Selected Annuity Values for Refurbishment and Replacement Items.

³⁸ Irrigation Systems Asset Revaluation Project Final Report, 2016.

4.4 Consultation Processes

Sunwater publishes Network Service Plans (NSPs) annually for each scheme. In the 2012 review, the QCA made numerous recommendations relating to customer consultation on Sunwater's annual NSPs, relating to:

- Inclusion of the renewals options analysis in NSPs
- Variance reporting and re-forecasting of renewals in NSPs
- Customer consultation on the annual NSPs

4.4.1 Inclusion of the Renewals Options Analysis in NSPs

In the 2012 review, the QCA recommended that Sunwater publish options analysis for material forward projects in NSPs. The full recommendation, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 21.

Table 21 Inclusion of the Renewals Options Analysis

<p>QCA Recommendation</p> <p><i>The NSPs should be enhanced to present:</i></p> <ul style="list-style-type: none"> • <i>High level options analysis for all material renewals expenditures expected to occur over the Authority's recommended planning period;</i> • <i>Detailed options analysis for all material renewals expenditures expected to occur within the subsequent five-year regulatory period.</i> <p>Original Action Proposed/Taken by Sunwater</p> <ul style="list-style-type: none"> • Sunwater presented a summary of the findings of each options analysis within the NSPs. Sunwater did not include the entire options analysis, due to concerns regarding commercial-in-confidence material. Customers could however receive copies of the options analysis from Sunwater on request. <p>Sunwater's Current Position</p> <ul style="list-style-type: none"> • As discussed in relation to Recommendation 1.1, Sunwater has decided to implement a new procedure for options assessments.

As discussed in Section 4.2.3, the approach of conducting options analyses based on complexity, rather than cost, means that options are not considered for all material projects, and does not align with the original QCA recommendation to present detailed (high-level) options analysis for all material expenditures expected to occur within the five-year regulatory period (planning period).

As discussed at Section 4.4.3, Sunwater states that customers will be provided an opportunity to provide feedback on the selection of projects for options analysis. However, a formal process for incorporating customer feedback is in option the selection decisions has not been sighted.

Sunwater should ensure that all planned material projects are clearly identified in NSPs, not just those where an options analysis is anticipated to be conducted using Sunwater's proposed approach.

4.4.2 Variance Reporting and Re-forecasting of Renewals in NSPs

In the 2012 review, the QCA recommended that Sunwater report on variances for material renewals in NSPs. The full recommendation, along with Sunwater's actions taken in relation to the recommendation are summarised in Table 22.

Table 22 Variance Reporting and Re-forecasting of Renewals

<p>QCA Recommendation <i>The NSPs should be enhanced to present details of Sunwater’s proposed renewals expenditure items and accounting for significant variances between previously forecast and actual material renewals expenditure items.</i></p> <p>Original Action Proposed/Taken by Sunwater</p> <ul style="list-style-type: none"> • Sunwater has an NSP Reporting Tool to summarise detailed SAP renewals cost information into reports that are directly comparable with QCA efficiency targets. <p>Sunwater’s Current Position</p> <ul style="list-style-type: none"> • Sunwater continue to report on renewals cost variances to the QCA’s five-year price path period in NSPs.

NSPs report key capital projects (along with budgeted costs) for the price path period. Evidence of cost variances reported against QCA targets (at the overall level for the scheme) has been sighted in NSPs. In their current form however, NSPs do not provide clear comparison of current to prior forecasts on a project level, or justification of variances. As NSPs report key capital projects for the price path period, Sunwater could consider reporting variances at this project level to provide more in-depth insight.

4.4.3 Customer Consultation on the Annual NSPs

In the 2012 review, the QCA recommended that Sunwater consult with customers in NSPs and annually publish both NSPs and customer submissions. The full recommendation, along with Sunwater’s actions taken in relation to the recommendation are summarised in Table 23.

Table 23 Customer Consultation on the Annual NSPs

<p>QCA Recommendation <i>The Authority recommends that Sunwater’s Statement of Corporate Intent (SCI) (and relevant legislation) be amended to require Sunwater to consult with customers in relation to, and publish annually on its website, updated NSPs commencing prior to 30 June 2014. Customers’ submissions in response to the NSPs and annual updates should also be published on Sunwater’s website alongside Sunwater’s responses and related decisions.</i></p> <p>Original Action Proposed/Taken by Sunwater</p> <ul style="list-style-type: none"> • Sunwater consulted with customers via the Irrigator Advisory Committees and the Sunwater website. • Analysis of customer NSP feedback led to adjustments to NSP, and responses to NSP Feedback posted on the Sunwater Website • Notification issued to all registered customers when NSPs are published via email and text message. <p>Sunwater’s Current Position</p> <ul style="list-style-type: none"> • Sunwater has continued the adopted approach of customer consultation.
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The consultation approach taken by Sunwater via Irrigator Advisory Committees and the Sunwater website reflects the requirements of the QCA recommendation.

Sunwater annually publishes NSPs and has continued to consult with customers on NSPs via the Irrigator Advisory Committees and the Sunwater website. Sunwater’s approach on customer consultation is considered appropriate.

The content of the NSPs is insufficient to provide a good understanding of emerging issues in the scheme and do not, in our opinion, provide an adequate summary of the impact, consequences and reasoning behind corrective action proposed. It is not possible to understand the variability in operational costs from the NSPs, and we recommend that Sunwater improve in this area.

4.5 Procurement

A review of procurement policies and practices forms part of Sunwater's policies and procedures review. The review was primarily based on documents provided by Sunwater through the Request for Information process³⁹, namely:

- Procurement Policy; Document PU001 P1; Revision 8 dated September 2018
- Procurement Decision Matrix; Document PU01_63; Revision 3
- Procurement Compliance Review and Improvement Guideline; Document 1918742

Additionally, we also researched and reviewed the following documents:

- Partnering with Sunwater: A guide for contractors, consultants and suppliers⁴⁰
- Sunwater's Code of Conduct⁴¹
- Sunwater's Fraud and Corrupt Conduct Policy⁴²
- Sunwater's Board Delegation of Authority Framework and Policy⁴³
- Director's Code of Conduct⁴⁴
- Risk Management Policy⁴⁵
- AS 4120—1994, Australian Standard - Code of tendering

No follow-up interviews with Sunwater's procurement department were conducted to augment this desktop review.

4.5.1 The Benchmarks

For reference, the following documents were relied on as benchmarks for this review:

- Queensland Government's Procurement Policy; dated June 2018, which is the State Government's overarching policy for the procurement of goods and services, including construction, intended to deliver excellence in procurement outcomes for Queenslanders
- The Commonwealth Procurement Rules (CPRs); dated April 2019, issued by the Finance Minister under section 105B(1) of the Public Governance, Performance and Accountability Act 2013 (as amended in August 2017). The CPRs are the core of the Commonwealth's procurement framework.
- The ASX Code of Conduct for Suppliers; dated August 2017

The Commonwealth and the State procurement frameworks can be considered to incorporate national and international best practice and ASX Code of Conduct for Suppliers is considered industry best practice for listed entities and have therefore been considered as benchmarks for this review.

³⁹ Reference: QCA Information Request A2 – Procurement policy and strategy

⁴⁰ Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Partnering_with_Sunwater.pdf - accessed 30-06-2019

⁴¹ Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Sunwater_Code_of_Conduct.pdf - accessed 30-06-2019

⁴² Source: www.Sunwater.com.au/wp-content/uploads/2019/01/Fraud_and_Corrupt_Conduct_Policy.pdf - accessed 30-06-2019

⁴³ Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Board_Delegations_of_Authority_Framework_and_Policy.pdf - accessed 30-06-2019

⁴⁴ Source: <https://www.Sunwater.com.au/wp-content/uploads/2019/02/BOD-POL-05-Directors-Code-of-Conduct-b9ba4ea131884d5698b03d84485c7996.pdf> - accessed 30-06-2019

⁴⁵ Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Risk_Management_Policy.pdf - accessed 30-06-2019

4.5.2 The Procurement Review

The CPRs define Procurement as the process of acquiring goods and services. It begins when a need has been identified and a decision has been made on the procurement requirement. Procurement continues through the processes of risk assessment, seeking and evaluating alternative solutions, and the awarding and reporting of a contract.

Central to Sunwater's procurement framework is the Procurement Policy. Its purpose is to provide guidance for procurement activities to support Sunwater's business objectives and its customer outcomes. The Policy is stated to align with the Queensland Government's Procurement Policy dated June 2018, and has been reviewed in relation to this. While the header of the documents refers to Revision 8, page 4 of the document refers to Revision 04. Such a discrepancy is inconsistent with industry document management principles.

Sunwater's Procurement Decision Matrix provides a guide to Sunwater staff when undertaking any purchasing activity. For major goods and services with total consolidated costs of >\$250,000, the number of quotes required is not mentioned. Other than a requirement to ensure that any variation to the purchase does not exceed budget or contingency, it is also unclear how the variations are to be managed. The decision matrix also specifies that for Standing Offer Arrangements (SOAs) two written quotes are required if the value of service is >\$20,000 and if a written proposal/methodology is required. Only one quote is required if there written proposal/methodology is not required. It is unclear who decides whether or not a written proposal/methodology is required for a particular project and what conditions need to be satisfied for making such a decision. In our view all services should require a written proposal/methodology, however small, as the current arrangement has potential for wilful or negligent misuse.

Sunwater's Procurement Compliance Review and Improvement Guideline facilitates the implementation of a three-tier approach to procurement compliance review and improvement processes, which will ensure that all business areas within Sunwater comply with the procurement policies and procedures.

We present the findings of our review of Sunwater's Procurement Policy in Table 24

Table 24 Assessment of Sunwater's Procurement Policy

Principle Number	Topic	Alignment with Benchmarks
1	Value for Money	Broadly aligns with Value for Money principles of benchmarked frameworks. However, Sunwater's framework for determining value for money does not adequately consider the alignment of service providers with Principle 2.3 ⁴⁶ of Sunwater's procurement policy to do business with ethically, environmentally and socially responsible suppliers. Principles 1.5, 1.6 and 1.7 ⁴⁷ consider social responsibility; however, we recommend that more explicit consideration be given to the aforementioned Principle 2.3 within the framework for assessing value for money, particularly in relation to ethical and environmental responsibility.
2	Advance Service Delivery, Safety, Economic, Environmental and Social Objectives	Aligns with Queensland Government's objectives to support the long-term wellbeing of the community. During the fact-check process, Sunwater stated that majority of procurement spend is regionally performed, while this Principle states that low value and low business risk procurement will be delegated to geographical locations closest to where the actual work is to be performed. Defining the applicable thresholds will help streamline procurement and delivery.

⁴⁶ Reference: QCA Information Request A2_Attachment 1_Procurement Policy, Page 2.

⁴⁷ Reference: QCA Information Request A2_Attachment 1_Procurement Policy, Page 1.

Principle Number	Topic	Alignment with Benchmarks
3	Integrity, Probity and Accountability	<p>Broad alignment with benchmarked frameworks other than specifically prohibiting bribery and facilitation payments. However, we note the following deficiencies:</p> <ul style="list-style-type: none"> • The need for inclusion of specific requirements to comply with all relevant laws and regulations in relation to bribery, corruption and other prohibited practices within the Procurement Policy and the Code of Conduct because while the Procurement Policy states that Sunwater’s Code of Conduct is to be observed in all procurement activities and which in turn refers to Sunwater’s expectation for individuals to be familiar with the Whistle-blower Protection provisions and the Corrupt Conduct Policy and Guide, the requirement is not specifically mentioned in the Procurement Policy or the Code of Conduct. • The Procurement Policy is silent on assigning clear roles and responsibilities. The Procurement Decision Matrix provides some guidance on when the Corporate Procurement should get involved in procurement activities. We understand that Sunwater maintains an organisational financial delegations list, which is applied in conjunction with the Procurement Policy and Procurement Decision Matrix. While definition of Financial Delegate outside of Corporate Procurement may exist (AECOM did not request specific clarification on this subject); we suggest that for clarity, the terms used in a document be defined within the same document. <p>It is also to be noted that, Sunwater’s Board Delegation of Authority Framework and Policy sets out a framework to establish standards of accountability and responsibility when making decisions of both a financial and non-financial nature relevant to Sunwater and its wholly owned subsidiaries. The framework document notes that Sunwater has documented matters of financial and non-financial nature that are reserved to the Board and delegated to the Chairman, Directors, Board Committees, the CEO and Company Secretary in schedule 1. Schedule 1 is labelled as ‘Commercial-in-Confidence’ and we have therefore not been able to review the applicable DoA triggers.</p>
4	Leaders in procurement practice	<p>Sunwater has outlined its commitment to achieving full, fair and reasonable opportunities for Queensland suppliers. However, the Policy does not seek to run open, fair and transparent procurement process but rather most appropriate – based on its interpretation of the task. Most of the benchmarked frameworks require a planned approach to procurement. To be a leader in procurement practice would also entail keeping the market informed of upcoming major investment in a planned and methodological way. As an example, such an approach is demonstrated by the Department of Transport and Main Roads via <i>‘The Queensland Transport and Roads Investment Program’</i> that details the current transport and road infrastructure projects pipeline that the Queensland Government plans to deliver over the next few years. Supplier and industry forums are run to inform the market on a regular basis that helps suppliers to plan ahead. It is not clear to what extent Sunwater shares the major project or investment pipeline with suitable suppliers in advance such that the suppliers can suitably prepare and offer best possible value for money outcomes. This may be an opportunity for improvement.</p> <p>This Principle refers to timely and effective procurement which is in line with benchmarked frameworks to ensure that focus is on outcomes rather than process.</p>

Principle Number	Topic	Alignment with Benchmarks
5	Governance, Compliance, Risk and Planning	<p>We have identified the following opportunities for improvement:</p> <ul style="list-style-type: none"> In the Risk and Opportunity Matrix provided by Sunwater (approved by the Sunwater Board in August 2018), the Likelihood x Consequences matrix is 5 x 5 but in the Methodology for Risk Assessment of Infrastructure Assets dated October 2012 the matrix is 7 x 6 and they have different definitions of the likelihood and consequences scenarios. Due to the number of assessments undertaken using the previous matrix and current system limitations, asset data is still considered against the outdated matrix contained in the Methodology for Risk Assessment of Infrastructure Assets. Sunwater has noted that it is committed to addressing this issue as part of the Finance and Asset Management System project. Additionally, Sunwater's Risk Management Policy notes the roles and responsibilities of various employee designations; however, it does not provide the risk matrix which should have been included for consideration. Sunwater's approach to day-to-day decision making is not very clear as we note large variations between initial budget and final delivered budget. The rationale for some decisions has not been properly explained or documented. This may be because, Sunwater does not refer to records management specifically in the Procurement Policy and the focus on records management is based on compliance with ICT Records Management Policy and Guide to ensure appropriate access, confidentiality and security of information and not on proper documentation management as part of change management. Sunwater's procurement policy only requires that the Financial Delegate must approve the scope and total spend prior to commencement of any purchase process. It does not state what documentation is minimum in order to allow this approval. Sunwater's procurement process could benefit from close alignment with the structured documentation process. For example, most benchmarked frameworks also have a requirement to document and record the business need that led to the requirement for the procurement. It is also considered good practice to record the close out documentation related to the procurement.

The procurement information provided by Sunwater is very high level. We have not been provided with any audit results that might have been conducted and therefore from the provided information we are unable to determine if the following documents are active and implemented:

- Procurement Management Plan
- Procurement and Contracting Strategy
- Procurement Delegations
- Procurement Procedures
- Contracting Management Plan
- Contract Management Processes

Procurement Compliance Review and Improvement Guideline

Sunwater has a three-tiered approach to Procurement Compliance Review (PCR):

Tier one: Quarterly Routine PCR Reporting –prepared by Central Procurement Team (CPT) for all business areas and provided to respective Senior Managers to enable them to be proactive in self-managing any areas of improvement.

Tier two: Annual PCR Health Check –prepared by CPT and provided to Senior Managers. This is followed by meeting between Manager Procurement and Senior and respective General Managers to improve processes and compliance.

Tier three: Formal Audits – this activity is undertaken by Internal Audit and other independent third parties e.g. QAO findings, SAI Global etc. who may utilise the information and findings from Tiers one and two and incorporate into the audit program for review.

AECOM has not received and therefore not reviewed any audit results to confirm the level of compliance or incorporation of any improvement initiatives.

Conclusions

As outlined in detail in Section 4.8.4, we have observed opportunities for improvement in relation to:

- Quality control of issued documents
- The alignment of risk matrices
- Review of procurement limits
- Bribery and facilitation payment prohibition
- Sunwater's records management process.

4.6 Project Management

A review of project management procedure and practices forms part of Sunwater's policies and procedures review. The review was primarily based on documents provided by Sunwater through the Request for Information process^{48,49,50}, namely:

- QCA Information Request A5 - Attachment 5 - Project Scope and Delivery Management Plan example
- Portfolio, Program & Project Management Framework (P3MF) presentation dated April 2019
- Sunwater's current project management framework consisting of a suite of documents
- Sunwater's proposed draft P3MF procedure, document number 2306640, Rev A

We note that no specific follow-up interviews with Sunwater's project managers were conducted to augment this desktop review.

Additionally, we also researched and reviewed the following Sunwater documents:

- Risk Management Policy⁵¹
- Partnering with Sunwater: A guide for contractors, consultants and suppliers⁵²

4.6.1 The Benchmarks

- Project Management Institute. (2013) A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition provides guidelines for managing individual projects and defines project management related concepts. It also describes the project management life cycle and its related processes, as well as the project life cycle.

⁴⁸ Reference: QCA Information Request A5 - Approval process for renewals

⁴⁹ Reference: QCA Information Request A50 - P3MF project management framework

⁵⁰ Reference: QCA Information Request A57 - Project management framework (current and proposed new)

⁵¹ Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Risk_Management_Policy.pdf - accessed 30-06-2019

⁵² Source: www.Sunwater.com.au/wp-content/uploads/2018/11/Partnering_with_Sunwater.pdf - accessed 30-06-2019

- Australian Standard AS ISO 21500:2016 provides guidance for project management and can be used by any type of organisation, including public, private or community organisations, and for any type of project, irrespective of complexity, size or duration.
- The Queensland Government does not have a coherent project management framework applicable to all infrastructure types. The Preliminary and Detailed Business Case Frameworks published by Building Queensland suggests that day-to-day management of business cases be in accordance with the project owning agency's project management methodology⁵³. However, there are a few frameworks practiced by Queensland Government agencies can used benchmarks for this review, including:
 - The OnQ framework, the Project Management Framework of the Department of Transport and Main Roads, ensures that the outputs from each project will deliver outcomes that are consistent with departmental objectives and government policy. The OnQ project management framework promotes:
 - communication between and with project stakeholders
 - planning the total project life-cycle before committing resources
 - an understanding of the bigger picture and the project's part in it
 - developing solutions that maximise stakeholder satisfaction
 - identification and management of opportunities and risks
 - improved reliability in estimating costs and benefits.
 - The Queensland Government Enterprise Architecture (QGEA) policy seeks to ensure a structured, effective and consistent approach for portfolio, program and project management is adopted across the Queensland Government. Agencies must use project, program and portfolio management methodologies, endorsed by the Queensland Government Chief Information Office, for all ICT or ICT-enabled initiatives. These are based on Portfolio, Programme and Project Offices (P3O®) AXELOS⁵⁴.

4.6.2 Review of Sunwater's Project Management Practices

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 47 logically grouped project management processes, which are categorised into five Process Groups. These five Process Groups are⁵⁵:

- Initiating
- Planning
- Executing
- Monitoring and Controlling
- Closing

However, project management processes do not exist in an organisation on its own. Project management is intrinsically linked to the organisational strategy and operates in an organisational environment as shown in the overview of project management concepts and their relationships in Figure 17⁵⁶.

⁵³ Source: <https://buildingqueensland.qld.gov.au/wp-content/uploads/2016/12/Detailed-Business-Case-2.1.pdf>

⁵⁴ AXELOS is a joint venture company, created in 2013 by the Cabinet Office on behalf of Her Majesty's Government (HMG) in the United Kingdom and Capita plc, to manage, develop and grow the Global Best Practice portfolio.

⁵⁵ Project Management Institute. (2013) A Guide to the Project Management Body of Knowledge, Fifth Edition, Page 5

⁵⁶ Source: AS ISO 21500:2016 Section 3 Page 3

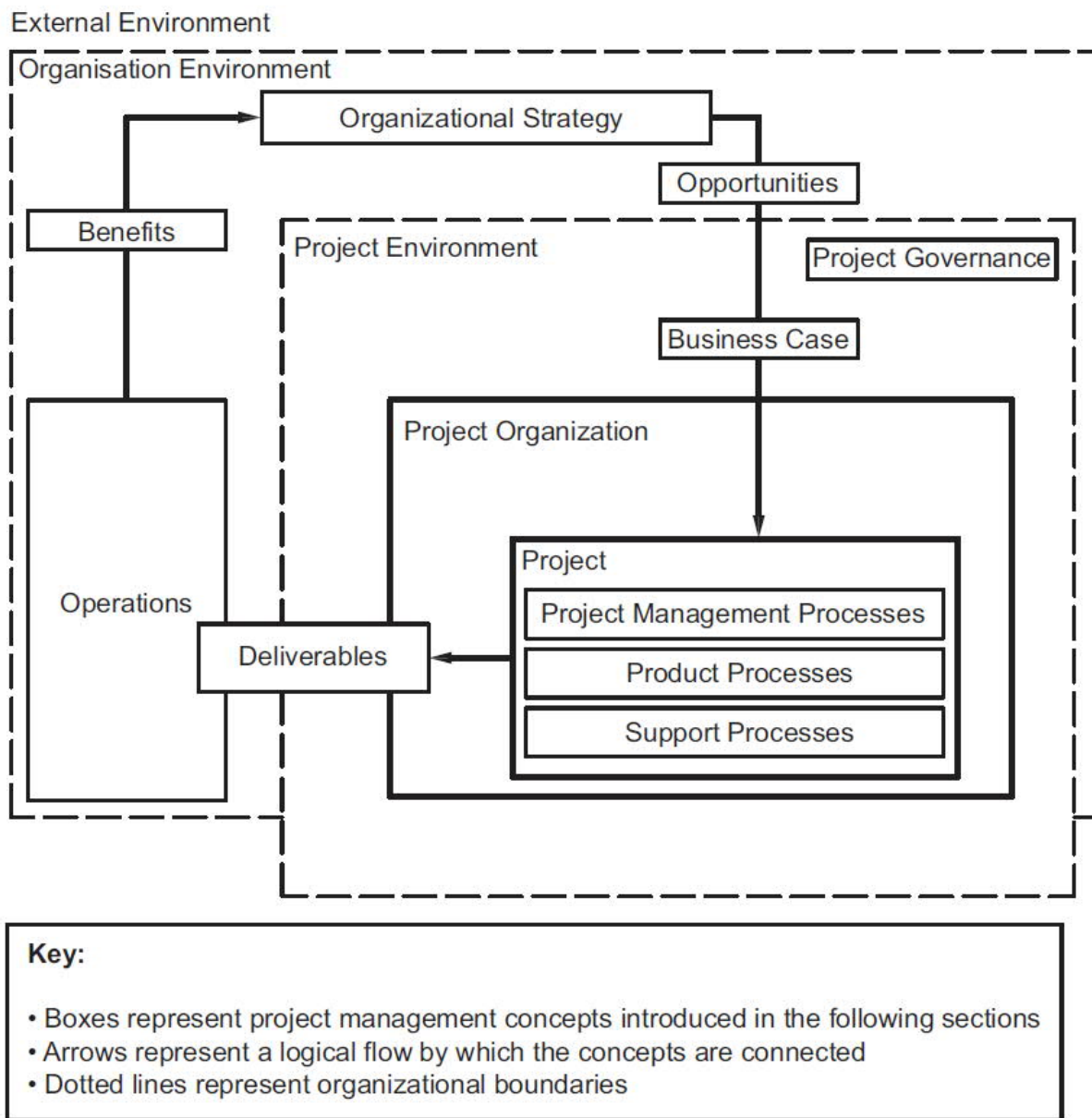


Figure 17 Overview of Project Management Concepts and associated Relationships

Sunwater's project management framework consists of a suite of documents which are mainly focused on major projects. The following documents were provided for review⁵⁷:

- Estimating template
- Project risk register
- Defects management checklist
- Project documentation handover form
- Major projects filing structure
- Project initial business case

⁵⁷ Reference: QCA Information Request A57 - Project management framework (current and proposed new)

- Program and project identification form
- Program steering group TOR
- Project dashboard report (Major Projects)
- Contract tracking register
- Project closure report
- Major Projects - Work breakdown structure (WBS) Procedure
- Project Variation Request form
- Major Projects Project Management Plan
- Lessons Learnt
- Project Steering Group meeting record
- Project Steering Group agenda
- Project deliverables acceptance certificate
- Project closure form.

While the framework has serviced major projects well, there has not been a single framework document to support all the different types and sizes of projects within Sunwater. Sunwater undertakes a wide variety of projects of various sizes and it seems that managing the projects in an ad-hoc manner would affect projects' efficiency and success.

With this in mind, Sunwater is undertaking a review of the process to ensure all Sunwater requirements are met. These are captured in a single Portfolio, Program and Project Management Framework (P3MF) to ensure consistency and efficiency across the business. To support the P3MF, a software system is being evaluated and tested to provide greater visibility of the portfolio of work, as well as improve governance, controls and reporting. Implementation and roll out of the new system is scheduled for the third quarter 2019⁵⁸. A draft framework was provided for review and it was stated that it was planned to have the framework finalised and ready for implementation by the end of June 2019. AECOM has not sought to confirm whether this has been achieved.

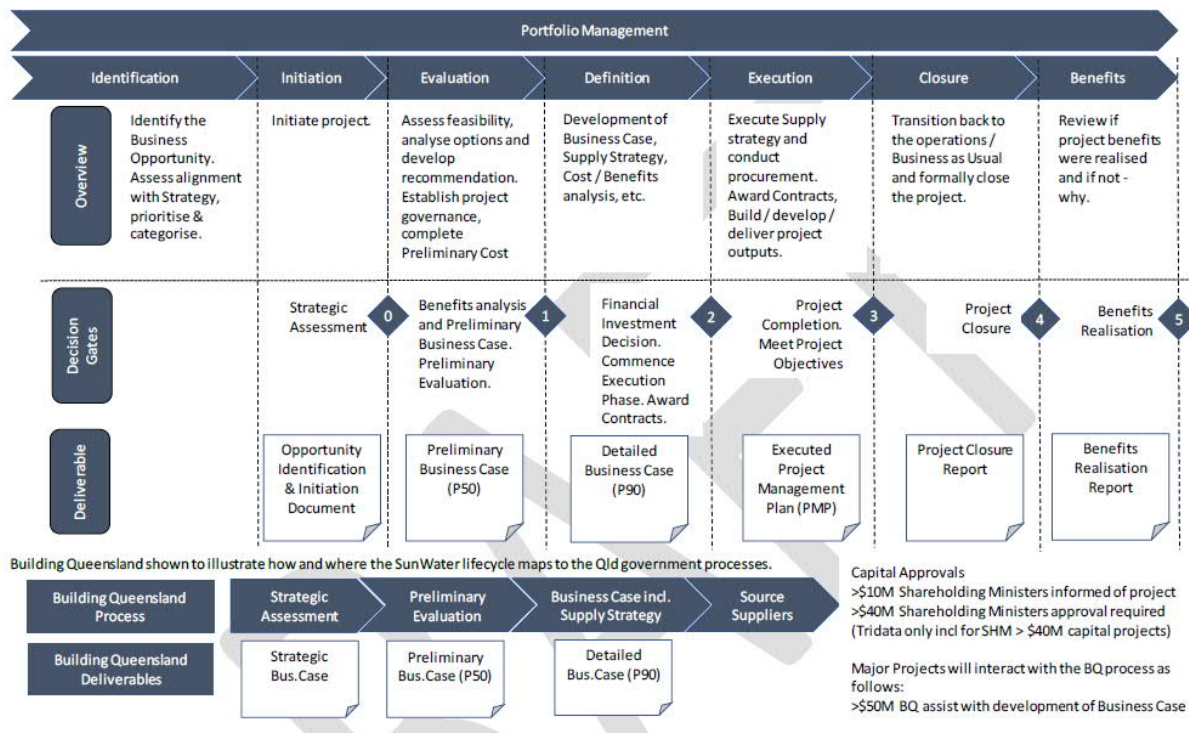
Figure 18 shows an overview of the Project Lifecycle and Governance Framework of the P3MF. Sunwater considers a Project Lifecycle to comprise seven phases - Identification, Initiation, Evaluation, Definition, Execution, Close out and Benefits. We note that the P3MF while claiming to align with "A Guide to the Project Management Body of Knowledge, Fifth Edition" does not give due stress on the Monitoring and Controlling process of the project lifecycle. Review of the sample of projects has brought to light a number of instances where the monitoring and control of the ongoing projects has been found lacking, leading to unexplained variations and increase in costs.

We also note that the P3MF's process maps and tools seem to be overly complex and it is arguable whether they will deliver good value for money unless they are clear and concise. We agree with Sunwater's recognition that further work is required to standardise and simplify these tools. They state that this work will be undertaken as part of the P3MF Phase #2 works and in alignment with the Policy Rationalisation Project⁵⁹.

⁵⁸ Reference: QCA Information Request A57 - Project management framework (current and proposed new)

⁵⁹ Draft Portfolio, Program and Project Management Framework (P3MF), Page 1

Figure 18 Sunwater’s P3MF - Project Lifecycle and Governance Framework Overview



4.7 Cost Allocation

In the 2012 review, the QCA recommended that Sunwater improves its cost allocation for fixed renewals expenditure in bulk schemes and distribution systems. The full recommendation, along with Sunwater’s actions taken in relation to the recommendation are summarised in Table 25.

Table 25 More Appropriate Allocation of Fixed Costs in Distribution Systems

<p>QCA Recommendation</p> <p><i>In relation to proposed cost allocation methodologies, the Authority recommends that:</i></p> <ul style="list-style-type: none"> • Sunwater’s proposed HUF methodology be used to allocate fixed renewals expenditure in bulk schemes between medium and high priority customers • Nominal WAEs (Water Access Entitlements) be used for the allocation of fixed distribution system costs between priority groups. Fixed distribution system charges should remain with customers when they convert between priority groups • Sunwater develop a more appropriate means of allocating fixed renewals costs in distribution systems and submit this for consideration by the Authority prior to 30 June 2014
<p>Original Action Proposed/Taken by Sunwater</p> <ul style="list-style-type: none"> • Sunwater has implemented a consistent cost allocation methodology. • Sunwater initially proposed to identify options for alternative allocation methodologies for fixed costs in distribution systems. However, Sunwater suspended this item, stating that it was inappropriate to investigate alternative charging methodologies for fixed renewals costs in distribution systems until the LMA review was resolved.
<p>Sunwater’s Current Position</p> <ul style="list-style-type: none"> • Sunwater maintains the previous position to suspend work on this item until the LMA review has concluded.

Sunwater has continued to use the Headworks Utilisation Factor (HUF) methodology to allocate fixed costs between medium and high priority customers and Water Access Entitlements (WAE) for the allocation of fixed distribution system costs between priority groups.

We note that Sunwater has implemented a consistent cost allocation methodology.

4.8 Conclusions

Key findings from our review of Sunwater’s policies and procedures are discussed in relation to the relevant topic, and key recommendations provided.

4.8.1 Sunwater’s renewal planning processes

In our review of Sunwater’s renewal planning processes, we find that:

- Sunwater’s asset management system (apart from the use of the decay curve to predict future renewal timing) appears to be satisfactory and consistent with good industry practice.
- Sunwater’s asset management policies could be improved by including specific clauses around optimisation of asset management expenditure and with reference to the cost to its customers of service interruption, but in practice Sunwater has covered that issue in its various strategy documents and has demonstrated that it applies the principles in its planning.
- We would have expected to see service level expectations based on interruption duration as well as frequency. If interruption duration is not a significant concern for customers, then we accept the more limited definition of service levels but note that both measures (among others such as measures of quality) are usually needed for prudent, cost-effective asset management.
- Sunwater’s renewal planning methodology as documented in the 2011 ‘*Asset Management Planning Methodology Paper*’⁶⁰ does not seem to have been adopted or implemented effectively.
- The reliance on an obscure equation to establish a decay curve for all assets is an issue, and we recommend that Sunwater deliver on its 2011 intention to develop a family of suitable curves for its asset types, preferably based on its own experience of failures. We would expect these to be Weibull curves.
- Development of suitable decay curves will enable more reliable assessment of failure risk, and therefore a more accurately defined point in the lifecycle of a critical asset that represents the maximum acceptable risk of failure. We note that this maximum acceptable risk should reflect customer expectations, and our review of these suggests that use of the second standard deviation is likely to represent a maximum risk that is far lower than required by Sunwater’s customers. This is considered further in Section 7.0, which considers potential adjustments if Sunwater were to use industry best practice delay curve methodology.
- The recent increase in service life for selected assets appears arbitrary and implies that Sunwater is not experiencing the rates of failure provided for in its methodology document.
- We have not seen adequate evidence as to indicate that the relationship between renewals expenditure and operating activities are appropriately taken into account in the forecasting approach. We recommend that Sunwater give more rigorous (and documented) consideration to the trade-off between operating and capital works in the renewals planning process (namely in outer forecast years).
- The options analysis process for renewals projects has been found deficient in some respects:
 - The proposed approach for identifying renewal works which require options analysis does not align with the QCA’s recommendation to undertake options analysis as based upon materiality
 - We have identified shortcomings of the reviewed options analysis in terms of the nature of the options considered and the formal assessment methodology employed

Sunwater actively reviews asset renewal proposals that fall within the pricing period and indicates that it will revise its renewal plan if asset condition does not require asset renewal. Most of the renewals planning issues identified relate to the rule-based approach used for renewals scheduled in the outer years, which are reflected in the annuity calculation.

⁶⁰ Asset Management Planning Methodology Paper, February 2011

4.8.2 Cost Estimation

We note that:

- Sunwater has taken actions to improve the accuracy of asset replacement costs, namely the revaluation of irrigation system assets conducted in 2016⁶¹
- Sunwater continues to prepare detailed works forecasts on a 12-month basis. We have not sighted evidence of scheduling (or other) efficiencies being provided for outside of the 12-month period.
- Sunwater states that a +/- 100% level of estimation accuracy is adopted for long term planning items for the purposes of enabling the generation of the annuity.⁶² Sunwater does not appear to use any form of probability assessment for different scenarios as a means of deriving expected costs. The low level of estimation accuracy adopted appears due to the high-level nature and undefined scope of these planning items.

4.8.3 Network Service Plans

In relation to the QCA's recommendations around NSPs, we have concluded that there are deficiencies in Sunwater's approach. Specifically:

- Renewals options analyses are not included in NSPs under Sunwater's proposed approach for identifying renewal works which require options analysis. There appears to be inadequate formal processes for incorporating customer feedback on this issue
- In their current form, NSPs do not provide clear comparison of current to prior forecasts on a project level, or adequate justification of variances.

4.8.4 Procurement

From the review of procurement policy and procedures review we conclude that:

- There is inconsistent use of revision numbers and revision date in the various documents; for example, the Procurement Policy has two version numbers mentioned within the same document. It is recommended that Sunwater review all of its documents to ensure consistency of use of revision number for the respective documents. The Procurement Matrix has a revision number but no revision date.
- Some documents can benefit from provision of contact details, especially for the public policy documents; for example, Sunwater's Code of Conduct notes that any queries be referred to the General Manager People & Culture, however no contact details are provided.
- There is inconsistency in use of revision history and upcoming review information. Sunwater's Code of Conduct does not have a date of application and next planned review. Sunwater's Board Delegation of Authority Framework and Policy was due for next revision in December 2018 and is therefore out of date. Sunwater's guidelines on Partnering with Sunwater: A guide for contractors, consultants and suppliers is dated October 2015. The Procurement Decision matrix has no date of release or next review date. Director's Code of Conduct document refers to a review of the Policy by the Board every two years. The last review is stated to have been undertaken in December 2018 with the next review date noted to be in April 2019. It is possible that the while a review on April 2019 would have been planned for convenience e.g. in order to align with Board meetings, the review is now overdue nevertheless. The Procurement Compliance Review and Improvement Guideline; Document 1918742, notes that the guideline is to be reviewed 24 months from the date of approval. However, the document does not state the date of last approval, therefore it is not known whether it has been regularly reviewed and updated as necessary.
- The Risk Scoring Table in the Risk Matrix does not align with the Risk Scoring Table in the Methodology for Risk Assessment of Infrastructure Assets as explained in Table 24.

⁶¹ Irrigation Systems Asset Revaluation Project Final Report, 2016.

⁶² RfI A3 Cost Estimation Process.

- The relatively high limit of \$100,000 before corporate procurement or senior manager approval or involvement is necessary, has potential for misuse. Such a concern was also noted in the 2012 review of Sunwater's capex by the then consultant SKM.
- It is good practice to align records management closely with the procurement process steps. For example, the Commonwealth framework requires that documentation should provide accurate and concise information on:
 - the requirement for the procurement
 - the process that was followed
 - how value for money was considered and achieved
 - relevant approvals
 - relevant decisions and the basis of those decisions

It has been noted during other parts of this review that business cases, decision rationale or close out documents were either not available or were never developed and hence not recorded.

4.8.5 Project Management

From a review of Sunwater's project management processes and framework, we have observed:

- Sunwater's Portfolio, Project and Program Management (P3MF) process maps and tools appear to be overly complex
- Sunwater does not appear to have provided warranted attention to the Monitoring and Control process of the project lifecycle, which should be treated as a separate process group giving consideration to *"A Guide to the Project Management Body of Knowledge, Fifth Edition"* to which Sunwater's P3MF process is intended to align.

Issues associated with project scope, cost and delivery which were observed during a review of sample projects support the finding that Sunwater's Monitoring and Control processes require improvement. From a review of a sample of projects, we make the following observations:

- The project reviews suggest that inconsistent project management appears to be a theme for Sunwater
- Sunwater reports that it has developed of a Workflow Root Cause Analysis Report to identify causes of program changes. We are aware that the root cause information is stored within the SAP Works Management System (WMS) but have not a sighted any formal analysis of this. It is unclear whether Sunwater uses this analysis to better inform its renewals planning.

Sunwater's new P3MF procedure does not specifically consider Monitoring and Controlling as a separate element of Project Lifecycle.

4.8.6 Key recommendations

4.8.6.1 Use of decay curves

In relation to renewals planning, we have concluded that Sunwater is using an obscure equation to project the timing of asset renewal for all its assets and has adopted a single approach (calculation) based on that to bring forward renewal of critical assets that may not reflect customer service expectations.

The practical implication is that the planning of asset renewal for the period subsequent to the next pricing period is likely to be conservative, and that renewal of a proportion of the assets as currently planned should be deferred. This conclusion applies particularly to renewal planning of critical assets, where three factors combine to bring forward renewal (the absence of a reliable decay curve, the period used to indicate renewal in advance of the curve, and the lack of a link to minimum acceptable service levels).

The best test of the value of the methodology used to predict asset failure is to demonstrate that the failure rate actually experienced is just within the risk tolerance acceptable to the customer. In the absence of data that demonstrates that Sunwater is achieving the maximum allowed failure rates, we

conclude that renewals included in the annuity should be deferred further than provided for in Sunwater's 2019 review but note that this conclusion should be revisited as soon as reliable predictions of failure can be made based on actual experience.

The extent to which asset renewal should be extended is unclear, since there is little information that can be used to support a recommendation. It may be simplest to adopt a simple deferral of all renewals currently planned, with the intention of reviewing the annuity when Sunwater has completed its assessment of failures and identified more suitable decay curves. This is considered further in Section 7.0, which considers potential adjustments if Sunwater were to use industry best practice delay curve methodology.

We strongly recommend that Sunwater undertake a comprehensive assessment of asset failures and use the outcomes to define the decay curves that will be used in projecting its future renewal program.

4.8.6.2 Incorporation of Options Analysis into Renewals Planning Process

In relation to the incorporation of options analysis in the renewals planning process, we recommend that Sunwater review the process of selecting projects for options analysis with the intent of ensuring greater consistency and ensuring that material projects within the five-year regulatory period are accounted for and review the quality of the options analysis in terms of the nature of the options considered and the formal assessment methodology.

4.8.6.3 Improvements to Procurement Policy and Procedures

Quality control of issued documents

We recommend:

- Sunwater review all of its documents to ensure consistency of use of revision number and also revision date.
- Contact details for General Manager People & Culture or at least the department of People & Culture be included in its next revision.
- Sunwater undertake a comprehensive review of all its policies and procedures for currency and content and follow a standard quality management process of documenting releasing authority, last update and future review dates.

Alignment of Risk Matrices

We recommend that the Sunwater aligns its Risk Scoring Table within its various divisions along with consistent definitions of Likelihood and Consequences and its application.

Procurement limits

We recommend that all services should require a written proposal/methodology, the details of which can be aligned to the risk/complexity of the requested service. According to the procurement rules, this will then require that all such services will require at least two quotes.

Bribery and facilitation payment prohibition

We recommend Sunwater include specific reference to bribery and facilitation payment prohibition in the Code of Conduct, and update the code and routinely provide ethics training to all employees (if not already done).

Improve records Management Process

We recommend Sunwater repurpose records management process in line with procurement process steps. Aligning record management processes with procurement processes will help to ensure that all documents are available and auditable.

4.8.7 Improve Project Management Processes

We recommend that Sunwater standardise and simplify its P3MF maps and tools, as stated to be undertaken as part of the P3MF Phase #2 works in alignment with the Policy Rationalisation Project⁶³.

Giving consideration to “A Guide to the Project Management Body of Knowledge, Fifth Edition”, we recommend that Sunwater improve its P3MF process, with respect to giving the warranted attention to the Monitoring and Control process of the project lifecycle.

4.9 Sunwater’s Submission on the QCA’s Draft Report

Sunwater has commented on a number of our findings in relation to policies and procedures in its response to the QCA’s draft report.

4.9.1 Examination of Policies, Procedures and Practices, with Reference to Best Practice

As outlined in Table 26, Sunwater has provided commentary in relation to policies, procedures and practices.

Table 26 Examination of Policies, Procedures and Practices, with Reference to Best Practice

Summary of Sunwater Response

“In respect of substitution possibilities between renewals and maintenance, our goal is to manage our assets (and the assets we manage for others) in a sustainable and commercially focused manner, to safeguard asset integrity and ensure optimal service value to our customers, in accordance with our strategic goals. Optimal service value requires a balancing of risk, cost and performance which necessarily takes into account both capital and operating expenditure considerations... Based on feedback from AECOM we will clarify how we consider capital and operating expenditure considerations in future plans.

In relation to AECOM’s concerns around service targets, our Water Supply Arrangements and Service Targets documents for each scheme (where applicable) outline service level expectations, including interruption duration targets. The service levels are inputs for planning renewals, in terms of scheme availability and asset performance. We will clarify these important linkages as part of our revisions.”⁶⁴

There is no change in our position as outlined in Section 4.2. We note Sunwater’s intended future improvement actions to more clearly link service levels to capital and operational expenditure considerations in future plans.

4.9.2 Decay curves

As outlined in Table 27, Sunwater has disputed our findings in relation to the use of a standardized decay curve.

Table 27 Decay Curves

Summary of Sunwater Response

“Sunwater deems best practice is considered in respect of ISO55001. This standard does not prescribe a universal methodology that all businesses should adopt. Rather, the standard reflects the need for organisations to develop systems and tools, where justifiable, to automate or facilitate asset replacement and rehabilitation decision making. The standard references the need for capital and operating expenditure projections for short, medium and long (five, 10 and 20 year) timeframes and with a defensible level of accuracy.

In this respect, AECOM correctly noted that local, site-by-site experience and knowledge must form part of the process for establishing standard lives. Importantly, statistical probability and industry averages form the basis of traditional decay curves. Traditional decay curves do not incorporate the operating context, routine maintenance and monitoring techniques employed to manage the asset. In contrast, our revised asset strategies take into account site-specific information, using the knowledge and experience of scheme and senior managers from

⁶³ Draft Portfolio, Program and Project Management Framework (P3MF), Page 1

⁶⁴ Response to the QCA’s Draft Report - Sunwater Irrigation Price Review 2021–24, Page 60

across the state.

In our November 2018 submission, we also noted that while we had committed to introducing additional decay curves matched to different asset classes, with further investigation Sunwater found that there was insufficient information on asset decay to generate curves for each of the asset families. Most of the assets have medium to long-term asset life cycles and subsequently have a slow rate of deterioration. Deriving and maintaining decay curves for asset classes would be a time consuming and costly exercise in an environment where customers are increasingly concerned about the level of non-direct costs. Each time a decay curve is adjusted, the lives of all related assets would need to be reviewed.

Our preference was (and continues to be) to prioritise improvements to a reliability centred maintenance program. Sunwater uses the decay curve as an indication for a renewals profile, but condition and performance data are used to inform and prioritise the works program. Where relevant data for an asset is not recorded, unavailable or not financially practical to acquire, asset age is used as an input. Asset age is also an input to condition assessments for assets with age dependent failure modes, but it is not the sole input.

Moving forward, we plan to incorporate routine maintenance along with condition inspection data, asset performance levels, customer impact risk and cost inputs when establishing our future renewals program. We have incorporated this into our updated non-routine planning and delivery process. We also expect whole of life asset management improvements to be implemented as part of our asset management improvement plan from 2020/21.

This will require investment in digital asset management and associated systems. However, in our view, this approach is less costly and provides better value for money than investing in a series of decay curves for Sunwater’s assets.”

We acknowledge that Sunwater uses condition assessments to validate renewal works, and that investment is not based on asset age alone. However, we observe that this validation occurs within the short term. Noting that Sunwater has proposed a 30-year planning period, this does not resolve long-term planning concerns.

Sunwater states that developing additional decay curves would be time consuming and costly. However, it is our view that the alternative standardised decay curve for renewals planning is likely to result in outcomes which are not prudent or efficient. There has been no analysis to indicate that the time and cost of developing additional decay curves would outweigh the gain. Sunwater should be collecting historical failure data in a manner that would enable this development.

As a result of this, there is no change in our position as outlined in Section 4.2.

4.9.3 Cost Estimation

As outlined in Table 28, Sunwater has commented on its practices regarding cost estimation.

Table 28 Cost Estimation

Summary of Sunwater Response

“In addition to the asset revaluations, our technical specification process identifies new technologies that should be considered for the specific project under review. In situations where identified technological advances lead to lower cost solutions, these are rolled out for other relevant projects across the different schemes and are incorporated into future projects in the form of technical standards and/or technical scopes.

We noted in the previous chapter, important investments in digital capabilities to improve the efficiencies of our business. The Finance and Asset Management Solution being developed as part of this program will also enable easier use of updated costs to be used for like assets. This is another reason why the QCA should revisit its decision on our investment in the DEBS program.”

“As noted above, Sunwater has expanded our planning horizon to a forward 18 months plus a 12-month window which will improve renewals validation and scheduling efficiencies.”

Sunwater's technical specification process to identify cost savings arising from technological advances for specific projects. Investment in the DEBS program is outside the scope of this review.

We acknowledge that Sunwater has expanded its planning horizon to a forward 18 months plus a 12-month window, and that this will have a positive short term-impact in relation to the identification of scheduling efficiencies. However, there remains no evidence of renewals validation or scheduling efficiencies being provided for outside of an 18-month period.

We note no other change in our position as outlined in Section 4.3.

4.9.4 Procurement

As outlined in Table 29, Sunwater has commented on our findings in relation to procurement.

Table 29 Procurement

Summary of Sunwater Response

“Sunwater notes AECOM’s comments in relation to opportunities to improve our procurement procedures and practices. We will consider these improvements in future revisions.”

There no change in our position as outlined in Section 4.5. We note Sunwater’s intended future improvement actions to improve procurement practices.

4.9.5 Project Management

As outlined in Table 30, Sunwater has commented on its project management processes.

Table 30 Project Management

Summary of Sunwater Response

“In relation to project management, Sunwater finalised our Portfolio, Program and Project Management Framework (P3MF) in June 2019. The final version incorporated changes to process maps, with a focus on making them fit for purpose. Initial feedback received from the training sessions held in July 2019 has been positive, with project managers and teams able to easily navigate and understand the new processes. The common language and “one stop shop” on Sunwater’s intranet will also ensure consistency across the organisation.

As the tools and processes have been rolled out, Sunwater now has a basis against which to monitor and control both medium-size and major projects. We have also procured a P3MF software system to automate and generate data and information from all projects captured under the framework. The system is configured with gate reviews and approvals to ensure higher-level governance and control through each phase. In addition, projects will be monitored and controlled in a consistent structure (including key performance indicators, costs, schedules, risks, scope and benefits), therefore leading to greater confidence in the status and performance of the projects.

Sunwater recognises the new project management framework may be too complex for minor projects, which are typically task-related or maintenance work. Further work is being progressed to determine the most appropriate and fit-for-purpose system and processes for these projects.”

There is no change in our position as outlined in Section 4.6. We note Sunwater’s intended future improvement actions to determine more fit-for-purpose systems and processes.

4.9.6 Consultation

As outlined in Table 31, Sunwater has commented on our findings relating to customer consultation.

Table 31 Consultation

Summary of Sunwater Response

"In 2018, we developed a new Network Service Plan template with our customers' feedback on what they were interested in seeing in mind. We focused on providing greater transparency of costs and projects, and made the plans shorter, clearer and less technical. Several customer representatives were interested in explanations of the variances in our forecast renewals program. We indicated in our November 2018 submission that we planned on reporting on variations to our non-routine program of works for the most recently completed financial year in future Annual Performance Reports. Our 2018/19 Annual Performance Reports, which are currently being prepared, will provide this information.

We will take on board AECOM's comments on incorporating customer feedback on which projects are selected for an options analysis as part of our asset management improvement plan."

There no change in our position as outlined in Section 4.3. We note Sunwater's intended future improvement actions.

5.0 Historical Renewals Assessments (FY12-FY18)

5.1 Project Reviews

A total of 28 historical projects from the period FY12-FY18 were reviewed. The historical project sample consisted of 11 flood damage projects, 12 bulk water projects, and five distribution projects. The project review summaries are provided in Appendix A. They include a description of each project's background, the options assessment process, its implementation, and our findings on prudence and efficiency.

The assessment forms for the historical projects are included in Appendix E. The assessment forms are the raw forms used by our assessors and include specific information on cost estimating, cost control, project governance and implementation.

5.2 Themes and Systemic Issues Arising from Project Reviews

We have identified three major themes and the associated systemic issues arising from review of the projects completed since FY12:

1. Poor Original Project Scoping and Cost Estimating

The project scoping process and associated cost estimates are often piecemeal and disorganised. Sometimes only the project development costs are included in the project cost estimate. Other times they are completely excluded. In some cases, different components of project are estimated separately. It is good practice to include all project scope for all phases of the project under one cover. Part of the reason for the piecemeal approach to project scoping and estimating may be Sunwater's annual budgeting and approval process. It appears that scopes and budgets are often only defined for a single year for the purposes of acquiring approval for particular year.

Project 13BIA48 for Flood Damage Repairs at Don Beattie PSTN is an example of this piecemeal approach to project scoping and estimating. The project ran from FY13 through to FY17 with the bulk of costs occurring during the construction phase in FY17. The documentation provided for review included nine different budgets of varying scope and cost, ranging from \$209,292 to \$898,369 (with the actual project expenditure being \$1,272,616).

Another systemic issue identified with respect to project scoping and estimating is the frequent underestimating of the project costs. For the projects sampled, where original budgets were documented, the final actual expenditure was, on average, 267% greater than the original budgets proposed. Sunwater has a cost estimating guideline of +/-100% cost accuracy in the concept design phase. It is better practice and more commonplace to originally overestimate the project costs when the scope and preferred solutions are not yet known. Larger contingency amounts are applied, and the more expensive potential options should be accounted for. Then as the scope is further refined, the cost estimates would typically reduce as the project risks become clearer.

Project 12SGA24 for Investigation and Works Requested at Moolabah Weir is an example of original underestimation of project costs. Sunwater initially estimated \$207,732 for the works to repair damage to the weir from the 2011 floods. After the options assessment was completed, the estimate increased to \$530,600 despite selecting the lowest cost option. The final actual costs were \$639,046, which is 208% greater than the original budget. Sunwater has an incident identification level estimate accuracy requirement of +/-100%.

2. Benefits from Procurement Policy not Realised

A competitive tender process for goods and services increases the probability of obtaining the services under prevailing market conditions. The Sunwater Procurement Decision Matrix identifies the number of quotes that must be received depending on the cost of the purchase and the contract risk. Generally, for projects greater than \$10,000, a minimum of two written quotes are required. Obtaining even more quotes increases the confidence that sufficient value is being obtained.

In the project sample, competitive procurement processes were generally undertaken, but in many cases insufficient offers were received. Early engagement with the offerors should be done to prepare them for the tender and gauge their interest prior to releasing the tender. Consideration to more appropriate bidding timelines may also encourage more quality offers. It appears common that offerors do not submit due to short timeframes. This requires improvements in Sunwater's early project planning such that Request for Offers can be released on time to prevent schedule rushes.

Project 07PIO05 for the Palmtree Creek Outlet Works is an example where a competitive procurement process was initiated but insufficient offers were received. The project documentation reported that an open tender process was undertaken on the Queensland Government eTender website for the supply and installation of a butterfly valve to serve as a guard valve on the Palmtree Creek outlet pipeline. Only one offer was received for \$249,466 from [REDACTED]. There are many suppliers of butterfly valves; therefore, it is not clear why only one offer was received. Had Sunwater engaged other suppliers earlier in the process, more offers may have been received.

Another systemic issue identified with respect to procurement is the apparent regular use and approval of procurement exemptions, especially where urgency is the documented reason. There appears to be gap in oversight and judgment of when procurement exemptions are made. In some of the projects reviewed, it was warranted. In other cases, the project occurred over multiple years, and the additional time needed for competitive tendering would have had a small overall impact on the project delivery schedule. In other cases, poor project management in the early stages of project appear to have caused urgency later in the project. For example, in the same project 07PIO05, procurement exemptions to allow a single quote was approved on two purchases, both based on urgency. A contract was awarded to [REDACTED] for \$59,710 for supply of a pepperpot valve and a contract of \$39,770 was awarded to [REDACTED] for piping modifications. The exemptions were made in June 2012 and the works completed by September 2013. The Project Scoping documented was completed in February 2011, which described the scope of works including the pepperpot and piping modifications. The butterfly valve underwent a competitive tender in January 2012. It is unclear why the other scope items did not undergo a similar competitive tender process at the same time.

3. Poor Project Management and Supporting Documentation

The findings for themes related to project management and documentation comprise of:

- Inadequate or missing project scoping and project management documentation
- Inappropriate use of contingency amounts
- Poor contractor management and documentation of variations
- Inadequate or missing project closeout reports

The Project Scoping Document and Project Management Plans are essential to effective project management. Of the projects reviewed, the Project Scoping document, although a standard Sunwater project document, was often missing or even if completed, it was done poorly with many sections blank or too brief. The Project Scoping document summarizes critical information for effective project management including the proposed scope, the budget, the schedule, and project risks. Of all the projects reviewed, there was only one instance of a Project Management Plan being completed. This was for project 17BRI31. For another project (16MVA01), the Contractor had prepared a Project Management Plan, but Sunwater had not completed its own. The Project Management Plan, also a standard Sunwater document, is a more detailed plan for executing the project. Another systemic issue regarding the project management documentation is that even if a Project Scoping document was completed, it was never updated as the project progressed. Project management documents are intended to be live documents to adapt to the project as it progresses. Almost all projects have scope, budget, or schedule changes, but they are never documented in the project planning documentation.

Project 14MDA13 for the Mareeba-Dimbulah SCADA Upgrade is an example where an initial project scoping document was prepared on March 12, 2015 for the implementation phase of the project. It included detailed technical scope, a planning cost estimate for FY16, and key milestone

dates but the quality control, cash flow, and variations sections were blank. A memorandum later that month was prepared to propose changes to the scope, budget and schedule by integrating other related projects. The main Project Scoping Document was not updated to reflect these changes. There were three Prudency & Efficiency documents (one in August 2015 and two separate documents in June 2016) that describe changes to scope, budget, and schedule. It appears that the project is expected to be completed in FY19. Project management documentation was never kept current.

Another systemic issue identified in the project reviews was the inappropriate use of contingency amounts in project planning and implementation. Contingency is intended to cover cost estimate uncertainty and risk exposure. Sunwater has guidelines for the level of accuracy. At the time of project implementation, the project phase is supposedly at detailed design and the cost accuracy should be +/-30%; although, depending on the individual project it could be more accurate. Added to this is the risk contingency, which is a sum of the expected monetary value of project risks. The Sunwater Project Scoping document template has a section for a risk register and estimated cost, but it appears to rarely be used. The total contingency amount should be monitored throughout the project to check its adequacy.

Of the projects reviewed, it was noted that contingency amounts are inconsistent, rarely justified, and almost never linked to specific project risks. Instead, they appear to be used for allowing unexplained budget overruns. In many cases, project costs exceed the project budget including the allocated contingency, which reinforces that contingency amounts are not appropriately calculated.

In project 17BRI31 for the Giru Weir Outlet Works, the contractor identified a risk of wet weather and included a contingency amount for the cost of dewatering. The project documentation identifies that this was one of the reasons they were chosen as the preferred contractor. In this case, it appears that Sunwater has indirectly, through the contractor, included a calculated contingency amount for a defined risk. As the project progressed, the risk materialised, and dewatering was required. The contractor still filed a variation for dewatering, of which Sunwater accepted. The contingency amount was either inappropriately quantified, or its purpose was ignored.

The third systemic issue related to project management is related to poor contractor management and documentation of variations. In the same project 17BRI31, the contractor and material costs totalled to \$633,378, which was higher than the combined total of \$522,429 for contractor and material quotes specified in the procurement documents. There are no itemized variation reports or justifications for the additional materials or contractor costs. Project 07PIO05 is another example where the final contractor costs (\$394,918) exceeded the contractor quotes (\$348,956) and no itemized documentation of variations and their justifications were included.

The fourth systemic issue related to project management and documentation is associated with project close out reports. The reports are not always completed, and if they are, they are generally too brief and do not add value. A project closeout report should provide a final summary and review of the initial and final scope, budget, and schedule. Reasoning for any changes should be documented such that an overview of the project challenges and successes can be made. This report is especially important considering project management documents tend not to be updated throughout the project. The closeout report is an opportunity to establish lessons learned to guide continual improvement of project delivery.

In general, overall documentation quality for the reviewed projects was frequently assessed as low. We believe that the range of documentation required for an assessment of capital projects is easy to define and should be available for in-house post project reviews carried out for audit purposes and to identify performance improvement opportunities (i.e., "lessons learned"). The documents should be standard practice for Sunwater. The consistency in preparing these documents is important to facilitate reviews such as this, whether done by third parties or internally.

5.3 Conclusions and Recommendations

The review of the projects in the historical sample shows that projects are generally prudent and efficient with respect to scope and standard. The area of concern is with respect to cost efficiency.

The majority of projects tend to exceed the original budgets allocated. From the documentation provided, it appears that in most cases the final costs are justified, and the overruns are generally a result of poor original scoping and budgeting.

Adjustments have generally only been made where a budget overrun has occurred, and justifications are not provided or cannot be reasonably assumed. There are five projects out of the 28 with recommended adjustments. The projects with adjustments and their underlying issues are:

- 13BIA47 – Inadequate project management/contractor oversight
- 12SGA24 - A combination of unexplained budget overrun, poor scoping, and procurement exemptions
- 07PIO05 - A combination of unexplained budget overrun and procurement exemptions
- 13NMA04 - An unexplained budget overrun
- 17BRI31 - An unexplained budget overrun, specifically contractor and materials

We recommend adjustments to two flood damage related projects for efficiency and prudence reasons. Table 32 provides details of costs for flood damage related projects, insurance proceeds and recommended adjustments.

Table 32 Detailed Breakdown of Flood Damage Project Costs

Project Name	Total Project Cost	Insurance Awarded	Amount Claimed from Customers	Prudence and Efficiency Recommended Adjustment	Remaining Value Accepted
13BIA47 - FD01 (2013) Flood Damage Repairs at Ben Anderson Barrage	\$8,313,310	\$5,853,278	\$2,460,032	\$258,806	\$2,201,228
13BBA04 - FD01 (2013) Flood Damage Repairs at Bjelke-Petersen Dam	\$386,726	\$281,728	\$104,998	\$0	\$104,998
13UBP04 - FD01 (2013) Claude Wharton - Flood Repairs	\$2,332,308	\$1,699,073	\$633,235	\$0	\$633,235
12BYR17 - FD01 (2011) - Spillway Repairs - Boondooma Dam	\$36,628,761	\$4,987,492	\$31,641,269	\$0	\$31,641,269
12SGA24 - FD01 (2012) - Moolabah Weir - Dam Break & Upgrade Construction	\$639,046	N/A	\$639,046	\$45,019	\$594,027
13CVA02 - FD01 (2013) Flood Damage Repairs at Callide Dam - left gate (floating chamber)	\$2,079,855	\$1,286,719	\$793,136	\$0	\$793,136
13DVA06 - FD01 (2013) Flood Damage Repairs at Neville Hewitt Weir	\$164,508	\$119,843	\$44,665	\$0	\$44,665
13LFD07 - FD01 (2012) Eden Barr Repair and Desilt the Fishlock to make it operable after February 2012 flood	\$493,849	N/A	\$493,849	\$0	\$493,849
12NMA08 - FD01 (2011) Tartus Weir Flood Damage Repairs - Erosion & Protection Works	\$229,417	N/A	\$229,417	\$0	\$229,417
13TMC04 - FD01 (2013) Flood Damage Cania Spillway	\$589,176	\$64,900	\$524,276	\$0	\$524,276
16BYR07 - Boondooma Dam Spillway Repairs Project Insurance Claim	\$591,180	N/A	\$591,180	\$0	\$591,180

The summary table of the historical project reviews is provided in Figure 19.

Project	Prudency Assessment	Efficiency Scope	Assessment Standard	Cost	Claim (\$ millions)			% Deductions
					Claim	Adjust.	Accepted	
13BIA47 - FD01 (2013) Flood Damage Repairs at Ben Anderson Barrage	✓	✓	✓	✗	\$8.31	\$0.26	\$8.1	3.1%
13BBA04 - FD01 (2013) Flood Damage Repairs at Bjelke-Petersen Dam	✓	✓	✓	✓	\$0.39		\$0.4	
13UBP04 - FD01 (2013) Claude Wharton - Flood Repairs	✓	✓	✓	✓	\$2.33		\$2.3	
12BYR17 - FD01 (2011) - Spillway Repairs - Boondooma Dam	✓	✓	✓	✓	\$36.63		\$36.6	
12SGA24 - FD01 (2012) - Moolabah Weir - Dam Break & Upgrade Construction	✓	✓	✓	✗	\$0.64	\$0.05	\$0.6	7.0%
13CVA02 - FD01 (2013) Flood Damage Repairs at Callide Dam - left gate (floating chamber)	✓	✓	✓	✓	\$2.08		\$2.1	
13DVA06 - FD01 (2013) Flood Damage Repairs at Neville Hewitt Weir	✓	✓	✓	✓	\$0.16		\$0.2	
13LFZ07 - FD01 (2012) Eden Bann Repair and Desilt the Fishlock to make it operable after February 2012 flood	✓	✓	✓	✓	\$0.49		\$0.5	
12NMA08 - FD01 (2011) Tartarus Weir Flood Damage Repairs - Erosion & Protection Works	✓	✓	✓	✓	\$0.23		\$0.2	
13TMC04 - FD01 (2013) Flood Damage Cania Spillway	✓	✓	✓	✓	\$0.59		\$0.6	
16BYR07 - Boondooma Dam Spillway Repairs Project Insurance Claim	✓	✓	✓	✓	\$0.59		\$0.6	
Flood Damage Projects Total						\$0.3	\$52.1	0.6%
16PRO03 - Investigate Spillway Chute Floor - Peter Faust Dam	✓	✓	✓	✓	\$0.61		\$0.6	
16MVA01 - Reinstate Down Stream Rock Protection - Mary River Barrage (Options/Design 2016)	✓	✓	✓	✓	\$0.39		\$0.4	
16CUW02 - Allan Tannock weir - Refurbish Outlet Works Gate	✓	✓	✓	✓	\$0.03		\$0.0	
14MAB05 - Coolmunda Dam: Refurbish Float Wells (Float Guides, Ropes, Tie Rod Ends)	✓	✓	✓	✓	\$0.28		\$0.3	
17BBR04 - Plug the River Conduit Inlet Tower Base Permanently - Eungella Dam	✓	✓	✓	✓	\$0.41		\$0.4	
07PIO05 - Replace Regulating Valve RV01 - Palmtree Creek Pipeline	✓	✓	✓	✗	\$0.96	\$0.09	\$0.9	9.5%
15PIO06 - Teemburra - Replace Control System including SCADA for Teemburra Dam, Palmtree Ck & Tannalo Valves - Teemburra Dam	✓	✓	✓	✓	\$0.47		\$0.5	
15CVA16 - Callide Flood Review	✓	✓	✓	✓	\$1.55		\$1.5	
15DAW01 - Upgrade PLC and SCADA System - MOSS Pump Station (Drawings/Spec/Cost Estimate 2015, Supply/Install/Commission 2016)	✓	✓	✓	✓	\$0.26		\$0.3	
12LFZ12 - Replace Control Equipment - Eden Bann Fishway (Scope/Options/Design 2014, Procure/Install/Commission 2015)	✓	✓	✓	✓	\$0.14		\$0.1	
13NMA04 - Spillway Seepage Investigations - Fairbairn Dam	✓	✓	✓	✗	\$0.73	\$0.07	\$0.7	10.2%
12MDA57 - Replace lighting system at the Tinaroo Falls Dam Gallery	✓	✓	✓	✓	\$0.48		\$0.5	
Bulk Water and Irrigation Scheme Projects Total						\$0.2	\$6.1	2.6%
13BIA48 - FD01 (2013) Flood Damage Repairs - Don Beattie PSTN	✓	✓	✓	✓	\$1.27		\$1.3	
11ETO06 - Replace Switchboards and Control Equipment - Brightley Pstn 1 & 2	✓	✓	✓	✓	\$0.97		\$1.0	
14MDA13 - Implement Findings: Strategic Plan for MDWSS I&D SCADA - Stage 2	✓	✓	✓	✓	\$0.88		\$0.9	
17BRI31 - Install STG II Functional Outlet Works - Giru Weir	✓	✓	✓	✗	\$0.77	\$0.14	\$0.6	18.8%
14MDA33 - Study Copper Sulphate Research Project - West Barron Main Channel	✓	✓	✓	✓	\$0.44		\$0.4	
Distribution Scheme Projects Total						\$0.1	\$4.2	3.3%
All Projects Reviewed (excluding Flood Damage Projects)						\$0.3	\$10.3	2.9%
All Projects Reviewed						\$0.6	\$62.5	1.0%

Figure 19 Summary of Historical Projects Review

The purpose of the project sample review is to identify systemic issues that may have impacted the prudent and efficient delivery of projects. The systemic issues have highlighted opportunities for Sunwater to improve in areas of project scoping, cost estimation, procurement, project management, and documentation. It is difficult to quantify a specific adjustment that would result from improvements in each of these areas. The dataset is small and statistically it would not be appropriate to conclude individual adjustments per systemic issue.

There were 11 flood damage projects reviewed. Of these, we recommend adjusting two projects for \$0.3 million or 0.6% for prudence and efficiency reasons. Due to the innate urgency of flood damage projects, we have treated these adjustments as project-specific. Six projects also received proceeds from insurance claims and settlement thereby reducing the net cost of these projects. Of the non-flood damage related historical projects, we reviewed 17 projects representing approximately 10.6% of the total value of the projects (in \$FY19). For these projects, we recommend a deduction of 2.9% as an adjustment. This deduction is related to observed systemic issues and could potentially be extrapolated to the full historical project portfolio.

5.4 Stakeholder Submissions

In response to the QCA's draft report, a stakeholder submission⁶⁵ was made with comment on the historical expenditure on the 15DAW01 – Moura Off Stream Storage (MOSS). The project involves the replacement of the PLC and SCADA control system. The stakeholder submission challenged the prudence of the project, stating the MOSS does not require SCADA as the site is operated manually and, furthermore, there is only one customer reliant on the operation of the MOSS. From the documentation reviewed, the Options Analysis clearly describes the current modes of operation including automatic, remote and local manual. It does not specify that the current mode is manual. In its analysis of the 'do nothing' option, it infers the current mode is automatic because if the control system fails, Sunwater has to revert back to manual operations and monitoring. This leads to a requirement to add more resources to the field within short notice. It is unacceptable for Sunwater to miss water allocations without giving the customers sufficient notice, as outlined in Sunwater's service levels. Hence, the 'do nothing' option was not a viable option in this case. Based on the information provided, the project appears to be prudent.

The stakeholder submission also challenged the efficiency of the project, stating the final capital expenditure of \$260,693 is six times the original project cost estimate between \$52,258 and \$32,258. Our original review stated that the original \$52,000 was for the project development phase (options analysis) and not the full project. A final actual cost breakdown of the project was not made available; however, the project development phase appears to have costed \$73,000, and the implementation phase by deduction would be approximately \$187,000. The original total project budget for the implementation phase was \$127,000 with a +/- 75% estimate accuracy. The final project costs are therefore not six times the original project development and implementation phase estimate, but is within the accuracy bound of the original estimate. For this reason, the project costs were deemed efficient.

⁶⁵ Relevant submissions: Theodore Water submission dated 5 November 2019

6.0 Transitional and Forward Renewals Assessments (FY19-FY53)

6.1 Project Reviews

A total of 65 transitional and forward renewal projects from the period FY18-FY53 were reviewed under the project sample. The project sample consisted of 46 bulk water projects and 19 distribution projects. The projects were a combination of one-off projects and rolling programs. The majority of projects had costs in each of the review periods – transitional (FY19-FY20), price path period (FY21-FY24), and beyond price path period (FY25-FY53). For this reason, the project reviews have not been separated by period.

The project review summaries are provided in Appendix B. They include a description of each project's background, the options assessment process, its implementation, and the findings on prudence and efficiency.

The assessment forms for the transitional and forward renewal projects are included in Appendix F. The assessment forms include specific information on cost estimating, cost control, project governance and implementation.

6.2 Themes and Systemic Issues Arising from Project Reviews

We have identified three key themes and the associated systemic issues arising from review of the projects proposed in the transitional and forward periods:

1. Timing of Replacement and Refurbishment

Sunwater has three planning tools that guide the scheduling of asset refurbishment and replacements. These are the:

- *Overall Strategy Common to all Irrigation Schemes by Object Type*
- *Overall Strategy Common to all Bulk Water Schemes by Object Type*
- *Whole of Life Maintenance Strategy and Object Codes*

The *Overall Strategy Common to all Irrigation Schemes by Object Type* is a strategy document that outlines specific asset strategies for a variety of, but not all, asset groups (also called object type) in the schemes. Sunwater proposes to apply these asset strategies to the 30-year program to better reflect a lower whole of life cost approach and avoid unnecessarily bringing major replacement items into the price path period, while still meeting condition and risk standards.

The *Overall Strategy Common to all Bulk Water Schemes by Object Type* is a similar strategy document but applies to asset groups in the bulk water schemes. It, also, only applies to a 30-year planning period.

The *Whole of Life Maintenance Strategy and Object Codes* provides a comprehensive listing of asset lives and refurbishment intervals for asset groups and sub-components or types of equipment within the asset group. Sunwater has adopted the standard life for each equipment type based on the available maintenance histories, literature review of public domain information and the collective engineering and technical experience of staff and consultants. Each equipment has a standard low risk life. This is defined as the mean time to failure for the equipment installed and operated in typical (or average) conditions. If the asset is deemed medium or high risk, the asset life is reduced to mitigate a run-to-failure scenario. So that assets remain in a serviceable condition throughout the adopted asset life, many undergo periodic maintenance or refurbishment. Sunwater has adopted refurbishment frequencies based on the available maintenance histories and the collective engineering and technical experience of staff and consultants. Some object types are run-to-failure and do not have a refurbishment frequency, while others are "in perpetuity" and are therefore not planned to be replaced.

Sunwater's intention is to apply the replacement and refurbishment intervals specified in the two asset strategy documents where the equipment falls into a defined asset group and the project is within the 30-year planning period. All other types of equipment or projects outside this 30-year period revert to the whole-of-life maintenance strategy.

Through review of the transitional and forward projects in the sample, we found that the application of the recommended replacement and refurbishment intervals was inconsistent. It often did not match the relevant asset strategy document, and sometimes did not match any of the three documents. For example, Project 0000042519 Cherry Creek Siphon Pipe Replacement involved the replacement of reinforced concrete sections of pipe in FY49 at an age of 92. This asset life does not match any of the planning documents. The applicable asset strategy is to adopt a 100-year life subject to regular condition and risk assessments. The most recent high-level condition assessment of the pipeline, in 2002, suggested it is level 2, which is equivalent to good condition. Based on this and the Sunwater decay curve, the replacement should be postponed beyond FY53.

Another systemic issue with respect to refurbishment and replacement timings is the coordination of planned refurbishments with future replacements. It appears that Sunwater has scheduled refurbishments in regular intervals based on the asset start-up date, but it does not consider the timing of proposed future replacements. In some cases, a proposed refurbishment was planned in the same or adjoining year of the replacement. For example, project 0000069873 19BBR09 Gattonvale PSTN Pump 1 Refurbishment was proposed in 6-year intervals starting in FY19. Firstly, the pump start-up year was 2005, therefore the refurbishment schedule has been offset by two years. Secondly, the pump is due for replacement in FY35 and the scheduled refurbishment was not omitted for that year (i.e., it was still scheduled in FY37, noting the two-year offset).

2. Transparency and Consistency of Cost Estimation

For most of the projects in the transitional years (FY19 and FY20), sufficient information to form the basis of a cost estimate was available. However, for most of the projects in the price path and beyond price path periods, no basis of cost estimate documentation specific to the projects reviewed was sighted. Sunwater states that the asset replacement costs listed in its WMS are the basis for long-term renewal costs.⁶⁶ Based on information in the asset register, asset revaluations were carried out by Sunwater and its consultants in 2008, 2015, 2016, 2017, 2018. The Sunwater capital expenditure submission was given in nominal dollar amounts; therefore, the exact comparison to the asset register replacement values is not possible since it is not known what inflation and escalation factors were applied. That said, by applying CPI (for Brisbane), to convert both figures into \$FY19, the values should be close enough to confirm a correlation. For many projects in the sample, a correlation could not be made. For example, project 00000075493 21ETO10 Oakenden Main Channel Flow Meter Replacement included a capital expenditure of \$159,360 (in \$FY19) in FY21, however the asset register replacement value is only \$2,530 (in \$FY19). There is a clear and significant discrepancy for this project. This is consistent for most flow meters. Replacements for other types of assets are generally closer, but rarely match.

The refurbishment costs cannot be compared to replacement cost data contained in the asset register. Sunwater states that cost estimates for non-routine works are informed by the review of similar completed tasks, experience and advice from project managers and technical staff.⁶⁷ However, inadequate supporting information was provided to explain how refurbishment costs were established for the reviewed projects. For example, for project 0000069873 19BBR09 Gattonvale PSTN Pump 1 Refurbishment, we note that an adjustment was recommended to the proposed expenditure because the cost was four times the pump replacement value on average.

⁶⁶ Rfl A3 Cost Estimation Process.

⁶⁷ Rfl A3 Cost Estimation Process.

3. Separation of Project Development and Implementation Phase Costs

It appears that Sunwater often separates project funding between the project development and implementation phases. This practice makes it difficult to analyse the full cost of a project. The asset replacement values in the asset register are calculated including allowances for project development costs. The August 2018 *Irrigation System Asset Revaluation Project* document states that Ownership Costs ranging from 47% to 97% of the direct costs, depending on location, are applied to establish the total replacement value. Other than the location allowance, the ownership cost is comprised of allowances for scoping, design, and indirects among other implementation phase costs such as project management, safety, procurement, legal, and travel.

For example, project 0000074061 19BDK01 Clare Weir Flap Gate Hydraulic Cylinder Refurbishment (Stage 3) is planned for FY20 for \$247,000 in \$FY19. This project has not only excluded the planning work that went into defining the project scope (i.e., presumably Stage 1 & 2), but it appears to also have split out different parts of the proposed rolling program into separate projects. The proposed program is for the refurbishment of 150 hydraulic cylinders at a cost upward of \$2M. While the project has uncertainty regarding what the FY20 scope encompasses, it is evident that it does not capture the full project scope for the project development phase or the full refurbishment program.

6.3 Conclusions and Recommendations

The review of the projects in the transitional and forward renewals sample generally show inconsistent and unclear application of project timing, frequency, scope and costs. Of the 65 projects reviewed, 19 have not been considered prudent. This is primarily due proposed timing inconsistent with the asset strategy or projects that require delay due to their assessed condition and calculated remaining life.

For project efficiency, of the 65 projects reviewed, seven projects were identified to have inefficiencies in scope, four in standard, and 12 in cost.

Adjustments have generally only been made where the proposed capital expenditure is unreasonably greater than the asset register replacement value (in the case of a replacement) or a documented budget/cost estimate. Timing of renewals has also been adjusted for some projects. For these cases, any adjustment is reflected in the recommendation from the annuities assessment to avoid double counting an adjustment.

The projects recommended for adjustment, and their reasoning, are:

- 0000069873 - Refurbishment reduced to less than replacement cost from asset register and timing of refurbishment also corrected
- 0000075186 - Adjusted based on project budget overrun
- 0000076265 - Adjusted to match cost estimate provided
- 0000057410 - Adjusted to match cost estimate provided
- 0000065103 - Adjusted to match replacement cost estimates provided for various flow meters
- 0000073006 - Rejected due to change in engineering standards that change project driver
- 0000014241 – Adjusted to reflect replacement cost from asset register
- 0000076382 – Thuraggi Channel to reflect extra costs incurred
- 0000075493 – Adjusted to reflect replacement cost provided for flow meter rolling programs
- 0000008682 – Adjusted to account for refurbishments that would occur in the year the asset is replaced
- 0000042159, 0000072774, 0000030670, 0000045622 - Replacement delayed beyond FY53 to reflect asset strategy
- 0000015276, 0000015210, 0000030689, 0000025738, 0000015726, 0000015177, 0000075990, 0000055946 and 0000042132 – Timings adjusted to reflect delay recommended by annuities assessment, but does not have any cost impacts

Three projects related to recreational use have been found not to be prudent:

- 0000076554 - Chinchilla Weir - Study: Develop Recreational Use Storage Management Plan
- 0000076580 - Fairbairn Dam - Study: Bathymetric survey
- 0000076581 - Bjelke-Petersen Dam - Study: Bathymetric survey

The summary of project reviews has been divided into three tables for the various review periods (transitional years, price path period, and beyond price path period), presented in Figure 20, Figure 21, and Figure 22 respectively. Some projects had expenditure occurring in more than one of the three review periods, and the findings presented in this section should be considered accordingly.

Project	Prudency Assessment	Efficiency Assessment			Total, FY19-20 \$FY2019 '000s				Deduction Type
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct	
000001060 - BURDEKIN FALLS DAM - Study: 20yr Dam Safety Review -Burdekin Falls Dam	✓	✓	✓	✓	\$130		\$130		
000002872 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).	✓	✓	✓	✓	\$122		\$122		
000004935 - BOONDOOMA DAM - Study: 20yr Dam Safety Review - Boondooma Dam (See Notes)	✓	✓	✓	✓	\$219		\$219		
000004992 - WURUMA DAM - Study: 20yr Dam Safety Review - Wuruma Dam	✓	✓	✓	✓	\$329		\$329		
000006501 - EUNGELLA DAM - Study: 20yr Dam Safety Review including anchor pullout test and intrusive inspection (by 30 June 2020)	✓	✓	✓	✓	\$349		\$349		
000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec,See notes.)	✓	✓	✓	✓	\$91		\$91		
000008908 - UPPER CONDAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy (\$41,595 / yr) (P2)	✓	✓	✓	✓	\$69		\$69		
000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	✓	✓	✓	✓	\$60		\$60		
000058091 - SYSTEM - Study: 20yr Dam Safety Review (by 1 Dec 2019)	✓	✓	✓	✓	\$220		\$220		
000064409 - KROOMBIT DAM - 20 Dam Safety Review (to be done by 1st June 2020)	✓	✓	✓	✓	\$254		\$254		
000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	✓	✓	✓	✓	\$82		\$82		
000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	✓	✓	✓	✓	\$74		\$74		
000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	✓	✓	✓	✓	\$77		\$77		
000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 (\$24,052/yr) (P2)	✓	✓	✓	✓	\$41		\$41		
000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBHStrategy	✓	✓	✓	✓	\$13		\$13		
000067246 - BEN ANDERSON BARRAGE - Reinststate 10 refurbished and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	✓	✓	✓	✓	\$306		\$306		
000069873 - GATTONVALE PUMP STATION - Refurbish Pump 1 - Gattonvale PSTN	✗	✓	✓	✗	\$33	\$33		100%	Systemic (High Cost Estimate)
000070052 - EUNGELLA DAM - 19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)	✓	✓	✓	✓	\$19		\$19		
000074061 - CLARE WEIR - Refurbish Hydraulic System and cylinders - Stage 3	✓	✓	✓	✓	\$247		\$247		
000075186 - EUNGELLA DAM - 17BBR04 Eungella Dam - Permanently Isolate River Conduit Intake Tower Base - Refer Opt Sty #2039445 & Cst Est #2301154	✓	✓	✓	✗	\$1,315	\$870	\$445	66%	Systemic (Budget Overrun)
000075187 - GATTONVALE OFF STREAM STORAGE - 17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Conditon Based (Rfr DS Insp Rpt #2288631)	✓	✓	✓	✓	\$574		\$574		
000075973 - BURDEKIN FALLS DAM - 18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)	✓	✓	✓	✓	\$111		\$111		
000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	✓	✓	✓	✓	\$99		\$99		
000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	✓	✓	✓	✓	\$145		\$145		
000076177 - BEN ANDERSON BARRAGE - Reinststate 10 refurbished and build& install 10 new shutters at Ben Anderson Barrage (#2242651)	✓	✓	✓	✓	\$243		\$243		
000076200 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 1	✓	✓	✓	✓	\$940		\$940		
000076265 - BURDEKIN FALLS DAM - 18BDK08 - Study: 20yr Dam Safety Review -Burdekin Falls Dam (2018-2020 Project)	✓	✓	✓	✗	\$146	\$25	\$120	17%	Systemic (High Cost Estimate)
76381 - SYSTEM - 16BAL12 Beardmore Dam - Thurragi Channel Repair	✓	✗	✓	✓	\$6,275	\$241	\$6,034	4%	Project Specific
000076554 - CHINCHILLA WEIR - Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir	✗	✗	✗	✗	\$43	\$43		100%	Project Specific
000076580 - FAIRBAIRN DAM - Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)	✗	✗	✗	✗	\$287	\$287		100%	Project Specific
000076609 - MARY BARRAGE - 16MVA01 Reinstating D/S Rock protection - Mary Barrage	✓	✓	✓	✓	\$587		\$587		
000056393 - OWANYILLA PUMP STATION - 20LOW13 Owanyilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy (#956033)	✓	✓	✓	✓	\$128		\$128		
000055946 - VICTORIA PLAINS PUMP STATION - 19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - Options Study Review Report' Doc Ref #2242568 Option #4	✗	✓	✓	✓	\$220		\$220		
000008682 - WEST BARRON DISTRIBUTION - 22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)	✗	✓	✓	✓	\$47		\$47		
000006363 - OAKENDEN MAIN CHANNEL DISTRIB - 19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)	✓	✓	✓	✓	\$41		\$41		
All Projects Reviewed					\$13,935	\$1,499	\$12,436	10.8%	
Project Specific/ One-Off Adjustments					\$6,605	\$571	\$6,034	4.1%	
Project Adjustments with Systemic Issues (Not Captured under Annuities Assessment)						\$928		6.7%	
Project Adjustments Captured by Separate Annuities Adjustment (Percentage not to be considered here)									

Figure 20 Summary of Project Reviews in the Transitional Years

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The purpose of the project sample review is to identify systemic issues that may have impacted the prudent and efficient delivery of projects. For the transitional and forward renewal projects, as there was no project-specific information provided such as scope of works, bill of materials, or cost estimates, the prudence and efficiency assessment was predominantly conducted based on adherence to the policies, guidelines, and processes used by Sunwater. For this reason, the total adjustments are not specific to project type or asset type. An attempt to group adjustments by project or asset type is not recommended. Instead, an overall adjustment to account for systemic issues should be derived from the full project sample. While we have identified some common themes between the project reviews and the review of Sunwater's policies and procedures (such as poor project management), the suggested adjustments are combination of one or more of the deficiencies in Sunwater's policies and procedures outlined in Section 4.0. The calculation of the percentage reduction for the systemic issues is based on the value of total adjustments recommended divided by the total value of all projects in the stated period. Any project-specific adjustments have been identified and excluded from the systemic issues adjustment but are reported separately.

The total recommended deduction for systemic issues identified in the transitional years (FY19-FY20) that are not captured by the annuities assessment is 6.7%. Additionally, the total project-specific adjustment is \$571,000 and reflects adjustments to three projects.

Project	Prudency Assessment	Efficiency Assessment			Total, FY21-24 \$FY2019 '000s				Deduction Type
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct	
000001332 - BURDEKIN FALLS DAM - Study: 5yr Dam Comprehensive Inspection (by 1 June, includes \$5k for elec. insp.), see notes.	✓	✓	✓	✓	\$110		\$110		
000006888 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020)	✓	✓	✓	✓	\$76		\$76		
000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec, See notes.)	✓	✓	✓	✓	\$158		\$158		
000008908 - UPPER CONDAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy (\$41,595 / yr) (P2)	✓	✓	✓	✓	\$153		\$153		
000009475 - COOLMUNDA DAM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020) -Large cost associated with draining dissipator	✓	✓	✓	✓	\$130		\$130		
000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	✓	✓	✓	✓	\$118		\$118		
000048336 - PETER FAUST DAM - Study: 20yr Dam Safety Rview (by 1 Dec 2023) incl. tasks mentioned in notes	✓	✓	✓	✓	\$350		\$350		
000048820 - EDEN BANN WEIR - 15LFZ01 Study: WEIR PROGRAM - 5yr Dam Comprehensive Inspection	✓	✓	✓	✓	\$42		\$42		
0000057410 - ALLAN TANNOCK WEIR - Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervios fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)	✓	✓	✓	✗	\$51	\$1	\$50	2%	Project Specific
0000064557 - KINCHANT DAM - Carry out 5 yearly dam safety inspection - Kinchant dam	✓	✓	✓	✓	\$133		\$133		
0000064960 - LESLIE DAM - Replace Crane Control Equipment	✓	✓	✓	✓	\$154		\$154		
0000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	✓	✓	✓	✓	\$161		\$161		
0000065103 - DAWSON RIVER DISTRIBUTION - Meter Replacement - Dawsons Valley (7 per year) (P2)	✓	✓	✓	✗	\$327	\$119	\$208	36%	Project Specific
0000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	✓	✓	✓	✓	\$244		\$244		
0000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	✓	✓	✓	✓	\$125		\$125		
0000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 (\$24,052/yr) (P2)	✓	✓	✓	✓	\$90		\$90		
0000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBHstrategy	✓	✓	✓	✓	\$45		\$45		
0000072774 - TEEMBURRA DAM - Stabilise bed and banks of the spillway discharge channel subject to dam safety review	✗	✗	✗	✗	\$350	\$350		100%	Captured by Annuities
0000073006 - KINCHANT DAM - Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake	✗	✓	✓	✓	\$285	\$285	\$0	100%	Project Specific
0000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	✓	✓	✓	✓	\$201		\$201		
0000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	✓	✓	✓	✓	\$222		\$222		
0000076201 - SILVERLEAF WEIR - Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 2	✓	✓	✓	✓	\$1,862		\$1,862		
0000076370 - FAIRBAIRN DAM - Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.	✓	✓	✓	✓	\$487		\$487		
0000076581 - BJELKE-PETERSEN DAM - Study: Bathymetric survey of BjelkePetersen Dam (ELT directive - see notes)	✗	✗	✗	✗	\$47	\$47		100%	Project Specific
0000075990 - OWANYILLA PUMP STATION - 24LOW03 Owanyilla PSTN - Replace - ELEC-SWB2 - SWITCHBOARD 2 - Repl & Ref Life Sty (#956033) & Irrig Com Strat (Item 1.1)	✗	✓	✓	✓	\$441	\$441		100%	Driven by Annuities Review
0000075493 - OAKENDEN MAIN CHANNEL DISTRIB - 21ETO10 Oakenden MC - Replace - ETO-OMC-FMTR - Replace Meter - Material Project (QCA) Control Equip Option Analysis AM11_G04	✓	✓	✓	✗	\$159	\$117	\$42	73%	Systemic (High Cost Estimate)
All Projects Reviewed					\$6,522	\$1,349	\$5,172	20.7%	
Project Specific/ One-Off Adjustments					\$710	\$452	\$258	6.9%	
Project Adjustments with Systemic Issues (Not Captured under Annuities Assessment)						\$107		1.6%	
Project Adjustments Captured by Separate Annuities Adjustment (Percentage not to be considered here)						\$791			

Figure 21 Summary of Forward Project Reviews in the Price Path Period

The total recommended deduction for systemic issues identified in the price path period (FY21-FY24) that are not captured by annuities assessment is 1.6%. This particular systemic adjustment is based on one project in this particular period, however this deduction has been recommended as a systemic adjustment due to similar systemic cost estimation issues, which have been observed in four other projects in the transitional period and beyond price path period. Additionally, the total project-specific adjustment is \$452,000 and reflects adjustments to four projects.

Project	Prudency Assessment	Efficiency Assessment			Total, FY25-53 \$FY2019 '000s				Deduction Type
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct	
000001060 - BURDEKIN FALLS DAM - Study: 20yr Dam Safety Review - Burdekin Falls Dam	✓	✓	✓	✓	\$141		\$141		
000001332 - BURDEKIN FALLS DAM - Study: 5yr Dam Comprehensive Inspection (by 1 June, includes \$5k for elec. insp.), see notes.	✓	✓	✓	✓	\$720		\$720		
000002872 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).	✓	✓	✓	✓	\$736		\$736		
000004935 - BOONDOOMA DAM - Study: 20yr Dam Safety Review - Boondooma Dam (See Notes)	✓	✓	✓	✓	\$355		\$355		
000004992 - WURUMA DAM - Study: 20yr Dam Safety Review - Wuruma Dam	✓	✓	✓	✓	\$345		\$345		
000006501 - EUNGELLA DAM - Study: 20yr Dam Safety Review including anchor pullout test and intrusive inspection (by 30 June 2020)	✓	✓	✓	✓	\$385		\$385		
000006888 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020)	✓	✓	✓	✓	\$572		\$572		
000008492 - TINAROO DAM - Study: 5yr Dam Comprehensive Inspection (by Dec, See notes.)	✓	✓	✓	✓	\$875		\$875		
000008908 - UPPER CONDRAMINE DISTRIBUTION - Replacement meter program as per 2015 UCO strategy (\$41,595 / yr) (P2)	✓	✓	✓	✓	\$1,146		\$1,146		
000009475 - COOLMUNDA DAM - Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2020) - Large cost associated with draining dissipator	✓	✓	✓	✓	\$802		\$802		
000009478 - SYSTEM - Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)	✓	✓	✓	✓	\$651		\$651		
000004836 - PETER FAUST DAM - Study: 20yr Dam Safety Review (by 1 Dec 2023) incl. tasks mentioned in notes	✓	✓	✓	✓	\$387		\$387		
000004820 - EDEN BANN WEIR - 15LFZ01 Study: WEIR PROGRAM - 5yr Dam Comprehensive Inspection	✓	✓	✓	✓	\$260		\$260		
000007561 - TINAROO DAM - Testing of post tensioning permanent strand anchors	✓	✓	✓	✓	\$673		\$673		
000006891 - SYSTEM - Study: 20yr Dam Safety Review (by 1 Dec 2019)	✓	✓	✓	✓	\$266		\$266		
000006457 - KINCHANT DAM - Carry out 5 yearly dam safety inspection - Kinchant dam	✓	✓	✓	✓	\$848		\$848		
0000064960 - LESLIE DAM - Replace Crane Control Equipment	✓	✓	✓	✓	\$167		\$167		
0000065102 - THREE MOON CK GROUNDWATER DIST - Meter Replacement Three Moon Creek (8 per year) (P2)	✓	✓	✓	✓	\$1,179		\$1,179		
0000065103 - DAWSON RIVER DISTRIBUTION - Meter Replacement - Dawsons Valley (7 per year) (P2)	✓	✓	✓	✗	\$2,450	\$942	\$1,508	38%	Project Specific
0000065104 - CALLIDE GROUNDWATER DISTRIB - Meter Replacement (12 per year) - Callide Valley (P2)	✓	✓	✓	✓	\$1,828		\$1,828		
0000065145 - PROSERPINE RIVER DISTRIBUTION - Replace Meter Program (8 per year) - Proserpine River (P2)	✓	✓	✓	✓	\$942		\$942		
0000065147 - MACINTYRE BROOK DISTRIBUTION - Replacement Meter strategy for IBT as developed in 2015 (\$24,052/yr) (P2)	✓	✓	✓	✓	\$655		\$655		
0000065148 - CHINCHILLA RIVER DISTRIBUTION - Replacement of Chinchilla Meter Outlets - 2015 IBH Strategy	✓	✓	✓	✓	\$330		\$330		
0000069873 - GATTONVALE PUMP STATION - Refurbish Pump 1 - Gattovale PSTN	✗	✓	✓	✗	\$452	\$412	\$40	91%	Systemic (High Cost Estimate)
000007274 - TEEMBURRA DAM - Stabilise bed and banks of the spillway discharge channel subject to dam safety review	✗	✗	✗	✗	\$272	\$272		100%	Captured by Annuities
0000074061 - CLARE WEIR - Refurbish Hydraulic System and cylinders - Stage 3	✓	✓	✓	✓	\$426		\$426		
0000076150 - BURNETT RIVER DISTRIBUTION - Replace Meter Program (10 per year) - Burnett River (P2)	✓	✓	✓	✓	\$1,469		\$1,469		
0000076154 - UPPER BURNETT DISTRIBUTION - Replace Meter Program (11 per year) - Upper Burnett (P2)	✓	✓	✓	✓	\$1,620		\$1,620		
0000076265 - BURDEKIN FALLS DAM - 18BDK08 - Study: 20yr Dam Safety Review - Burdekin Falls Dam (2018-2020 Project)	✓	✓	✓	✗	\$158		\$158		
0000042159 - WEST BARRON DISTRIBUTION - Replace Pipe Cherry Ck Siphon	✗	✗	✓	✓	\$6,722	\$6,722		100%	Captured by Annuities Review
0000076329 - SYSTEM - 24BIA20 Isis System - Refurbish - BIA-ISIS - ISIS - Irrigation Common Strategy Concrete Ch (30yr Pln) (Item 2.0)	✓	✓	✓	✓	\$2,188		\$2,188		
0000042409 - WEST BARRON DISTRIBUTION - Replace Syn/Lin Chnl 38142.67-40917.1M	✓	✓	✓	✓	\$1,402		\$1,402		
0000015276 - TOM FENWICK PUMP STATION 4/5 - Replace Reduction Gearbox	✗	✓	✓	✓	\$1,068	\$529	\$539	50%	Driven by Annuities Review
0000015210 - TOM FENWICK PUMP STATION 2/3 - Replace Pump No.2	✗	✓	✓	✓	\$1,903	\$1,903		100%	Driven by Annuities Review
0000030670 - ISIS DISTRIBUTION - Replace Pipe From 1535.00 To 5250.74M	✗	✓	✓	✓	\$1,399	\$1,399		100%	Captured by Annuities Review
0000030689 - DON BEATTIE PUMP STATION - Replace Common Control System STG I	✗	✓	✓	✓	\$784		\$784		
0000025738 - MONDURAN PUMP STATION - Replace Pump	✗	✓	✓	✓	\$886		\$886		
0000015726 - CLARE IRRIGATION DISTRIBUTION - Replace Pipeline 1352.0 - 4307.0	✗	✓	✓	✓	\$1,429	\$1,429		100%	Driven by Annuities Review
0000015177 - TOM FENWICK PUMP STATION 1 - Replace H V Switchboards	✗	✓	✓	✓	\$538		\$538		
0000014241 - MILLAROO IRRIGATION DISTRIB - Replace Concrete Lining	✓	✗	✓	✗	\$1,321	\$768	\$552	58%	Systemic (High Cost Estimate)
0000056393 - OWANYILLA PUMP STATION - 20LOW13 Owanyilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy (#956033)	✓	✓	✓	✓	\$135		\$135		
0000055946 - VICTORIA PLAINS PUMP STATION - 19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - [REDACTED] Options Study Review Report' Doc Ref #2242568 Option #4	✗	✓	✓	✓	\$335		\$335		
0000045622 - ARRIGA DRAINAGE - Replace Earth Drain 1845.00-3765.00M	✗	✓	✓	✗	\$340	\$340		100%	Captured by Annuities Review
0000008682 - WEST BARRON DISTRIBUTION - 22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCR N - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)	✗	✓	✓	✓	\$241	\$98	\$143	41%	Systemic (Timing)
0000042132 - WEST BARRON DISTRIBUTION - Replace Scour Valve 1275.59M	✗	✓	✓	✓	\$119		\$119		
000006363 - OAKENDEN MAIN CHANNEL DISTRIB - 19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)	✓	✓	✓	✓	\$109		\$109		
All Projects Reviewed					\$42,029	\$14,371	\$27,657	34.2%	
Project Specific/ One-Off Adjustments					\$2,450	\$942	\$1,508	2.2%	
Project Adjustments with Systemic Issues (Not Captured under Annuities Assessment)						\$1,277		3.0%	
Project Adjustments Captured by Separate Annuities Adjustment (Percentage not to be considered here)						\$12,152			

Figure 22 Summary of Forward Project Reviews Beyond the Price Path Period

The total recommended deduction for systemic issues identified in the beyond price path period (FY25-FY53) that are not captured by annuities assessment is 3.0%. Additionally, the total project-specific adjustment is \$942,000 and reflects an adjustment to one project.

6.4 Transitional Year Renewals Projects with Costs in Historical Period

Sunwater revised its previously submitted costs⁶⁸ for 16BAL12 – Beardmore Dam – Thurraggi Channel Repair in FY19 from \$1.34 million for FY19 to \$3.58 million in FY19 and an additional \$2.70 million to be incurred in FY20. This project was included in the assessed sample for transitional period (FY19-FY20) projects. As the analysis for the transitional year period did not account for costs prior to FY19, a separate assessment was required for the costs in these years to allow for review of the full project scope and the associated prudence and efficiency.

The Thurraggi Channel Repairs (16BAL12) had \$874,315 in costs prior to FY19 of which have not been considered efficient. Documentation reviewed in response to RFI FR52 suggests an agreement by Sunwater to claim only half of these historical costs due to identified inefficiencies but this was not reflected in the submission. We therefore recommend, a once-off project adjustment for these costs for historical years.

Project	Prudence Assessment	Efficiency Assessment			Claim (\$ millions)			% Deductio
		Scope	Standard	Cost	Claim	Adjust.	Accepted	
16BAL12 Beardmore Dam - Thurraggi Channel Repair	✓	✓	✓	✗	\$0.87	\$0.44	\$0.44	50.0%
Projects Total						\$0.4	\$0.44	50.0%

Figure 23 Summary of Project Reviews in the Transitional Years with Historical Costs

6.5 Stakeholder Submissions

Stakeholder submissions⁶⁹ in response to QCA's draft report noted comments on the transitional and forward years' proposed expenditure at the Moura Off Stream Storage (MOSS) and the Glebe Weir.

The MOSS was constructed to provide increased storage capacity for the Moura Weir. The stakeholder submissions stated that the MOSS is for direct benefit of a single customer and the costs should not be allocated to other irrigation customers. The Options Analysis report provided for the 15DAW01 project describes project drivers and what the MOSS is used for. The document describes its purpose as supplying 2,820 ML to Moura Weir's holding capacity, which supplies the towns of Banana, Moura, and mining and irrigation customers (a total of 153 customers). The document did not specify the MOSS is used for a single customer only. Based on the documentation reviewed, it appears that Sunwater views the Moura Weir and the MOSS as a combined storage system for the benefit of all customers. The view of the stakeholders may also be appropriate but the decision is related to cost allocation and is outside of AECOM's assessment scope. We have therefore maintained our original position on project prudence, which is based on the information provided for review.

The stakeholder submissions also comment on the prudence and efficiency of specific projects proposed at the MOSS. While not part of AECOM's review sample, we have reviewed available information with respect to the projects. A comprehensive risk assessment, 5-year dam safety inspection, and a 20-year dam safety review are proposed in consecutive years from 2022 to 2024. The stakeholders challenged the need for studies in consecutive years as well as the specific need for a 5-year inspection. AECOM does not have any information to review the prudence of each of the proposed studies; however, it notes that the MOSS is a Category 1 referable dam under the Water Act (2000) and therefore the studies are likely to statutory requirements.

The other project at the MOSS challenged by the stakeholders is for the refurbishment and replacement of a submersible pump, project "0000018910) Replace 1 Cumec Flygt Submersible Pump" in the Moura Off-stream Storage (MOSS). Two issues were raised. First, it was questioned why the refurbishment occurs only two year before it is replaced completely. AECOM has identified the

⁶⁸ QCA Information Request FR52_Historical renewals-16BAL12 and Attachment 1_Thurraggi Channel Project Budget Approval

⁶⁹ Relevant submissions: Theodore Water submission dated 5 November 2019, Dawson Valley Cotton Growers Association submission dated 4 November 2019 and Hutchinson AG submission dated 4 November 2019

timing of refurbishments as a systemic issue across all projects. The timing of refurbishments is not coordinated with the timing of replacements. The other issue is the proposed cost of \$937,100 for the pump replacement. The stakeholder stated the cost should be less than \$100,000. AECOM notes that the proposed costs are \$739,393 in \$FY19 and also include Sunwater's non-direct cost allocation. To check the efficiency of the proposed costs, we requested a cost breakdown from Sunwater and also obtained a supplier quote using the pump details in the asset register. Based on AECOM's review, it appears the supply cost of the pump and associated equipment is under-estimated by Sunwater; however, the cost of installation has been over-estimated, and the allocation of non-direct costs appears to be significantly over-estimated. Overall, we believe the proposed costs may be over-estimated by approximately \$340,000 (in \$FY19).

The stakeholder submissions highlighted 27 various projects at the Glebe Weir for which they stated the costs appeared to be over-estimated. While not part of AECOM's review sample, we have reviewed available information with respect to two of the Glebe Weir projects. The five-year dam inspection, while not a regulatory requirement, is conducted as part of a program as per the *Sunwater's Risk Assessment of Sunwater Weirs*, which arose as a result of the 2012 Moolabah Weir incident. In the risk assessment report, Glebe Weir was identified to have a major criticality rating as a result of a high public safety risk and structural risk (overturning/sliding). The report, however, does not state a required frequency of inspection for the Glebe Weir; therefore, the prudence of the frequency of inspections could be challenged. The cost of the five-yearly inspection is approximately \$40,000 (\$FY19), which is similar to the Claire Weir five-yearly inspections that were estimated at \$43,000 (\$FY19). Considering the public safety and structural risks of the weir and the budgeted cost for the inspection being in line with similar weir inspections, the project is likely to be prudent and efficient.

The Glebe Weir electrical cable refurbishment/replacement has been incorrectly labelled as cables. As per the functional locations in CAPEX model, there are six switchboards and one electrical cable line items in the model. Refurbishments for both the cabling and the switchboard has been estimated at \$18,000 for refurbishment and \$52,000 for replacement (both in \$FY19). The asset register does not have valuations for these assets, so it is not clear how they were estimated. Cable replacements at other weirs range from \$5,000 to \$140,000. Switchboard replacements range from \$4,000 to \$217,000 at other weirs. The cost is dependent on the length and size of cables and the switchboards, of which there is no information currently available for the site in question. While we cannot provide a definitive assessment of efficiency, the proposed costs appear to be within range of replacements at other weirs and we do not recommend any adjustments.

The summary of proposed adjustments to the projects identified from stakeholder submissions are shown in Figure 24.

Project	Prudence Assessment	Efficiency Assessment			Claim (\$ millions)			% Deductions
		Scope	Standard	Cost	Claim	Adjust.	Accepted	
0000018910 - MOSS Replace 1 Cumec Flygt Submersible Pump	✓	✓	✓	✗	\$0.74	\$0.34	\$0.40	45.9%
Projects Total						\$0.3	\$0.4	45.9%

Figure 24 Summary of Project Reviews Resulting from Stakeholder Submissions

7.0 Annuities Assessment

This section presents a review of Sunwater's proposed renewal program for the price path period and beyond price path period which is used as the basis for calculating the annuity.

7.1 Sunwater's Approach to Planning Asset Renewal

Application of Sunwater's documented policies for planning and estimating asset renewal was reviewed in Section 4.2, and involves, in summary:

- Adopting a standard expected asset service life for each asset class
- Using this and the known age of each asset to plan for replacement at the expected end of service life, or at a standard fraction of that life if the asset is deemed to be a high-risk asset
- Planning for refurbishment at intervals during the asset life, based on an approach intended to optimise lifecycle costs as documented in asset management plans
- Estimating the cost of replacement or refurbishment based on a review of similar work carried out recently

Sunwater's policy is to review scheduled refurbishment or replacement projects when the current year approaches five years before the scheduled timing, to make a full evaluation of the assets involved to confirm that current condition and other factors meet Sunwater's criteria for capital projects, and to prepare business cases for approval where appropriate.

Sunwater's approach and the findings of our review of Sunwater's policies and procedures as they relate to asset renewal suggest several tests of the renewal program in order to determine whether the renewal program is prudent and efficient:

1. Since we have concluded that the decay curve used by Sunwater is not a standard one, what would be the potential impact of using industry standard approaches (based on Weibull curves)?
2. An industry standard approach would involve asset replacement timing based on a stated risk tolerance for critical assets. What level of risk tolerance would enable Sunwater's assets (those included in the submission) to be maintained in a satisfactory state of good repair?
3. Is the renewal project data provided in its submission accurate and reliable?
4. Has Sunwater consistently applied its documented planning strategies to project renewal timing?
5. Is the cost estimation process used by Sunwater acceptable?

We address these points in this section. It should be noted that all values have been converted from nominal values to current (FY19) dollars for this analysis.

7.2 Sunwater's Submission of Renewal Projects for the Annuity

Sunwater's revised submission presented to the QCA in June 2019 included more than 11,000 individual projects for the schemes under review for the period from FY21 to FY53.

Figure 25 is a summary of the investment required by the submission (in FY19 dollars), separated for convenience into projects related to dams and weirs, and the remainder. The value of the projects scheduled for delivery in these schemes during the FY25-FY53 beyond price path period, is \$932 million in \$FY19.

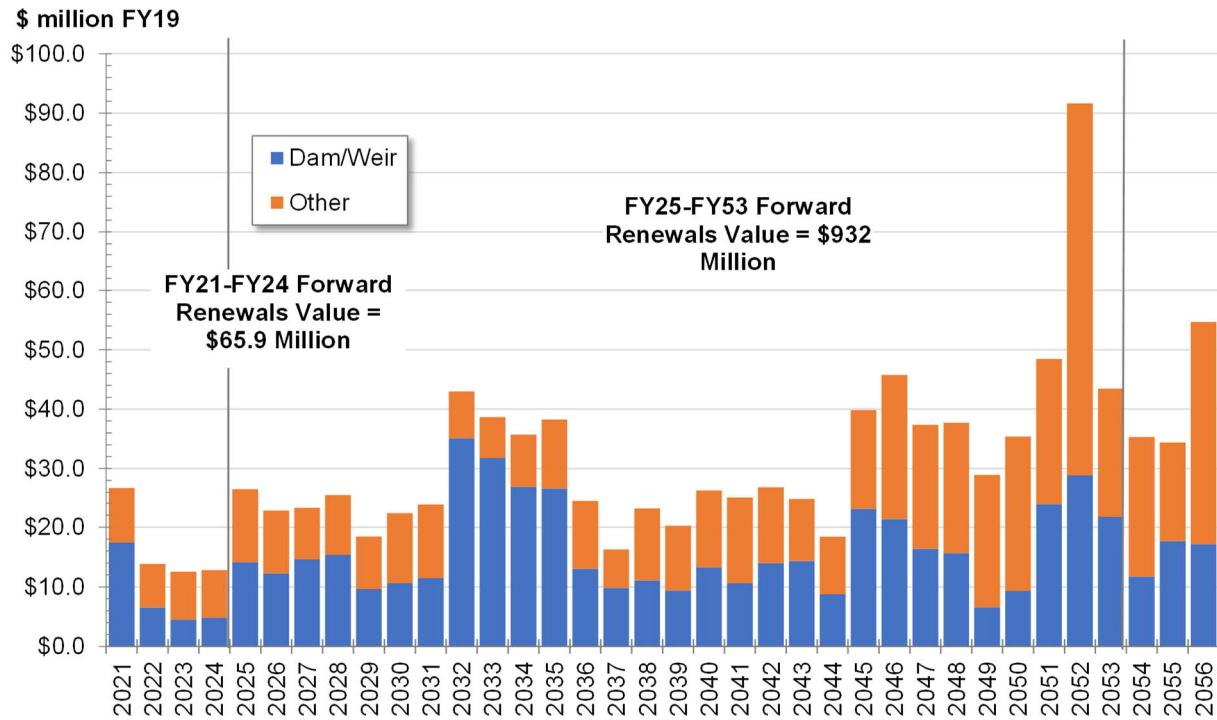


Figure 25 Total Value of Forward Renewals (\$ million, FY19)

The revised submission includes projects with 5% lower total value overall (FY21-FY53) than the original submission, as indicated in Figure 26, where the original submission is shown in orange).

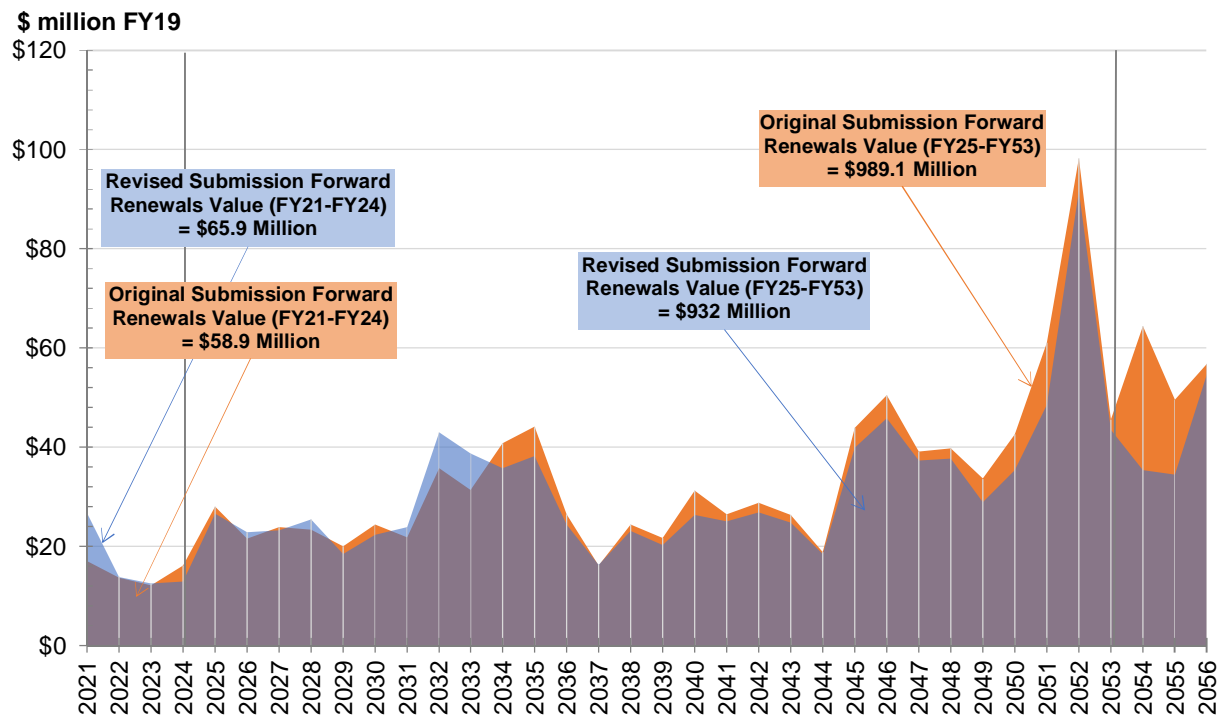


Figure 26 Revised vs original Submission of Forward Renewals (\$ million, FY19)

The revision to the original submission (over the FY21-FY53 period) included:

- New projects totalling \$157 million
- Projects removed, to a total cost of \$157 million
- Adjusted renewal timing for 11% of projects (some projects delayed, and some brought forward)
- A revision of cost estimates for almost all projects, with projects included in both submissions on average decreasing by 6%

There appear to have been significant omissions in the original submission. For instance, \$12.7 million of flood damage remediation works to the spillway discharge channel at Fred Haigh dam (17BUN11) have been added in the revised submission. The work is required as a result of rainfall and flood events due to cyclonic conditions in 2010/2011, 2013 and 2017 which caused significant scour in the unlined channel downstream of the concrete spillway structure. We note that the asset condition assessment for this asset recorded in June 2015 cites major scouring of the channel floor, and as such the required works should have been known well in advance of the development of the original submission. Significant changes between the two submissions presented to the QCA such as this example suggest that there may be shortcomings in Sunwater's procedures and processes for the forecasting of future works.

7.3 Assessment Approach

The adopted approach to reviewing Sunwater's proposed renewals program⁷⁰ is summarised in Table 33. Due to limitations of the high-level assessment approach outlined in Section 7.3.1, the annuity review is primarily a prudency assessment of renewal activities with regards to project timing.

Table 33 Renewals Assessment Approach for the Annuity

Stage	Steps
1.0 Collection of asset information	<ul style="list-style-type: none"> • Projects were matched to assets in Sunwater's asset register by functional location. • Asset object type, replacement cost, risk rating and condition assessment scores were obtained from the asset register as available.
2.0 Identification of Sunwater's investment planning strategies	<ul style="list-style-type: none"> • Sunwater's investment trigger points were obtained from Sunwater's <i>Whole of Life Maintenance Planning Strategy and Object Codes</i>⁷¹ by using: <ul style="list-style-type: none"> - the asset object type, we obtained the expected useful life of the assets - the assessed asset risk, we obtained the investment trigger point.

⁷⁰ Reference: QCA Information Request 1_Attachment 1_Non-routine projects_30-year planning period v3.xlsx, June 2019

⁷¹ Document Reference: QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.XLS

Stage	Steps																		
<p>3.0 Determination of current asset condition</p>	<ul style="list-style-type: none"> We used available asset condition assessment data, asset capitalisation dates, expected useful life (as per Sunwater's <i>Whole of Life Maintenance Planning Strategy and Object Codes</i>) and Sunwater's asset decay curve to model expected asset condition using Sunwater's lifecycle planning rules⁷². To form a view on asset's current condition, the following approach was used: <ol style="list-style-type: none"> Use condition scores as is, if asset condition assessments were completed in FY19. Where asset condition assessment scores were recorded prior to FY19 (reported as, Prior to FY14 and between FY14-FY18), we converted the condition scores to percentage life expiry in the year of condition assessment in according with Sunwater's asset decay curve⁷³ and adjusted using the same approach to determine the expected condition in FY19 In instances where no condition assessment score was ever recorded, we used asset capitalisation date and expected useful life data to calculate current life expired and expected condition in FY19 using Sunwater's asset decay curve⁷⁴. In instances where current asset condition could not be derived due to non-availability of aforementioned data, we used Sunwater's renewals plan included in its submission, without adjustments. <p>Figure 27 provides a summary of the source of condition information by project value.</p> <div style="text-align: center;"> <p>% of Expenditure Source of Current Condition Information by Project Value (\$ million, FY19)</p> <table border="1"> <caption>Data for Figure 27: Source of Current Condition Information by Project Value</caption> <thead> <tr> <th>Project Value (\$ million, FY19)</th> <th>Condition assessment completed in FY19</th> <th>Condition assessment completed within FY14-FY18</th> <th>Condition assessment completed prior to FY14</th> <th>Condition estimated without condition assessment score</th> <th>Inadequate data to estimate condition - Sunwater submission used</th> </tr> </thead> <tbody> <tr> <td>FY21-FY24</td> <td>\$4.0</td> <td>\$28.9</td> <td>\$14.9</td> <td>\$5.3</td> <td>\$12.9</td> </tr> <tr> <td>FY25-FY53</td> <td>\$108.3</td> <td>\$325.2</td> <td>\$236.0</td> <td>\$120.1</td> <td>\$142.5</td> </tr> </tbody> </table> </div> <p>Figure 27 Source of Current Condition Information by Project Value – Projects in Renewal submission (\$ million, FY19)</p>	Project Value (\$ million, FY19)	Condition assessment completed in FY19	Condition assessment completed within FY14-FY18	Condition assessment completed prior to FY14	Condition estimated without condition assessment score	Inadequate data to estimate condition - Sunwater submission used	FY21-FY24	\$4.0	\$28.9	\$14.9	\$5.3	\$12.9	FY25-FY53	\$108.3	\$325.2	\$236.0	\$120.1	\$142.5
Project Value (\$ million, FY19)	Condition assessment completed in FY19	Condition assessment completed within FY14-FY18	Condition assessment completed prior to FY14	Condition estimated without condition assessment score	Inadequate data to estimate condition - Sunwater submission used														
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FY25-FY53	\$108.3	\$325.2	\$236.0	\$120.1	\$142.5														

⁷² *Ibid*
⁷³ *Ibid*
⁷⁴ *Ibid*

4.0 Potential adjustments if Sunwater were to use Industry Best Practice delay curve methodology	<p>4.1 Testing hypothesis that Sunwater is planning for inefficiently renewing assets Sunwater uses a propriety asset decay curve for all assets and use of this decay curve does not align with the industry best practice methodology of using Weibull curves by asset class. AECOM sought to determine potential impact of using a non-industry best practice methodology for assessing remaining life and asset condition in future years:</p> <ul style="list-style-type: none"> • By projecting the asset condition forward from the FY19 base (outcome of Task 3.0) using one Weibull curve rather than using Sunwater’s proprietary curve⁷⁵. • Then by applying Sunwater’s investment triggers we determined the resultant projected condition post investment in order to determine whether the level at which assets are being maintained is consistent with industry best practice. • If assets are being efficiently renewed, then their weighted average condition would lie in the ‘adequate’ range which AECOM considers as industry best practice. • We found that Sunwater assets’ weighted average condition was higher than the target ‘adequate’ condition range supporting the hypotheses that Sunwater’s assets are being planned to be over-maintained and therefore inefficiently renewed.
	<p>4.2 Adjusting for Sunwater’s use of non-industry best practice decay curve</p> <ul style="list-style-type: none"> • AECOM adjusted the investment triggers for renewals in the AECOM tool so as to achieve the target ‘adequate’ condition range. We evaluated the impact of deferring investment triggers to be roughly equivalent to imposing a 10% increase in expected useful life using Sunwater’s approach. • On this basis, we applied a 10% life extension to Sunwater’s expected useful life to delay renewal works and measured the impact by doing so. Noting that a greater degree of planning is expected to occur in the price path period (as opposed to the beyond price path period), delays to renewals within the price path period have only been allowed to occur where renewal activities are not supported by projected asset condition using Sunwater’s investment planning strategies (as discussed at 5.0). The reduction in the total annuity amount is the potential adjustment.
5.0 Additional analysis into renewal activities which are not supported by projected asset condition	<p>AECOM separately sought to determine the potential impact of adjusting the timing of renewals based on the projected asset condition using Sunwater’s strategies, in order to:</p> <ul style="list-style-type: none"> • Avoid delaying required works within the price path period, where a higher degree of planning takes place. • Determine whether the renewal project data provided in Sunwater’s submission is accurate and reliable, and whether Sunwater has consistently applied its documented planning strategies to project renewal timing.
	<p>5.1 Projecting of asset condition to the relevant year of future renewal Asset condition was projected forward from the FY19 base by using Sunwater’s standard asset decay curve and expected useful life data⁷⁶.</p>
	<p>5.2 Assessing prudence of renewals timing in Sunwater’s submission</p> <ul style="list-style-type: none"> • We applied Sunwater’s lifecycle planning rules⁷⁷ to the projected asset condition obtained in 4.1 and found that the resulting renewals program did not match the renewals timing in Sunwater’s submission.
	<p>5.3 Indicative adjustment of renewals timing based on projected asset condition</p> <ul style="list-style-type: none"> • Where renewal works in Sunwater’s submission were identified as being undertaken earlier when compared to outcome from 5.2 (i.e. as per AECOM’s assessment), those renewals were delayed to the year when the projected condition will align with Sunwater’s investment triggers⁷⁸ and the impact of doing so was modelled. • There are instances where renewals in Sunwater’s submission were identified as being undertaken later when compared to outcome from 5.2 (i.e. as per AECOM’s assessment), those renewals were modelled to have been brought forward in order to provide a balanced view.

⁷⁵ AECOM owns a propriety asset investment planning tool which uses one Weibull curve equivalent to a normal failure distribution order. AECOM uses this tool for a number of strategic asset management and investment studies.

⁷⁶ Document Reference: QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.XLS

⁷⁷ *Ibid*

⁷⁸ *Ibid*

7.3.1 Issues Observed in Assessment of Renewals Timing

Issues, assumptions and limitations of the adopted renewals assessment are outlined in Table 34.

Table 34 Assumptions and Limitations of Renewals Assessment

Issue	Commentary															
Classification of works	<ul style="list-style-type: none"> Works in Sunwater's submission were classified as either 'replacement' or 'maintenance'. However, some works listed as 'replacement' actually appear to be refurbishments or routine inspections, as based upon the project description and value of works to be delivered. Due to inconsistent project naming conventions and numerous spelling discrepancies (such as refurbishment works being titled as 'refrbish' and 'refrubish' or 'refrub') the projects in Sunwater's submission were manually classified in order to provide a more accurate annuity assessment As indicated in Table 35, the classifications assigned to projects in the revised submission include replacement projects, refurbishment projects and inspections <p>Table 35 Summary of Projects Included in Submission by Project Type (\$ million, FY19)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d9d9d9;"> <th style="text-align: left;">Type of Project</th> <th style="text-align: right;">FY21-FY24</th> <th style="text-align: right;">FY24-FY53</th> </tr> </thead> <tbody> <tr> <td>Replacement</td> <td style="text-align: right;">\$21.9</td> <td style="text-align: right;">\$482.0</td> </tr> <tr> <td>Refurbishment</td> <td style="text-align: right;">\$35.5</td> <td style="text-align: right;">\$404.4</td> </tr> <tr> <td>Inspection</td> <td style="text-align: right;">\$8.5</td> <td style="text-align: right;">\$45.6</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">\$65.9</td> <td style="text-align: right;">\$932.0</td> </tr> </tbody> </table> <ul style="list-style-type: none"> We have reviewed scheduled project timings for the projects classified as 'replacement' (approximately 50% of the total submission for the annuity) 	Type of Project	FY21-FY24	FY24-FY53	Replacement	\$21.9	\$482.0	Refurbishment	\$35.5	\$404.4	Inspection	\$8.5	\$45.6	Total	\$65.9	\$932.0
Type of Project	FY21-FY24	FY24-FY53														
Replacement	\$21.9	\$482.0														
Refurbishment	\$35.5	\$404.4														
Inspection	\$8.5	\$45.6														
Total	\$65.9	\$932.0														
Documentation of Sunwater's asset management planning strategies	<ul style="list-style-type: none"> Sunwater updated its lifecycle strategies for classes of assets and documented this in two documents; <i>Overall Strategy Common to all Irrigation Schemes by Object Type</i> and <i>Overall Strategy Common to all Bulk Water Schemes by Object Type</i>.^{79 80} Jacobs reports in the <i>LMA Stage 3 Engineering Due Diligence Report</i>⁸¹ that the prior document was adopted in 2016, however neither document is dated, and it is unclear at what point the former revision to bulk water scheme assets occurred. It appears that the investment triggers specified in the <i>Whole of Life Maintenance Planning Strategy and Object Codes</i> were not updated as they should have been As the revised documents do not provide detail on trigger points for renewals, or the frequency for refurbishments, we have applied the investment triggers specified in the <i>Whole of Life Maintenance Planning Strategy and Object Codes</i> Some examples of the observed inconsistencies between documentation are detailed in Section 7.3.3 Issues specifically relating to Sunwater's refurbishment planning strategies are addressed in Table 36 															
Specification of works	<ul style="list-style-type: none"> In many instances, works have been divided into different projects which make the overall project cost less transparent. Examples identified include: <ul style="list-style-type: none"> Procurement, design and delivery/construction being separated into different projects Construction part 1 and construction part 2 being separated into different projects Sunwater have budgeted for the replacement of some assets based on annual rolling replacement programs (such as customer meters, which are in practice 'run to failure'), instead of determining replacement timing based upon asset age/condition. 															

⁷⁹ Rfl A1, Attachment 7.

⁸⁰ Rfl A1, Attachment 8.

⁸¹ Reference: *LMA Stage 3 Engineering Due Diligence Report*

Issue	Commentary
Assigned object codes	<ul style="list-style-type: none"> It appears that some works are specified on high level assets/object types (such as 'SCHEME') for which useful life or investment triggers have not been specified Where possible, for high level assets we have assumed useful life to be of the high-level asset (such as 'HE - hydroelectric systems') to be the average its relevant lower level assets, and have calculated renewal triggers from this Additionally, we have some identified instances where the object code is missing or appears inaccurate
Risk	<ul style="list-style-type: none"> We have assumed asset risk to be low where no risk assessment data for the relevant asset is available
Impact of improvements to decay curves	<ul style="list-style-type: none"> Sunwater does not have decay curves for each asset class and does not use asset failure data to develop or refine the decay curve it is using, as would be expected by best practice. The scope of this review does not include development of alternative curves, so for the purposes of this review we have used a single Weibull curve. We expect this to be an improvement on Sunwater's approach, but it can only be used as an indication of the outcome if this approach were to be used, because it assumes that all asset failures will follow a similar distribution (which is unlikely to be the case in practice).
Instances where we are unable to establish asset condition	<ul style="list-style-type: none"> There are instances where we are unable to establish, or project, asset condition due to the being no available capitalisation data, condition assessment data, and / or useful life data In these cases, we have not made adjustments to Sunwater's proposed renewal timing
Constraints of undertaking an efficiency assessment	<ul style="list-style-type: none"> Due to the lack of detail made available with regards to the scope of works to be delivered and the basis for cost estimates, in this section we have not sought to make adjustments to Sunwater's submission reflecting assessment of efficiency. Instead, efficiency is addressed through systemic issues identified through detailed project reviews, as summarised in Section 6.0. The review presented in this section is primarily a prudence review relating to project timing.

7.3.2 Issues Associated with Review of Planned Refurbishments

In addition to the topics discussed in Table 34, there are issues associated with reviewing Sunwater's planned refurbishments program on a portfolio level. These are outlined in Table 36. We have not in this section made adjustments to the timing of Sunwater's proposed works which we have classified as refurbishments. Further, we have not in this section made adjustments to the timing of Sunwater's proposed refurbishment works which we have classified as inspections.

Table 36 Issues Associated with Review of Planned Refurbishments

Issue	Commentary
Scope of works	<ul style="list-style-type: none"> Limited information has been provided on the type or scope of works to be delivered for each project included in Sunwater's submission
Inadequate documentation of investment planning rules	<ul style="list-style-type: none"> In many cases, Sunwater has not specified frequencies for refurbishment works to take place, or the types of work to be delivered For instance, in the document labelled <i>Overall Strategy Common to all Bulk Water Schemes by Object Type</i>, Sunwater reports that it will maintain dam assets into perpetuity; however, this document does not detail the type or frequency of refurbishment works to be delivered. In the <i>Whole of Life Maintenance Planning Strategy and Object Codes</i>, which details investment triggers, refurbishment works are only specified for <i>Outlet Works</i> and <i>Spillway/Overflow Structures</i> within the <i>DAM</i> object type.
Lack of historical information	<ul style="list-style-type: none"> In some instances where the frequency for refurbishment of object types is provided, there is more than one refurbishment expected to occur over the expected useful life of the asset. We do not know when, and if, the last refurbishment was undertaken and hence when the next refurbishment is due using Sunwater's lifecycle planning rules.

7.3.3 Inconsistencies in Documentation of Lifecycle Strategies

It appears that the investment triggers specified in the *Whole of Life Maintenance Planning Strategy and Object Codes* were not updated as they should have been when Sunwater updated its lifecycle strategies for classes of assets. Some examples of the observed inconsistencies are detailed in Table 37.

Table 37 Inconsistencies in Lifecycle Strategy and Methodology

Asset description	Reported Existing strategy	Reported New strategy ^{82 83}	Review of Investment Triggers ⁸⁴
Dam and structural components	Replace on 80 to 200 year interval based on condition and risk and object type	Maintain into perpetuity by undertaking periodical refurbishments based on condition and risk	Sunwater has not specified specific thresholds for refurbishment of dam assets. Sunwater still reports replacement at end of useful life (200 years)
Weirs and barrages	Replace on 50 to 125 year interval based on condition and risk and object type	Maintain into perpetuity by undertaking periodical refurbishments based on condition and risk	Sunwater has only specified thresholds for refurbishment of same weir and barrage assets. Sunwater still reports replacement at end of useful life.
Hydro electric systems	Replace on 60 year interval and refurbish after 15 years based on condition and risk	Replace on 30 year interval and refurbished as required based on condition and risk	Sunwater still specifies useful life for hydroelectric systems at 60 years
Hydraulic systems	Replace on 60-year interval and refurbish after 20 to 30 years based on condition and risk and object type	Maintain into perpetuity by undertaking periodical refurbishments based on condition and risk	Sunwater still specifies useful life for hydraulic systems at 60 years
Mild Steel Unlined Pipe	Replace at full replacement cost at standard asset life 60 years	Adopt asset life of 80 years subject to condition and risk assessment, NPV of pipe leaks on a case by case basis	Sunwater still specifies a 60 year useful life for Mild Steel Unlined Pipe and two refurbishments per lifecycle (every 20 years)
Concrete lined channels	Replace at full replacement cost at standard asset life 80 years	Concrete channels are not replaced at end of life but are subject to ongoing refurbishment over time. Concrete lined channels at 40 years after construction will be refurbished within 100 years (assumed revised design life) therefore divide total replacement cost by 60 years. Then place this in the plan to replace and repair bays on a 5 year frequency.	Sunwater still specifies an 80 year useful life for Concrete lined channels and three refurbishments per lifecycle (every 20 years)

⁸² Rfl A1, Attachment 7.

⁸³ Rfl A1, Attachment 8.

⁸⁴ Document Reference: QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.XLS

7.3.4 Cost Estimates

Sunwater’s procedures for developing cost estimates for projects scheduled later than the price path provide for the use of the recorded asset replacement cost, or the actual costs incurred in a similar project to be used as the basis for the cost provision for a future project. These preliminary cost estimates are reviewed in detail when the scheduled project falls within the next five-year period.

Review of the cost estimates recorded for projects that appear to be similar shows considerable variation in cost estimates (refer to Figure 28 as an example). This suggests that Sunwater’s procedures are not being followed consistently.

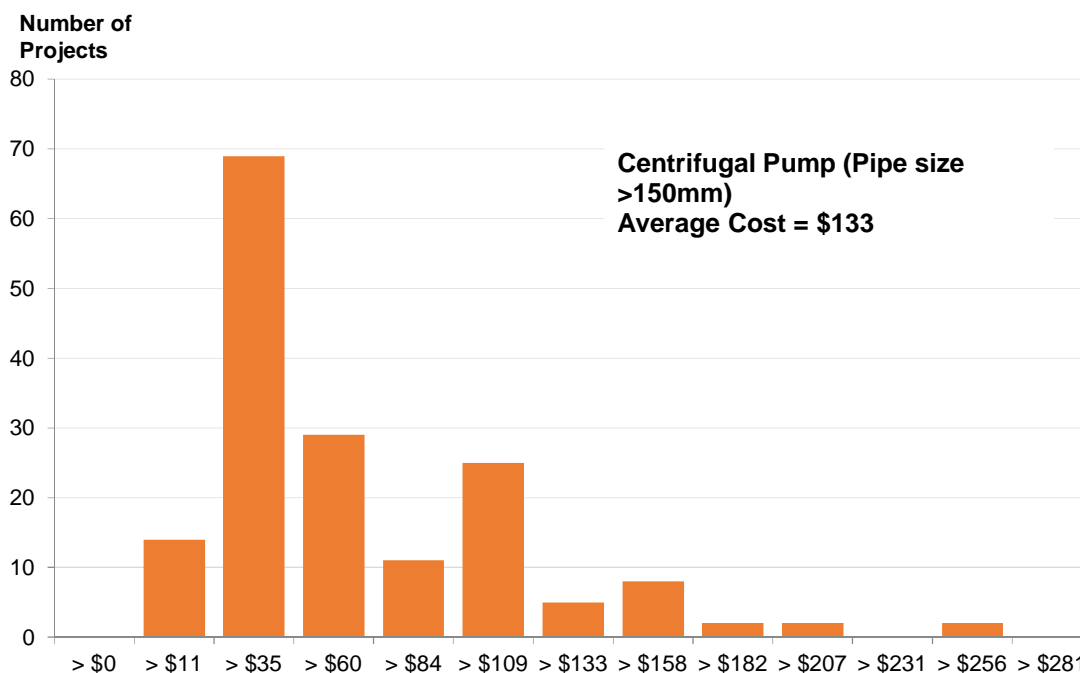


Figure 28 Variability in Cost Estimates (\$'000s, FY19)

The timing and value of future projects must be considered to have a decreasing level of confidence the farther out they are in the future, because a wide range of factors are increasingly unlikely to remain as currently planned. As noted in Section 4.8.2, it appears that Sunwater does not use any form of probability assessment for different scenarios as a means of deriving expected costs.

It is recommended that Sunwater improves the consistency of its cost projections for projects in the annuity period, and to consider the use of probability-based scenario planning to derive expected costs for material items. Due to the lack of detail made available with regards to the scope of works to be delivered and the basis for cost estimates of all of the projects included in Sunwater’s submission, in this section we have not sought to make adjustments to Sunwater’s submission reflecting project cost. Instead, cost efficiency is addressed through the extrapolation of systemic issues identified through detailed project reviews, as summarised in Section 6.0.

7.4 Potential Adjustments if Sunwater were to use Industry Best Practice Decay Curve Methodology

This section tests the hypothesis that Sunwater is planning for inefficiently renewing assets and provides an adjustment to the annuity to reflect Sunwater’s use of non-industry best practice decay curve.

7.4.1 The Impact of Sunwater’s Proprietary Decay Curve

We have noted that Sunwater is not using a standard approach to predicting changes in asset condition through the lifecycle. In the absence of a set of evidence-based Weibull curves for each major or critical asset class, we have modelled the renewal of Sunwater’s assets included in its revised submission using in-house tools, using a Weibull curve equivalent to a normal failure distribution to indicate the deterioration of assets through their lives, and use this to indicate the impact of the different approaches to planning for asset renewal.

Our modelling is designed to enable optimisation of funding and overall risk of failure, using asset condition (in this case) as a proxy for the risk of failure. The approach is based on an expectation of failure distribution and the implied deterioration of the asset over its lifecycle, where the failure distribution would normally vary by asset class and be informed by actual evidence (experience).

End of life is generally defined as the point in the lifecycle where the risk of failure becomes unacceptable (the assets can generally be used after that time, but service interruption will become more severe and maintenance costs will usually be significantly higher). Critical assets are held to a lower tolerance of risk, as indicated by the first vertical line in Figure 29.

With this approach, a decision on the timing of the renewal of a critical asset relies on the highest acceptable level of service interruption, often referred to in terms of service interruption frequency and duration. We note that both measures are needed for prudent and efficient asset management. This approach specifically enables future funding requirements (for asset renewal) to be related to minimum service levels.

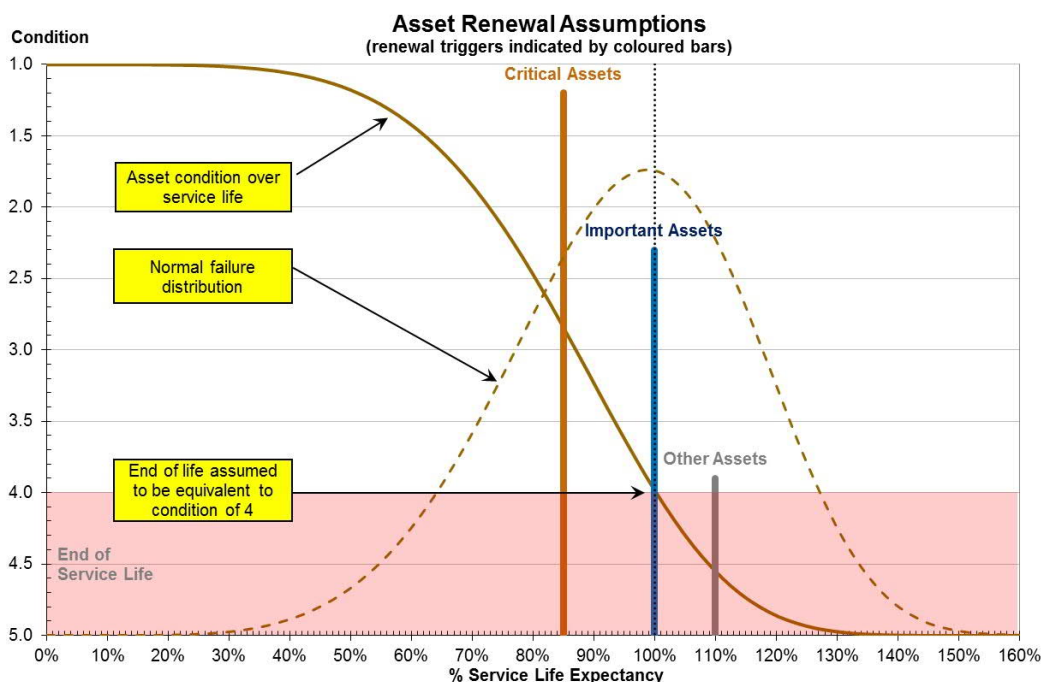


Figure 29 Example of Weibull Curve Equivalent to a Normal Distribution of Failure

Whilst there are noted deficiencies in Sunwater’s data (Section 7.3.1), this analysis has been conducted to determine whether Sunwater is overly-conservative in the timing of renewals with respect to Sunwater’s current asset decay curve and asset replacement strategies. Given issues encountered

with the data, this assessment and adjustments made in light of this assessment are conservative (for instance excluding refurbishment works and excluding works where we have inadequate information to determine projected asset condition).

The result of copying Sunwater’s annuity program data into an AECOM asset investment planning model which use a Weibull curve as the basis for developing lifecycle costs is shown in Figure 30. The figure shows the investment required each year (in FY19 dollars) aggregated by asset criticality, and shows:

- a solid brown line that indicates the weighted asset condition (for all assets in the submission scheduled for renewal, weighted using replacement value) assuming that no investment takes place
- a dotted brown line that shows the weighted asset condition after the scheduled investment (renewal). This line indicates a higher mean asset condition, because deteriorated assets are replaced with new assets.

The range of asset condition between the ratings of 2 and 3 is often referred to as the ‘State of Good Repair’, and generally infrastructure maintainers are advised that it is prudent and most cost-effective to maintain their assets in that range (allowing the weighted average condition to deteriorate below the rating of 3 on this scale increases the risk of failure, and allowing it to improve past 2 is generally a more expensive option than necessary (noting that the rating of 4 is defined as ‘end-of-life’, where the risk of failure is no longer acceptable).

The dotted black line is a trend line of annual investment needed. It increases because higher value assets with longer service lives fall due for renewal later in the planning period.

The renewal program as configured in this model, which applies Sunwater’s renewal strategies, would typically keep the weighted asset condition above the State of Good Repair range, suggesting that the condition of assets is being maintained at too high a level using Sunwater’s existing strategies.

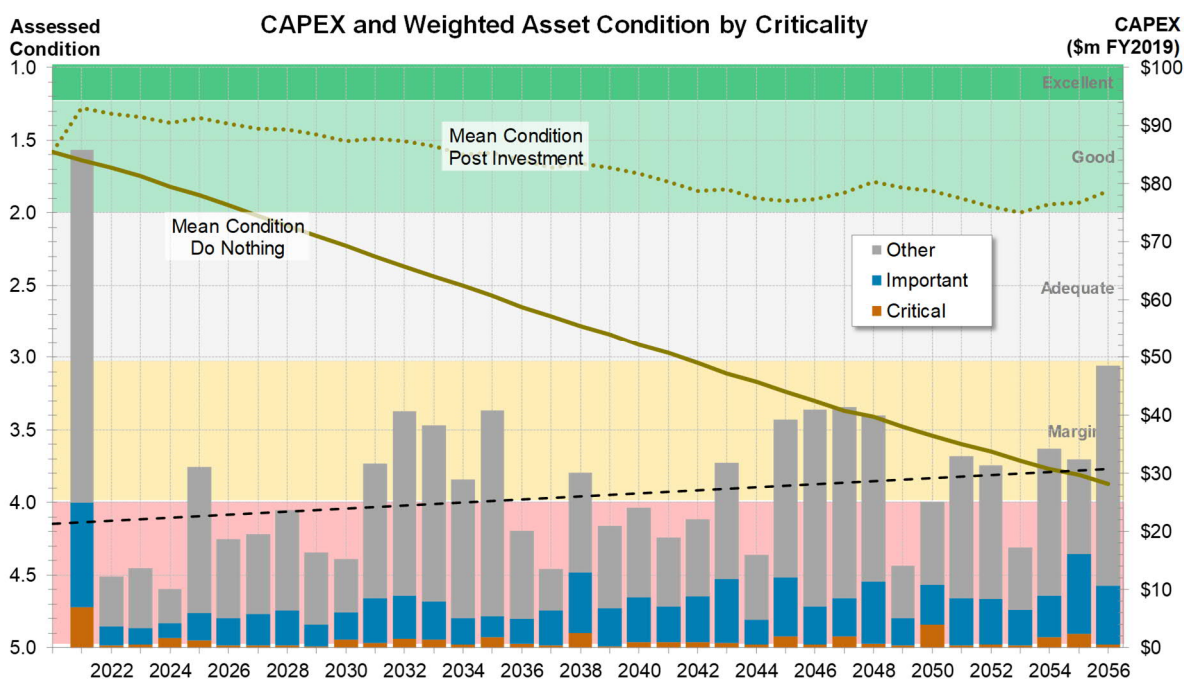


Figure 30 Sunwater’s Annuity Program Developed Using an AECOM Model, Presented by Asset Criticality

Figure 31 presents the impact of applying a 10% deferment (delay in renewals). The renewal program as configured in this model, applying the 10% deferment in renewal timing, would typically keep the weighted asset condition closer to the top of the State of Good Repair range.

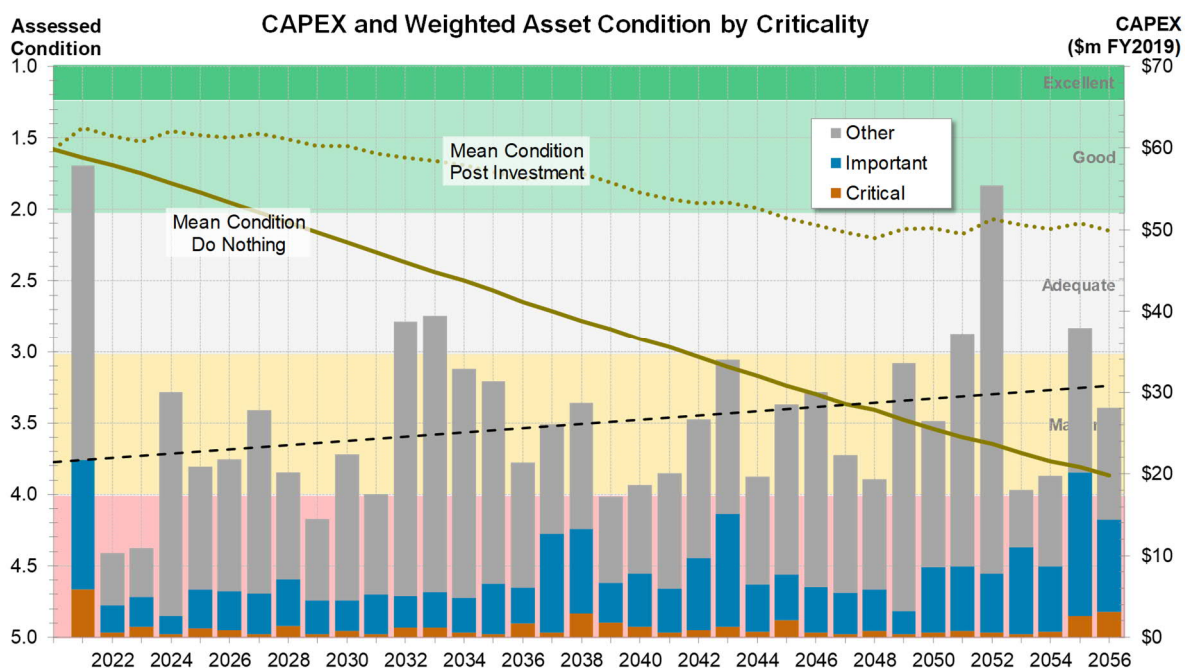


Figure 31 Sunwater’s Annuity Program Developed Using an AECOM Model, Applying a 10% Renewals Deferment

The figures presented in these charts are for illustrative purposes to indicate projected post-investment asset condition; the annual values in these charts vary to those in Sunwater’s submission and in our adjusted submission, mainly due to:

- The specification of a differing decay curve; in this case a single Weibull curve reflecting typical infrastructure failure rates
- The application of a risk-based method to determine prudent renewal timing for critical assets. Misalignment exists between the renewals timing specified in Sunwater’s submission and the timing implied by Sunwater’s renewal strategies and asset condition projected using Sunwater’s data (discussed in Section 7.5)
- The aggregation of Sunwater’s asset and project data by type of asset rather than using discrete assets for simplicity

It may be useful to note the current condition of the assets included in Sunwater’s submission. This is shown in Figure 32, which positions Sunwater’s assets according to weighted condition by asset class, where the bubble size indicates the value of each class of assets. The bubbles are presented using the same Weibull curve as used in the previous charts from our model to indicate the approximate stage in their lifecycle.

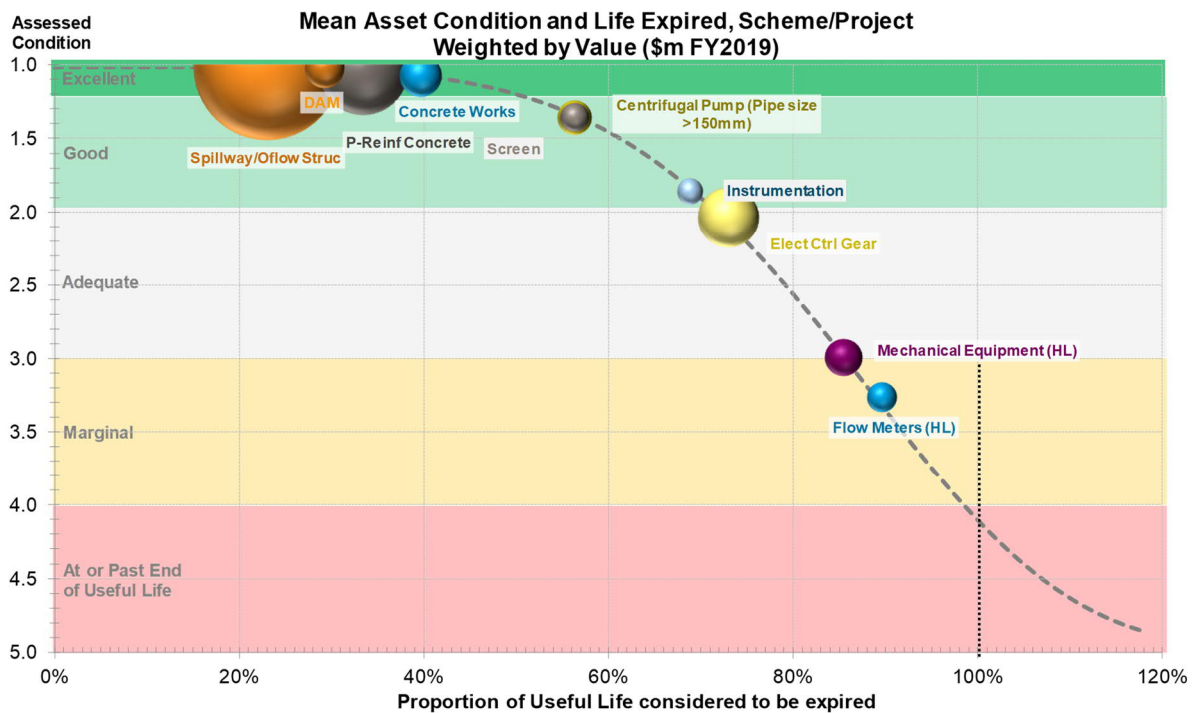


Figure 32 Current Condition of Sunwater’s Assets Included in the Annuity Submission

For comparison purposes, the current condition of the assets included in Sunwater’s submission is also presented using Sunwater’s standard decay curve and Sunwater’s condition rating definitions in Figure 33. We note that Sunwater’s standard decay curve is notably steeper to the more typical Weibull curve we have employed. We note that both curves assume that asset failures will follow a similar distribution (which is unlikely to be the case in practice).

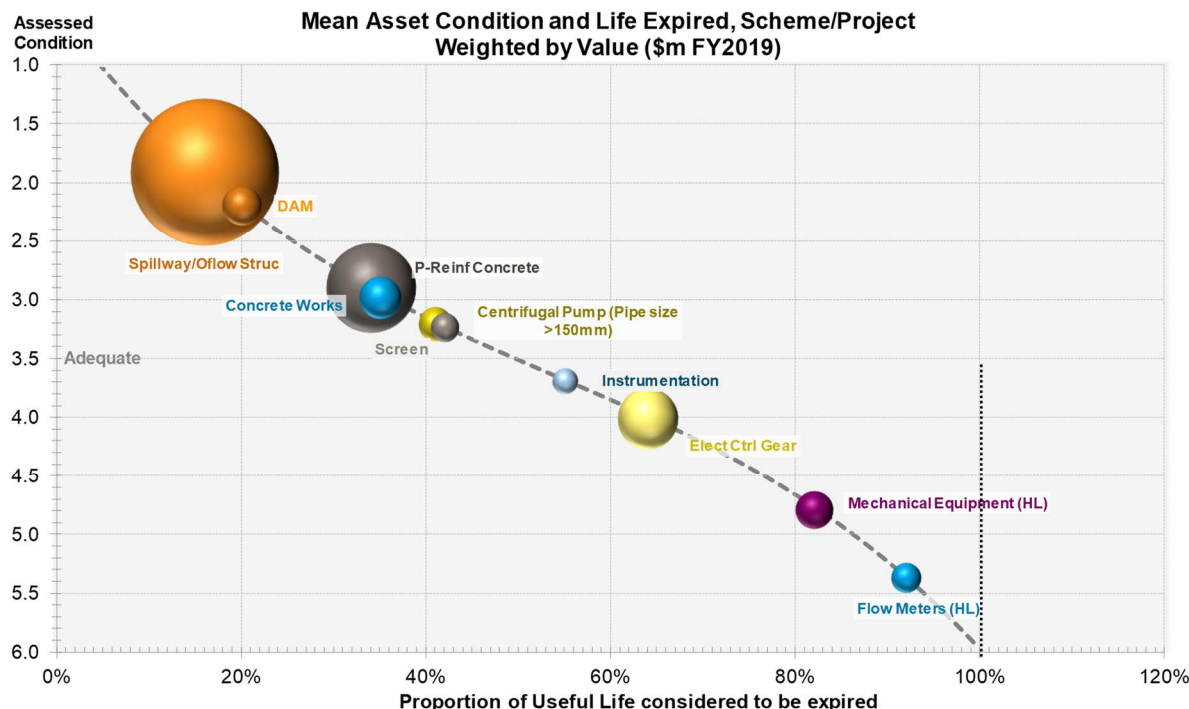


Figure 33 Current Condition of Sunwater’s Assets in the Annuity Submission Modelled Using Sunwater’s Decay Curve

7.4.2 Adjusting for Sunwater’s use of Non-Industry Best Practice Decay Curve

We have not seen evidence of asset failures that could be used to justify Sunwater’s asset life expectancies. Sunwater’s revised strategy documents that include the asset life extension do not provide the rationale used, and since there is no evidence of asset failure, we have concluded that the life expectations now in use may not reflect reality as experienced by Sunwater.

In consideration of the analysis conducted in Section 7.4, we recommend that a 10% increase in life expectancy for all asset renewals be applied to reflect the potential impact of applying a higher tolerance for risk of failure. In practice, a prudent and efficient infrastructure operator would have developed failure curves based on history for each asset class.

Noting that a greater degree of planning is expected to occur in the price path period (as opposed to the beyond price path period), delays to renewals within the price path period have only been allowed to occur where renewal activities are not supported by projected asset condition using Sunwater’s investment planning strategies (as discussed at Section 7.5).

As indicated in Figure 34, the value of the annuity reduces to \$59.7 million and \$755.6 million for the price path period and beyond price path period respectively. As indicated in Figure 35, the annuity value is sensitive to asset life expectancies.

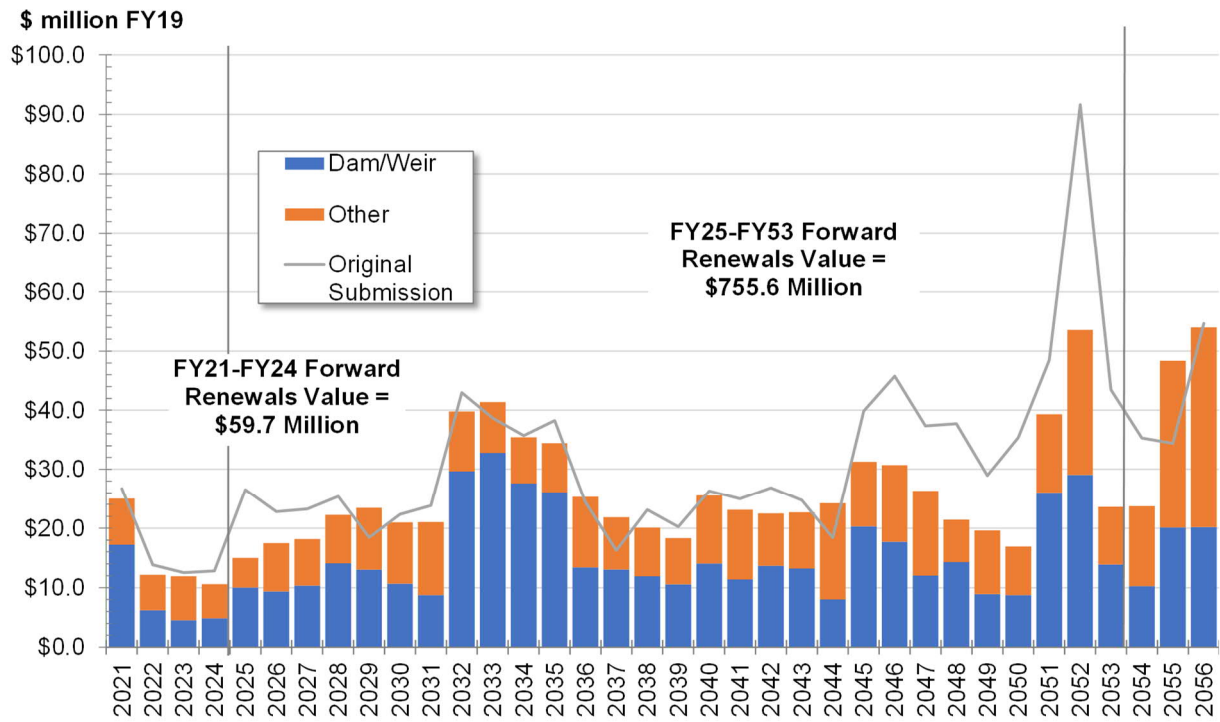


Figure 34 Revised Forward Renewal Program Applying a 10% Increase in Useful Life (\$ million, FY19)

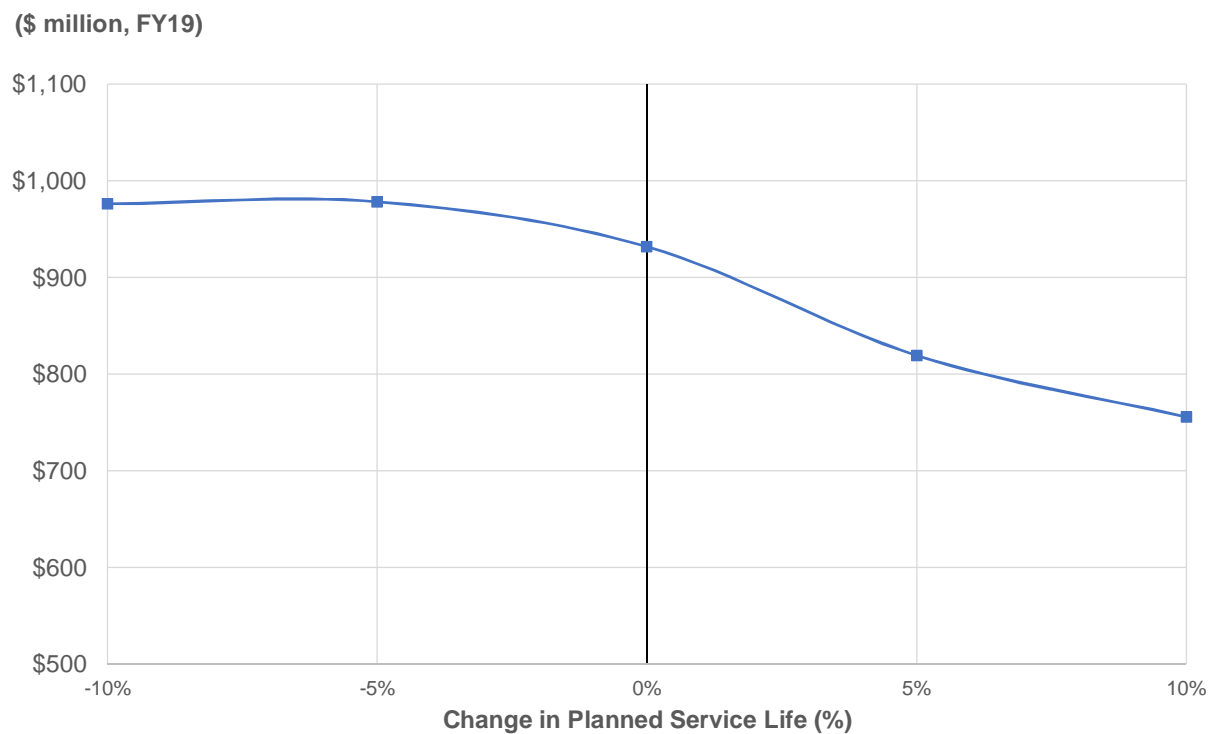


Figure 35 Sensitivity of Sunwater's FY25-FY53 Forward Renewals Value to Changes in the Service Life Expectancy of Assets to be Replaced

7.5 Additional Analysis into Renewal Activities which Are Not Supported by Projected Asset Condition

This section presents a separate analysis into the extent to which renewal activities are supported by projected asset condition and Sunwater’s documented strategies, in order to:

- Avoid delaying required works within the price path period (where a higher degree of planning takes place) in the adjustment made in Section 7.4 to reflect an increase in useful life
- Determine whether the renewal project data provided in Sunwater’s submission is accurate and reliable, and whether Sunwater has consistently applied its documented planning strategies to project renewal timing

7.5.1 Condition Assessment

Sunwater has a documented methodology for completing condition assessments based on a six-point scale:⁸⁵

- 1 Perfect, as-new condition
- 2 Minor defects only
- 3 Moderate deterioration with minor refurbishment required to ensure ongoing reliable operation
- 4 Significant deterioration with substantial refurbishment required to ensure ongoing reliable operation
- 5 Major deterioration such that asset is virtually inoperable
- 6 Asset has failed and is not operable

In Section 4.2.2 we refer to issues noted by the QCA’s consultants in 2012 on the quality and completeness of condition inspection data, and the impact of this on the accuracy of renewals planning. We find similar issues in our review of the revised submission.

We analysed the most recent condition assessment data available for each asset to determine the extent to which the proposed renewal works are supported by Sunwater’s condition assessments, expecting that the majority of works planned for the medium term would have a recent condition assessment and that it was used as a basis for timing expectations.

We found, however, that 21% of the renewal/rehabilitation works (by project value) scheduled for 2021 (and 27% over the full price path period) in the revised submission do not have condition assessment data recorded against the relevant asset and do not appear to be supported by a condition assessment. For these assets, it appears that expected asset condition is based only on age.

We conclude that the quality of condition assessment data and the validation of works remains an issue.

7.5.2 Projected Condition at Renewal using Sunwater’s Planning Approach

We modelled the projected asset condition of the assets being renewed/refurbished to assess whether the timing of the works included in Sunwater’s submission is prudent, using the condition assessment data available (adjusted for the proposed project timing using Sunwater’s decay curve), asset age, asset life expectancy (as specified in the *Whole of Life Maintenance Planning Strategy and Object Codes*.⁸⁶)

Figure 36 and Figure 37 present the value of the Sunwater’s proposed renewal and refurbishment works programs respectively, showing the predicted asset condition at the planned time for renewal. The predicted asset condition (using Sunwater’s criteria and decay curve) is colour-coded, ranging from one (as new, in green) to six (at end-of-life, in dark brown).

⁸⁵ Rfl A1, Attachment 4. *Asset Refurbishment Planning: Methodology for Condition Assessments of Assets*.

⁸⁶ Rfl A1, Attachment 2.

Our analysis finds that 15% of the planned works (by value) are for assets where the projected condition assessment data is expected to be a condition state of three or better at the time of renewal, which using Sunwater’s standard decay curve represents assets which have less than 37% of their life expectancy expired.

We assume that these will be deferred when the detailed review is undertaken, following Sunwater’s documented policies and procedures.

We note that Sunwater has specified triggers for replacement of assets according to the assessed risk (or criticality) of the assets, which provide for renewal of ‘high risk’ (the most critical) assets when 63% of their expected life has expired, or approximately equivalent to a condition rating of four using Sunwater’s criteria. Using this definition, there should not be any assets scheduled for renewal with a condition rating of less than four.

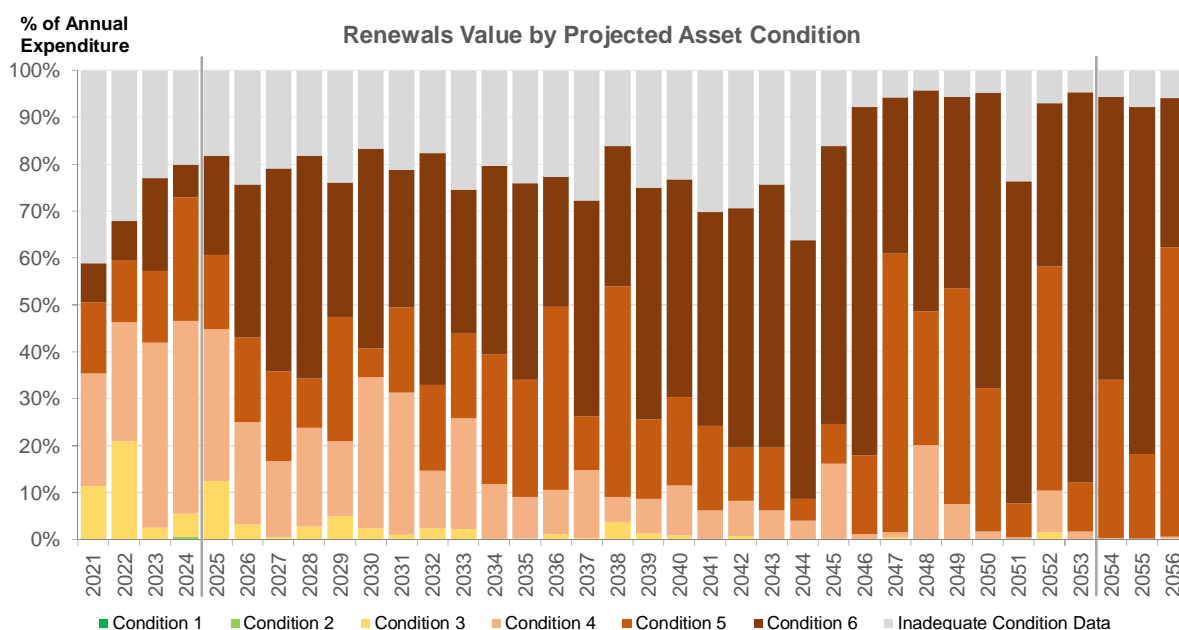


Figure 36 Sunwater’s Proposed Renewals Expenditure by Predicted Asset Condition

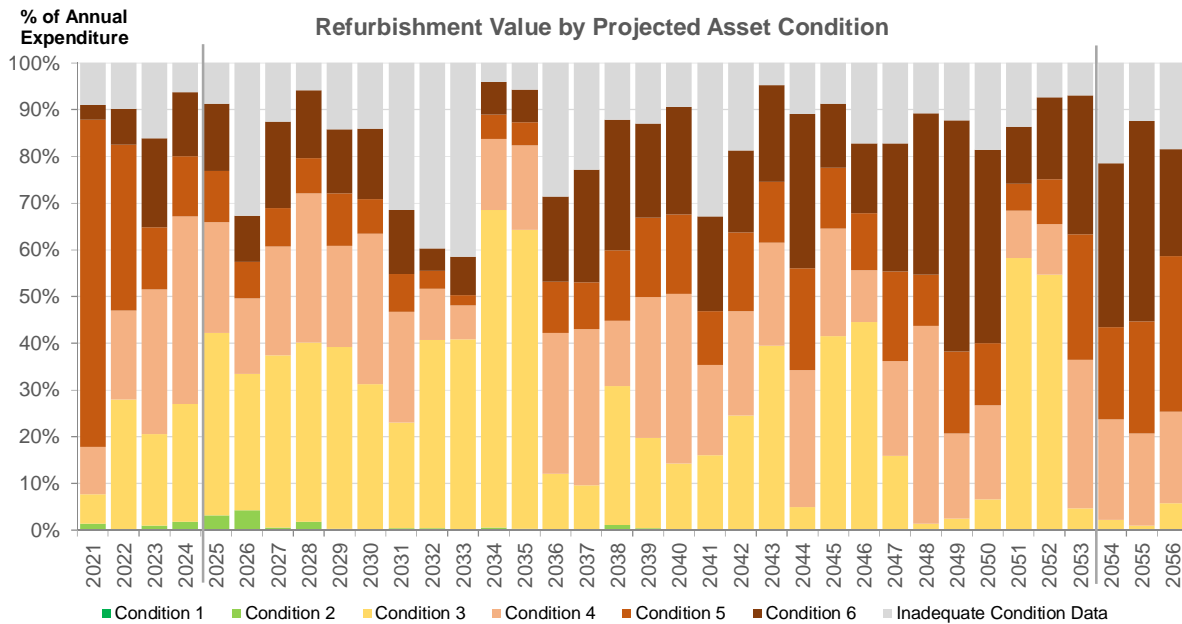


Figure 37 Sunwater’s Proposed Refurbishment Expenditure by Predicted Asset Condition

Very limited information has been provided by Sunwater on the frequency of asset refurbishment (as opposed to renewal), the specific trigger points applied, or the actual scope of works expected to be undertaken.

These findings suggest that the timing of a substantial proportion of asset renewal/rehabilitation works is too early, and therefore not efficient. This provides further support to the adjustment made in Section 7.4.2.

7.5.3 Indicative Adjustments to Renewal Projections based on Projected Condition

We have applied Sunwater’s rules to the proposed renewal projects as we believe they should have been applied, following Sunwater’s own documented procedures. The result is shown in Figure 38, with Sunwater’s revised submission shown as a line above the bars. A breakdown of the adjustments made due to the timing of projects is presented in Figure 39.

The revision reduces the value of the annuity to \$52.5 million and \$847.0 million for the price path period and beyond price path period respectively (in \$FY19). This finding is in support of the adjustment made in Section 7.4.2, indicating that Sunwater’s renewals program as submitted would result in over-maintenance of assets. This adjustment based on projected condition is shown for indicative purposes only, and is considered to be captured by the adjustment made in Section 7.4.2 reflecting an increase in useful life.

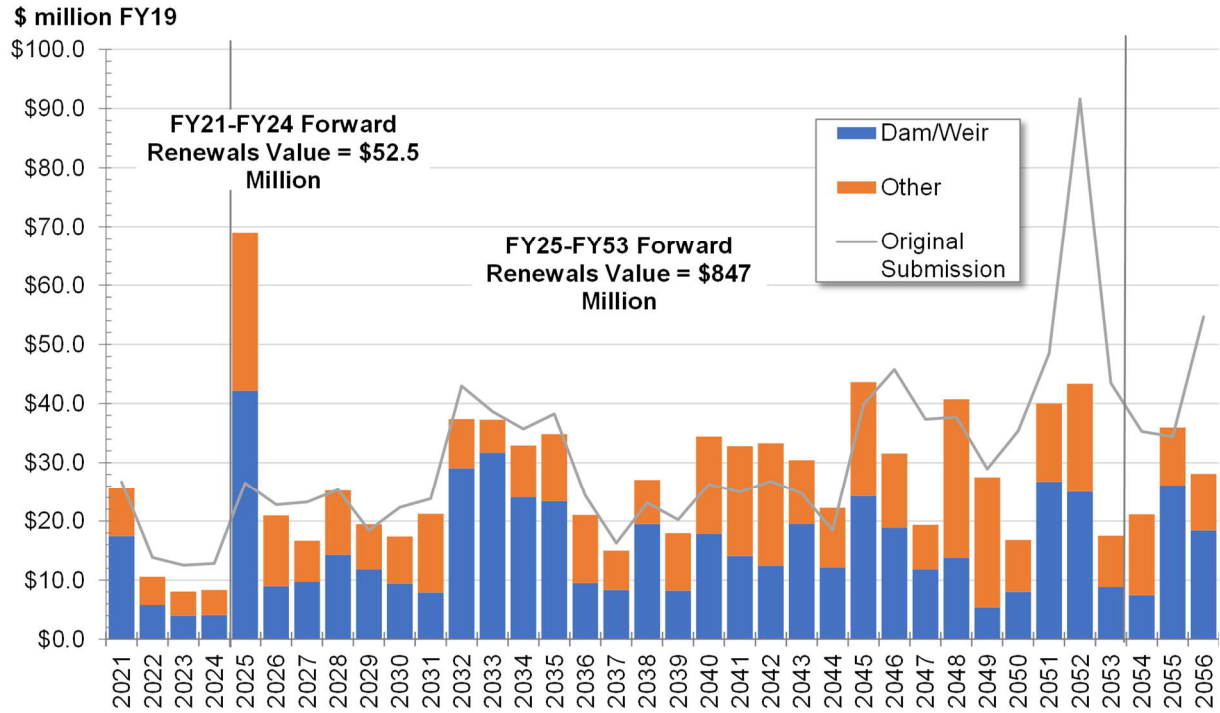


Figure 38 Revised Renewal Program Applying Sunwater's Rules (\$ million, FY19)

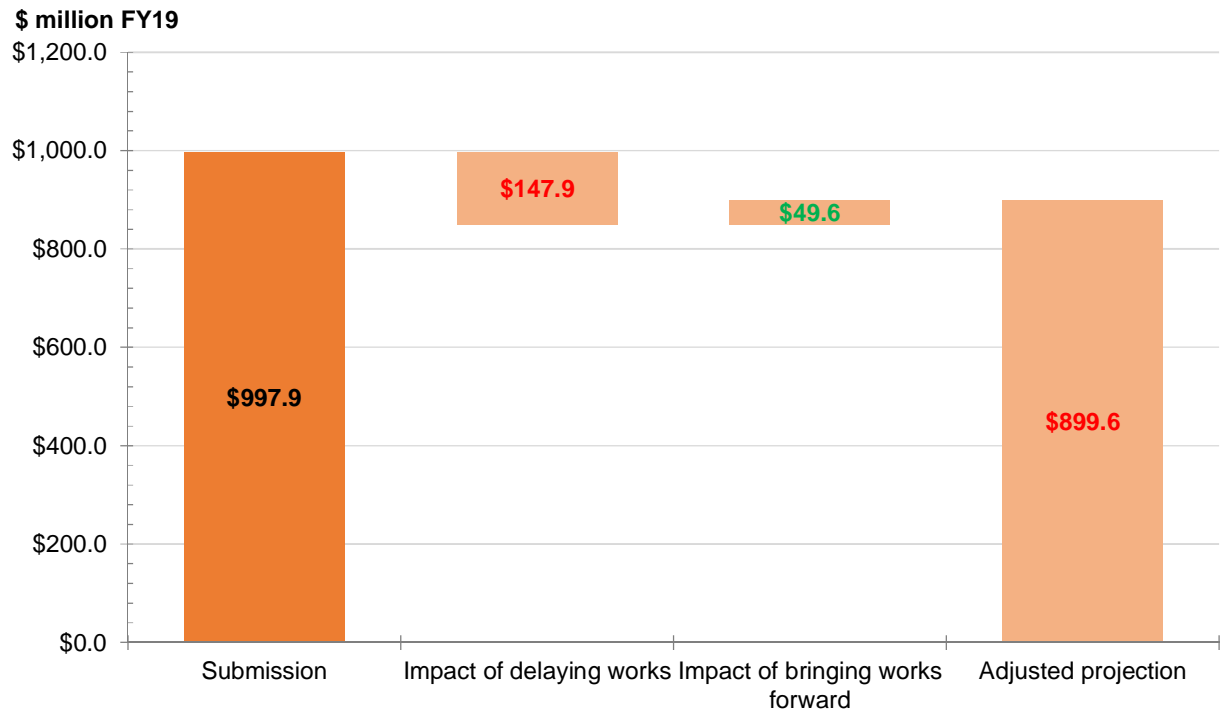


Figure 39 Breakdown of Adjustments made Applying Sunwater's Rules, FY21-FY53 (\$ million, FY19)

The most significant issues noted in this indicative analysis occurred in distribution schemes, specifically; Bundaberg distribution and Mareeba-Dimbulah distribution.

Some noteworthy examples of the type of assets where projected condition implies a delay beyond FY53 include:

- Numerous replacement projects for long life civil assets such as pipes, channels, or drains from outer years in the beyond price path period:
 - The timing of many of these works does not appear to have been adjusted (or adequately adjusted) to reflect assessed condition
 - For some replacement projects the age of the asset does not warrant renewal according to Sunwater’s documented strategies and there is no condition assessment available to justify early renewal
- Numerous centrifugal pump replacement projects from outer years in the beyond price path period. It appears that the timing of many of these works has not been adjusted to reflect assessed condition.

7.6 Refurbishment Analysis

The prior analysis has been targeted on identifying portfolio-level timing issues in relation to asset renewals. However, refurbishment projects make up a large portion of the annuity (over 40% of projects in the beyond price path period by value).

Following from the QCA’s draft report, we have identified a particularly significant type of refurbishment project occurring in bulk water schemes, described as *‘Replace/Refurb: Grout Anchors, Drains, Concrete’*. This type of project is summarised in Table 38, which shows the value and timing of works by scheme. Overall, this amounts to \$113.5 million over the price path period, and represents approximately 28% of the refurbishment works in the beyond price path period.

Table 38 Summary of ‘Replace/Refurb: Grout Anchors, Drains, Concrete’ Projects (\$ million, FY19)

Scheme	Facility	Timing	Project Value (FY25-FY53)
Proserpine	Peter Faust Dam	FY51- FY52	\$24.6
Bundaberg bulk	Fred Haigh Dam	FY34 - FY35	\$32.7
Barker Barambah bulk	Bjelke-Peterson Dam	FY45 - FY46	\$15.7
Callide Valley	Callide Dam	FY32- FY33	\$40.5
Total			\$113.5

Our review of these projects is divided into two parts; observed duplication of projects in the submission and the prudence and efficiency of the projects.

7.6.1 Project Duplication

During the course of this review we observed a duplication of *‘Replace/Refurb: Grout Anchors, Drains, Concrete’* works at Callide Valley.

The November 2018 submission contained the *‘Replace/Refurb: Grout Anchors, Drains, Concrete’* project assigned only at the header location level CVA-CLC-CAL-SPW-STs, at a value of \$0.1 million in FY30, \$7.1 million in FY32, and \$7.2 million in FY33 (in \$FY19).

In the revised submission, the work has been assigned at the header location level (CVA-CLC-CAL-SPW-STs) at a value of \$9.9 million in FY32 and \$19.3 million in FY33 (in \$FY19), and also at the three lower location levels:

1. CVA-CLC-CAL-SPW-STs-SPC at a value of \$3.3 million in FY32 and \$3.4 million in FY33 (in \$FY19)

2. CVA-CLC-CAL-SPW-STS-SPD at a value of \$3.3 million in FY32 and \$3.4 million in FY33 (in \$FY19)
3. CVA-CLC-CAL-SPW-STS-SPH at a value of \$3.3 million in FY32 and \$3.4 million in FY33 (in \$FY19)

Sunwater confirmed that *‘the lower level items have been included in error and are duplicates of the higher-level planning item’*.⁸⁷ As such, we have applied an adjustment of \$20.3 million (\$9.9 million of works in 2032 and \$10.3 million of works in 2033, in \$FY19) to account for project duplication.

7.6.2 Prudency and Efficiency Assessment

We raised a series of RFIs in order to assess the *‘Replace/Refurb: Grout Anchors, Drains, Concrete’* works. Sunwater was able to provide very limited information in relation to the scope of works to be delivered, and the basis of the cost estimates contained in the submission.

- **Scope**

In relation to project scope, Sunwater states that; *“...a detailed scope has not been developed at this time. Scope development will be informed by the cyclic annual and five-yearly dam inspections, and 20-year dam safety reviews”* and that *“types of interventions are dependent on the extent of deterioration, and can range from filling cracks with epoxy resin to complete refurbishment or replacement of the structure including tying back into the parent material”*.⁸⁸⁸⁹

- **Cost**

This scope uncertainty introduces a high degree of uncertainty in relation to future project cost. Sunwater did not provide a basis for the cost estimates contained in the submission and noted that *“detail regarding the breakdown of estimated costs... are not documented”*.⁹⁰⁹¹

- **Timing**

In relation to the timing of the works, we note that there is a refurbishment frequency specified in the *‘Whole of Life Strategy by Object Type’* for SPWY assets;

- Low risk - 100 years (or a condition of 3.5).
- Medium risk – 88 years (or a condition of 3.3).
- High Risk – 55 years (or a condition of 2.5).

We noted that the timing of the refurbishments, as implied by these rules and Sunwater’s age and condition data, differed to the timing of the works contained in Sunwater’s submission.

Sunwater noted that *“due to the volume of assets in Sunwater’s portfolio, the changes to refurbishment frequencies based on the whole of life strategy is completed on a priority basis and not all assets beyond the price path period have been updated. The current frequency is incorrect...”*.⁹²⁹³ Sunwater has confirmed that *‘the ‘Replace/Refurb: Grout Anchors, Drains, Concrete’ refurbishment works will be rescheduled to align with the Whole of Life Maintenance Strategy & Object Code document’*.⁹⁴

Sunwater also contended that this does not require correction, as we have applied a systemic adjustment to renewals in the beyond price path period. However, we note that these are refurbishment projects which have not been adjusted under the renewals adjustment in Section 7.4.2, and thus do require adjustment.

⁸⁷ QCA Information Request FR16_Renewals expenditure beyond price path period_Callide Valley

⁸⁸ QCA Information Request FR31_Follow up to FR17 - Renewals expenditure beyond price path period - Proserpine

⁸⁹ QCA Information Request FR30_Follow up to FR16 - Renewals expenditure beyond price path period - Callide Valley

⁹⁰ QCA Information Request FR31_Follow up to FR17 - Renewals expenditure beyond price path period - Proserpine

⁹¹ QCA Information Request FR30_Follow up to FR16 - Renewals expenditure beyond price path period - Callide Valley

⁹² QCA Information Request FR16_Renewals expenditure beyond price path period_Callide Valley

⁹³ QCA Information Request FR17_Renewals expenditure beyond price path period_Proserpine

⁹⁴ QCA Information Request FR48_Clarification of FR16 and FR17

We acknowledge that the scope, timing, and consequently cost of the works will be refined as asset condition inspections are undertaken and as the assets deteriorate. However, we consider that given the high value of the works, a more formal approach should have been followed in defining and documenting the scope, timing and cost of the works.

In lieu of any formal, documented evidence to support variance from the 'Whole of Life Strategy by Object Type' document (and noting Sunwater's intent to align with this), we have adjusted the timing of the works to align with the guidelines provided in this document. In applying this adjustment, we note that;

- All assets which this project has been assigned to have been assessed as 'low' risk by Sunwater. However, we have adjusted all to be considered 'medium' risk to be conservative, noting that while Sunwater has stated that they use guidance from the strategy document, they also recently admitted that the current timing is incorrect. This approach implies a refurbishment frequency of 88 years (or a condition of 3.3).
- For all relevant assets, there is available assessed condition inspection results based on inspections conducted recently between 2016-2019. To be conservative in our adjustment, the revised timing was determined as the earliest of;
 - The timing from acquisition year (based on asset age only)
 - The age of the asset, adjusted for assessed condition

The impact of applying this adjustment to account for conservative project timing, and to account for the duplication of projects at Callide, is presented in the revised schedule of 'Replace/Refurb: Grout Anchors, Drains, Concrete' in Table 39. All projects (bar for Callide, and one location at Bundaberg Bulk - BUN-KOL-FHD-SPW-STS-SPH-001) have been delayed beyond FY53 as a result. This has an impact of reducing the renewals value by \$70.9 million (a total impact of \$91.2 million, including the Callide adjustment).

Table 39 Revised Schedule of 'Replace/Refurb: Grout Anchors, Drains, Concrete' Projects (\$ million, FY19)

Scheme	Facility	Revised Timing	Revised Value (FY25-FY53)
Proserpine	Peter Faust Dam	Beyond FY53	\$0.0
Bundaberg bulk	Fred Haigh Dam	BUN-KOL-FHD-SPW-STS-SPH-001 - FY30) Remainder - Beyond FY53	\$2.0
Barker Barambah bulk	Bjelke-Peterson Dam	Beyond FY53	\$0.0
Callide Valley	Callide Dam	FY53	\$20.3
Total			\$22.3

The impact of this on the annuity (additional to the renewals adjustment outlined in Section 7.4.2) is presented in Figure 40. This would reduce the value of the annuity to \$59.7 million and \$664.4 million for the price path period and beyond price path period respectively (in \$FY19).

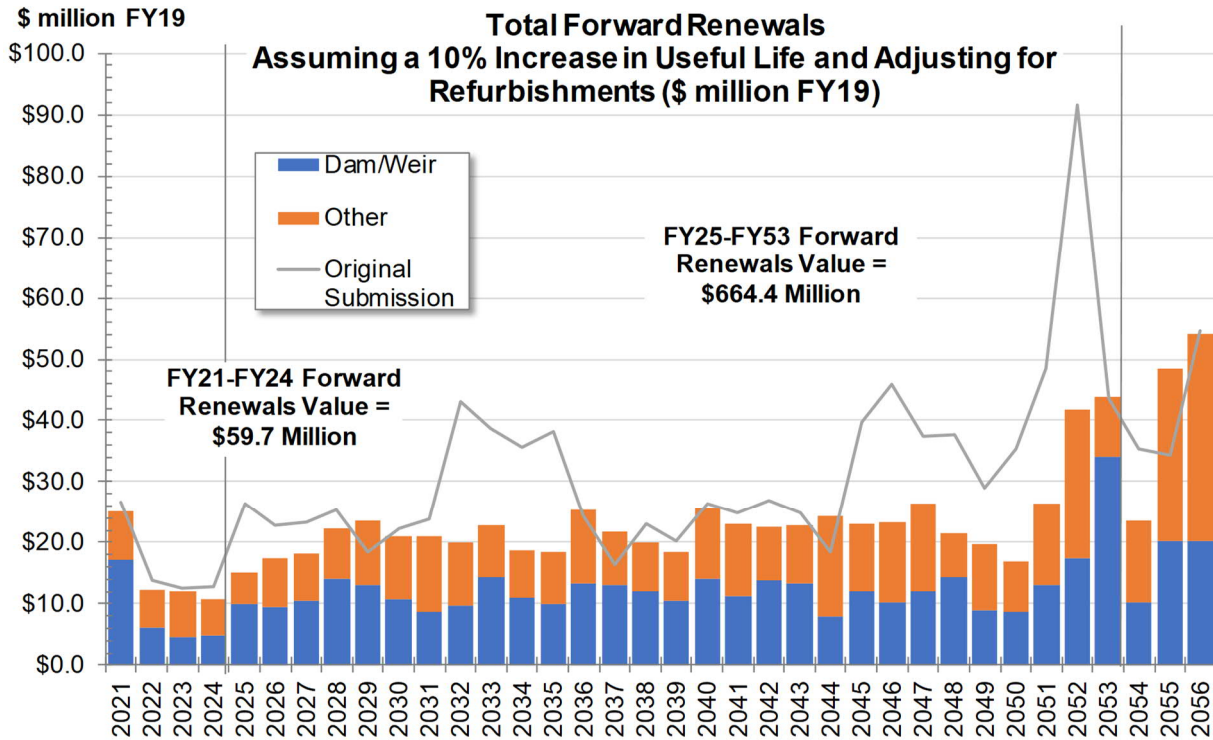


Figure 40 Revised Forward Renewal Program Applying a 10% Increase in Useful Life and Adjusting for Refurbishments (\$ million, FY19)

7.7 Conclusions

We have made a number of findings and recommendations in this section. In summary:

- We noted in our review of Sunwater’s policies and procedures (Section 4.8) that if the purpose of the annuity is to smooth asset renewal and refurbishment costs over a period of time (for pricing purposes), then the period selected for the annuity should be similar to the lives of the highest value and longest lived assets involved. In practice Sunwater has assumed some of its assets have no end-of-life, and since planning for the very long-term introduces increases uncertainty, we consider a 30-year period for an annuity to be a reasonable compromise.

We therefore recommend that the QCA specify a 30-year period for the annuity calculation.

- We have identified several issues with Sunwater’s project program for the annuity, including inconsistent or deficient data classifications. Sunwater should be advised to address these.
- In relation to asset condition data, there were issues in the quality and completeness of asset condition assessment data similar to those noted by the QCA’s consultants in the prior 2012 irrigation reviews (Section 4.2.2), and inconsistent use of condition assessment data to determine the timing of forward projects.
- We observed inconsistencies in cost estimates (Section 7.3.4) for projects included in the annuity and recommend that Sunwater take action to improve its controls of this process.
- Sunwater extended service lives in revisions to its long planning strategies but has not provided adequate rationale for the basis of the extension. There does not appear to be evidence of analysis of failures that could inform a more rigorous establishment of asset performance over time or with usage.
- We recommend that our revision of Sunwater’s data as indicated in Figure 40 be used for calculating the annuity. We recommend that, the value of annuities (in \$FY19) for the price path period be reduced from \$65.9 million to \$59.7 million, a reduction of \$6.2 million or 9.4% and the

value of annuities (in \$FY19) for beyond price path period be reduced from \$932.0 million to \$664.4 million, a reduction of \$267.6 million or 28.7%. This adjustment is primarily a prudence adjustment to account for overly-conservative renewals timing, and issues associated with *'Replace/Refurb: Grout Anchors, Drains, Concrete'* refurbishment projects.

- We recommend that Sunwater initiate a comprehensive review of failure distribution for its critical assets and use that to develop its own evidence-based deterioration curves. The proposed increase in asset service lives by 10% should be applied unless Sunwater can demonstrate that this would result in an unacceptable increase in service failures, and in practice it may be possible to continue increasing expected service lives until minimum service levels are achieved, which will indicate that life expectancies are realistic.
- There seems to be no provision for asset renewal where unplanned failures occur. There will always be a risk of unplanned failures, and we would normally expect a provision to be made for these. We have no data to indicate past instances or levels of unplanned asset failure, and a high proportion of these are likely to be able to be resolved through maintenance using operational budgets. Since other avenues exist to recover the cost of these works if they occur, we do not recommend a change to the current status quo.
- We have noted the value of using service interruption frequency and also interruption duration in guiding asset management priorities.
- Sunwater currently does include maximum interruption frequencies in its NSPs that were derived in consultation with its customers. This should be guiding asset renewal (provided that the risk of exceeding this maximum is clearly defined and used in long-term planning). A maximum interruption duration target would provide guidance on response times, sourcing of essential components and other factors that affect asset management and enable more prudent and efficient management of Sunwater's assets.

8.0 Dam Safety Upgrade Project Assessments

8.1 Project Reviews

Two dam safety upgrade projects were reviewed under the project sample. The projects had costs in each of the review periods – historical (FY12-FY18), transitional (FY19-FY20), price path period (FY21-FY24), and beyond price path period (FY25-FY53). The projects have been reviewed on a whole-of-project basis, but costs have been disaggregated by period.

The project review summaries are provided in Appendix D. They include a description of each project's background, the options assessment process, its implementation, and the findings on prudence and efficiency.

The assessment forms for the dam safety upgrade projects are included in Appendix G. The assessment forms include specific information on cost estimating, cost control, project governance and implementation.

8.2 Themes and Systemic Issues Arising from Project Reviews

The two projects reviewed were at Burdekin Falls Dam and Fairbairn Dam. Both projects involve significant works with high capital expenditure in order to bring the dams' risk levels to below the ANCOLD limit of Tolerability. While the projects share the same goal of risk reduction, the root cause underlying the need for each project is different.

The Burdekin Falls Dam Safety Upgrade is driven by an update to rainfall and flood projections by the Bureau of Meteorology. Higher extreme rainfall events are now expected compared to what the dam was designed for. As a result, the dam no longer complies with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity. Works are required to raise the dam level to reduce the risk to an acceptable level. The project was started in FY17 and is currently in the conceptual design and planning phase.

The Fairbairn Dam Safety Upgrade is driven by damage to the dam spillway that was discovered during various inspections, surveys, tests, and risk assessments completed from FY09 to FY17. Voids and subsurface drainage issues have led to the corrosion of anchors that presents a risk of uplift or transient pressures on the concrete slabs during flood events, which could in turn dislodge the concrete slabs and expose the foundation. Works are required to raise the dam level to reduce the risk to an acceptable level. The project was started in FY16 and is still under construction.

The project reviews concluded that both projects were considered prudent and efficient, but some project issues and areas for improvement were still observed.

1. Project Planning and Design Rework

The Burdekin Falls Dam Safety Upgrade project was started in FY17. A Preliminary Business Case was completed and approved by the Sunwater Board in March 2017. A concept design report was completed in November 2018. It later had to be revised to account for a new hydrology assessment and a new approach for risk-adjusted approach to acceptable flood capacity. The revised concept design report and associated business case introduced completely new options and recommendations. The conclusions section of the Executive Summary (of the initial final report Nov 2018) references the ARR2016 report and in our view should have considered the results of the new 2016 hydrology requirements. This rework can be considered inefficient, especially since the hydrology is a critical input to the design. It is not clear why the hydrology assessment was not completed in advance of the concept design report.

A similar early omission of key technical inputs occurred on the Fairbairn Dam Safety Upgrade project. Decisions were made to limit or forgo geotechnical and investigations early on in the project. Physical modelling was also deferred. The risk associated with rework due to inaccurate geotechnical, structural, or lack of physical modelling was likely not considered (or contingency amounts approved) and as a result, unplanned costs for design rework occurred.

Adjustments on the projects have not been made as the cost of the design rework was not provided and has been assumed as small compared to overall construction costs.

2. Cost Estimation and Documentation

The Burdekin Dam project had several versions of the total project cost estimate with discrepancies in the total project cost and the annual cost profile. Using the [REDACTED] Revised Concept Design Report as its reference, Sunwater prepared a Preliminary Business Case. Not only do cost estimates vary between the business case main document and its appendices, but it also differs from the Concept Design Report. Furthermore, the capital expenditure submission does not match any of the cost estimates from the supporting documentation.

For the Fairbairn Dam project, a large number of revisions the project budget and scope were needed over the course of the project. While these historical variations were mostly well justified and documented, the figures in the final budget approval document for the FY20 and FY21 costs do not match the figures in the capital expenditure submission for those years.

While the documentation is of a high quality overall, these types of cost variances between documents and lack of associated justification are consistent with the systemic issues identified for the renewals project assessments. We have not recommended cost adjustments due to the observed cost variances as;

- We consider the overall cost of the projects to be reasonable
- For the Burdekin Dam project, the total cost in Sunwater's submission was lower than that provided in the design report and business case where variations were observed
- The scope of the cost variation observed between Sunwater's submission and the budget approval document for the Fairbairn Dam project is considered to be reasonable giving consideration to the scale and complexity of the project.

8.3 Conclusions and Recommendations

The review of the dam safety upgrade projects in sample generally show project prudence and efficiency has been appropriately justified. While some project issues and areas for improvement have been identified, the magnitude of the cost impacts would be small compared to full project costs. For that reason, no adjustments have been proposed.

A summary of the project reviews with costs separated by review periods is provided in Figure 41, Figure 42, Figure 43, and Figure 44. In these figures, the green colour coding represents the level of document quality.

Project	Prudence Assessment	Efficiency Assessment			FY16-18 Cost \$FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgrade Works	✓	✓	✓	✓	\$66.2		\$66.2	
Burdekin Dam Upgrade Works	✓	✓	✓	✓				
All Projects Reviewed					\$66.2		\$66.2	

Figure 41 Summary of Dam Safety Upgrade Project Reviews for Historical Years

Project	Prudence Assessment	Efficiency Assessment			FY19-20 Cost \$FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgrade Works	✓	✓	✓	✓	\$80.5		\$80.5	
Burdekin Dam Upgrade Works	✓	✓	✓	✓	\$12.7		\$12.7	
All Projects Reviewed					\$93.2		\$93.2	

Figure 42 Summary of Dam Safety Upgrade Project Reviews for Transitional Years

Project	Prudency Assessment	Efficiency Assessment			FY21-24 Cost \$FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgrade Works	✓	✓	✓	✓	\$21.0		\$21.0	
Burdekin Dam Upgrade Works	✓	✓	✓	✓	\$283.9		\$283.9	
All Projects Reviewed					\$304.9		\$304.9	

Figure 43 Summary of Dam Safety Upgrade Project Reviews for the Price Path Period

Project	Prudency Assessment	Efficiency Assessment			FY25-53 Cost \$FY19			
		Scope	Standard	Cost	Claim	Adjust.	Accepted	% Deduct
Fairbairn Dam Upgrade Works	✓	✓	✓	✓				
Burdekin Dam Upgrade Works	✓	✓	✓	✓	\$35.1		\$35.1	
All Projects Reviewed					\$35.1		\$35.1	

Figure 44 Summary of Dam Safety Upgrade Project Reviews for Beyond the Price Path Period

8.4 Stakeholder Submissions

Stakeholder submissions were made with comment on the Burdekin Fall Dam Safety Upgrade Work. The transparency of the project was questioned due to the project description, feasibility study, business case, or statutory drivers not being made available to the stakeholder. These documents were made available to AECOM in its review. This included the dam portfolio risk assessments, a comprehensive risk assessment, a concept design report, a hydrology report, and a preliminary business case. A brief summary of the documentation review is provided in AECOM's project review sheet in Appendix D.

9.0 Summary of Conclusions and Recommendations

9.1 Policies and Processes

We have made a number of findings and recommendations in Section 4.0. In summary:

- We strongly recommend that Sunwater undertake a comprehensive assessment of asset failures and use the outcomes to define the decay curves that will be used in projecting its future renewal program
- We recommend that Sunwater review the process of selecting projects for options analysis with the intent of ensuring greater consistency and ensuring that material projects within the five-year regulatory period are accounted for
- We recommend that Sunwater review the quality of the options analysis in terms of the nature of the options considered and the formal assessment methodology
- With regards to procurement policies and procedures, we recommend that Sunwater:
 - Improve quality control of issued documents
 - Aligns its risk matrices among its various divisions
 - Require a written proposal/methodology for all procured services, the details of which can be aligned to the risk/complexity of the requested service
 - Include specific reference to bribery and facilitation payment prohibition in the Code of Conduct
 - To ensure Sunwater's policies and code of conduct provisions are consistent with best practice; the Code of Conduct should include specific reference to bribery and facilitation payment prohibition; staff training on the Code of Conduct should include bribery and facilitation payment prohibition references and training should be provided to all employees.
 - Improve its records Management Process
- With regards to project management, we recommend that Sunwater:
 - Standardise and simplify its P3MF maps and tools
 - Improve its P3MF process with respect to giving the warranted attention to the Monitoring and Control process of the project lifecycle

9.2 Renewals Projects Sample Review

9.2.1 Historical Renewals (FY12-FY18)

There were 11 flood damage projects reviewed. Of these, we recommend adjusting two projects for \$0.3 million or 0.6% for prudence and efficiency reasons. Due to the innate urgency of flood damage projects, we have treated these adjustments as project-specific. Six projects also received proceeds from insurance claims and settlement thereby reducing the net cost of these projects. Of the non-flood damage related historical projects, we reviewed 17 projects representing approximately 10.6% of the total value of the projects (in \$FY19). For these projects, we recommend a deduction of 2.9% as an adjustment. This deduction is related to observed systemic issues and could potentially be extrapolated to the full historical project portfolio.

9.2.2 Transitional Renewals (FY19-FY20)

The project reviews for the transitional and forward renewals were completed on a whole of project/program basis. Project reviews often had costs in each of the three periods (transitional, price path, and beyond price path). That said, the costs and adjustments were disaggregated by period to establish recommended adjustments by period.

The total recommended deduction for systemic issues identified in the transitional years (FY19-FY20) that are not captured by the annuities assessment is 6.7%. Additionally, the total project-specific adjustment is \$571,000 and reflects adjustments to three projects.

The calculation of a percentage reduction for the systemic issues is based on the value of total adjustments recommended divided by the total value of all projects in the period. Any project-specific adjustments in the transitional years, have been identified and excluded from the systemic issues adjustment. Likewise, adjustments recommended for the same reasons as those in the annuities assessment have been excluded to avoid double counting.

9.2.3 Transitional Year Projects with Costs in Historical Years

Sunwater revised its previously submitted costs for 16BAL12 – Beardmore Dam – Thuraggi Channel Repair in FY19 from \$1.34 million for FY19 to \$3.58 million in FY19 and an additional \$2.70 million to be incurred in FY20. This project was included in the assessed sample for transitional period (FY19-FY20) projects. AECOM also noted costs incurred and claimed by Sunwater in the historical years FY16-18 of \$874,315. Documentation reviewed in response to RFI FR52 suggests an agreement by Sunwater to claim only half of these historical costs due to identified inefficiencies. We therefore recommend a project specific deduction of \$423,658 for costs incurred for the project 16BAL12 in the historical period FY16-18.

9.2.4 Forward Renewals in Price Path Period (FY21-FY24)

The total recommended deduction for systemic issues identified in the price path period (FY21-FY24) that are not captured by annuities assessment is 1.6%. This particular systemic adjustment is based on one project in this particular period, however this deduction has been recommended as a systemic adjustment due to similar systemic cost estimation issues, which have been observed in four other projects in the transitional period and beyond price path period. Additionally, the total project-specific adjustment is \$452,000 and reflects adjustments to four projects.

The calculation of a percentage reduction for systemic issues has been done using the same method as that for the transitional years. Any project-specific adjustments in the price path period years have been identified and excluded from the adjustment for systemic issues.

9.2.5 Forward Renewals beyond Price Path Period (FY25-FY53)

The total recommended deduction for systemic issues identified in the beyond price path period (FY25-FY53) that are not captured by annuities assessment is 3.0%. Additionally, the total project-specific adjustment is \$942,000 and reflects an adjustment to one project.

The calculation of a percentage reduction for systemic issues has been done using the same method as that for the transitional years. Any project-specific adjustment in the price path period has been identified and excluded from the adjustment for systemic issues.

9.2.6 Stakeholder Submissions Post QCA's Draft Report

Stakeholders responded to QCA's Draft Report with a number of submissions related to scope and costs for projects in the historical, transitional, price path and beyond price path periods. Most of these projects were not in the assessed sampled projects, therefore, a number of select additional reviews were conducted and our responses to the issues raised in these submissions as related to those select additional reviews are within the respective report sections. In conclusion, we recommend an additional deduction for the project "(0000018910) Replace 1 Cumec Flygt Submersible Pump" in the Moura Off-stream Storage (MOSS) of \$0.34 million.

9.3 Annuities Assessment

We have made a number of findings and recommendations in Section 7.0. In summary:

- We recommend that the QCA specify a 30-year period for the annuity calculation, giving consideration to long-asset lives.
- We have identified a number of issues with Sunwater's project program for the annuity, including inconsistent data classifications and inconsistent use of condition data, and recommend that Sunwater address these.
- We observed inconsistent cost estimating for projects included in the annuity and recommend that Sunwater take action to improve its controls of this process.
- We recommend that Sunwater initiate a comprehensive review of failure distribution for its critical assets and use that to develop its own evidence-based deterioration curves.
- We suggest that a proposed increase in asset service lives by 10% be applied for calculating the annuity, unless Sunwater can demonstrate that this would result in an unacceptable increase in service failures.
- We recommend that our revision of Sunwater's data as specified in Section 7.4.2 be used for calculating the annuity, which includes an adjustment for overly-conservative renewals timing and issues associated with major refurbishment projects in bulk water schemes. In summary, on the basis of adjustments to asset lives (and the resulting delay to renewal activities) and adjustments to specific bulk water scheme refurbishments; we recommend that, the value of annuities (in \$FY19) for the price path period be reduced from \$65.9 million to \$59.7 million, a reduction of \$6.2 million or 9.4% and the value of annuities (in \$FY19) for beyond price path period be reduced from \$932.0 million to \$664.4 million, a reduction of \$267.6 million or 28.7% . This adjustment is primarily a prudence adjustment to account for overly-conservative renewals timing, and issues associated with 'Replace/Refurb: Grout Anchors, Drains, Concrete' refurbishment projects.
- We have noted the value of using service interruption frequency and also interruption duration in guiding asset management priorities. We recommend that include maximum interruption frequencies in its NSPs and use these to guide asset renewal.

9.4 Dam Safety Upgrade Projects

A number of observations in the dam safety upgrade project reviews were made that would have improved project performance, but no adjustments were recommended. The observations were related to inefficiencies in the design phase and discrepancies in cost estimates and budgets. The magnitude of the cost impacts from these findings, for these particular projects, would be small due to the overall magnitude of the projects' construction costs.

9.5 Timeline and Data Challenges Experienced During the Review

The QCA engaged AECOM to undertake the assessment of the prudence and efficiency of the Sunwater's historic and forecast renewals expenditure in specified water supply schemes and distribution systems, and of forecast capital expenditure on dam safety upgrades as part of the Rural Irrigation Price Review 2020–24.

During the Inception Meeting undertaken in January 2019, the detailed project plan was finalised in consultation with the QCA. This plan called for a full draft report in mid-April and a final report in mid-May 2019. One of the biggest project risks mentioned in our proposal and considered in the subsequent project plan was related to availability of timely documentation and that the documentation is of sufficient quality to enable the desktop reviews.

This review has primarily been a desktop review, with several rounds of requests for additional documentation to clarify particular issues in relation to the projects being reviewed. A number of face-

to-face meetings were also held to augment the understanding of the provided information or for clarifying the emerging queries.

AECOM appreciates Sunwater's approach to having a single point of contact for project queries and setting-up of a dedicated email address. Use of a central repository for data in form of 'SharePoint' set-up by the QCA was also very helpful.

However, AECOM wishes to note the data related challenges experienced during the review including, determination of representative project samples (the original submission contained over 90,000 project entries for the FY19-FY53 period. We consolidated this by maintenance code, resulting in a consolidated list of over 14,000 projects. We note that a number of these items related to the same project e.g. divided by stage or year but had different project numbers with no clear or consistent means of linking these); delays in the provision of information for projects in the review sample, wide-ranging changes to data during the course of the project (resultant of both the revised renewals submission and revisions in project documentation), many instances where there were gaps in the information provided or where the provided data was of poor quality and not readily usable, and had to be interpreted and manually manipulated to enable its use. The data challenges have been noted throughout the report. The lack of the full range of documentary evidence and the lack of consistency in those documents provided means that we have in many cases had to rely on professional judgement to make an assessment of prudence and efficiency and to assign a relatively low level of documentation quality to some of our findings.

Additionally, Sunwater provided a revised submission in June 2019, after our review was due to have finished, in accordance with the original project program. This required us to rework the analyses, compare the original November 2018 submission with new June 2019 submission and extract numbers from a mix of different data sets to undertake the level of analysis required for the benefit and thoroughness of the review. As a result, substantially increased time and effort was needed to ensure that AECOM was able to support the QCA in meeting the requirements of the ministerial direction.

We note that significant changes occurred in Sunwater's revised June 2019 renewals submission. As discussed in Section 7.2, we consider that a portion of this data should have already been accounted for in the original November 2018 submission. Given that this is not the first time that such a pricing review has been undertaken, it is reasonable to expect that Sunwater has a streamlined process for accumulating and disseminating the information required for such a review. We therefore suggest that Sunwater reviews the manner in which it prepares for such pricing reviews and that Sunwater develops internal procedures and processes that aids in a robust review for the benefit all stakeholders.

Appendix A

Project Reviews for
Historical Renewals

07PIO05 – Palmtree Creek Outlet Works

Project Overview

The replacement of the regulating valve RV01 of the Palmtree Creek Pipeline undertaken by Sunwater was deemed prudent by Sunwater. The main Palmtree Creek Pipeline had experienced a number of problems with the regulating valve potentially causing a water hammer scenario in the pipeline. This could lead to rupture of the pipeline causing a number of safety and environmental issues. The scope of works is detailed as investigation, procurement and installation of a suitable regulating valve. The level of documentation is of a low to medium quality. The consequence of the inoperability and the risks of continued operation without the valve being inoperable are not clear.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$955,558
			Standard	✓	Impact of findings on claim	\$90,658
			Cost	✘	Total Accepted	\$864,900

Background

Teemburra Dam supplies raw water to customers along Pioneer Valley and water from Saddle Dam Number 2 is transported by the main Palmtree Creek pipeline, supplying Palmtree Creek. The Palmtree Creek pipeline has a second offtake towards the end of the pipeline which supplies to irrigation farmers via a series of pressure reducing valves. The main pipeline has experienced a number of problems and catastrophic failures. In 1996, as part of the construction of the Teemburra Dam, ██████ supplied the original regulating valve that suffered a number of issues before failing in September 2001. In 2007, ██████ supplied another valve, under the commissioning process in April 2008, and the bronze ported body had failed. This was replaced in November 2008 by a redesigned and strengthened ported body. The bursting disc that relieves high pressure associated with the valve had burst. High levels of vibration due to high velocities within the chamber were noted. These discs were replaced and subsequently burst again. It was identified that due to the level of vibration, metal fatigue could cause the valve to fail closed and lead to a water hammer scenario in the pipeline. This was modelled and determined to potentially cause rupture leading to safety and environmental issues. As an interim measure, the old pepper pot type dissipater was re-installed with no internals until a final solution was implemented.

Options Assessment

An Options Analysis was conducted by Sunwater in July 2009. The report refers to another report titled 'Palmtree Pipeline Dissipater Valve – Waterhammer Investigation for Alternatives to Rupture Discs', which helped influence the options considered. In total, 12 different options were presented and their advantages and disadvantages were assessed. Three options were shortlisted including:

- Option 3.11 – Line with DN600 globe valve and break pressure tank, with smaller fixed flow orifice line branching off it;
- Option 3.12 – Single DN600 globe valve and break pressure tank;
- Option 3.9 – Install reducing station with 5 parallel globe valves and break pressure tank and remove Glenfield valve.

The study recommended Option 3.9 as the preferred option due to its range of flow control, no sudden valve closure causing waterhammer, eliminates the Glenfield valve, 5 parallel valves mitigate line blockage, and the likelihood of the relocated guard valve causing disaster is infinitesimal.

In the recommendation, one last additional option was presented. This involved a modified pepperpot design with bolt-on outlet spools that cater for different flow requirements. This would require manual changeout of the spool to change flow rates. Each changeout would require a minimum of three days, but this was considered acceptable as only eight flow changes per year would be required.

Two peer reviews were conducted – one, by [REDACTED] in April 2010, on the waterhammer analysis, the other, by [REDACTED] in August 2010, on the valve and system selection. The [REDACTED] report concluded that the DN600 globe valves would be pushing the limits of their technology and shouldn't be pursued. Instead, they recommended an end of line valve option such as a Bailey polyjet, a redesigned Glenfield valve, or the existing pepperpot with limited flow range adjustment. The preferred option, should Sunwater accept a manual solution, is the pepperpot. It was the least cost option.

Implementation

The project showed actual costs of \$955,558 spent from July 2011 to project completion in 2013. It was noted that the project had actually commenced in 2007 as part of the previous price path period, but the financial and procurement details provided are relevant to the current price path period (July 2012 onward).

The project scoping document budgeted \$769,950 for the work. This included \$489,000 for the supply and installation of the valves and piping. The quotes received totalled \$348,956 from [REDACTED] and [REDACTED]. \$28,129 was quoted by [REDACTED] for the water hammer review. The actual expenditure was \$394,918, which represents a difference of \$17,833. This may be attributed to the cost of the [REDACTED] review, whose quote or cost was not provided. There is no information documenting contractor variations but based on the final contractor costs, from the Total Actual Cost report, any variation would likely have been minor.

Competitive tendering was used for the butterfly valve, but only one bid was received. The pepperpot was later sole sourced to the same supplier [REDACTED]. Early engagement of other valve suppliers may have led to more interest in the project, and a more competitive price may have been received. That said, the [REDACTED] quote was in line with the budgeted amount.

The pipe modifications were granted a procurement exemption to sole source the work to [REDACTED] based on urgency. The urgency in the project has not been proven, therefore the need for the exemption is uncertain. That said, the cost was \$39,770 so a competitive bid would have had a minor impact on total project costs.

The total actual expenditure was \$955,558 was made over FY12 and FY13, which represents an overrun on the project of \$185,607. This can be attributed to non-direct Sunwater costs. The Sunwater labour had an overrun of \$80,417 beyond the budget. The actuals report also had a line item for Prior Year Expenses of \$10,241 which should be excluded. The total non-direct costs appear to be 53% of the total project costs, which is considered high. No supporting documentation was included to justify project overruns; therefore, it is expected that Sunwater would recoup some of the costs. The indirect and OH appears to be high too, but as this is managed through SAP, it is assumed as acceptable.

Findings

- **Prudency:**

This project is deemed to be prudent; however there is a lack of detail in documentation provided, specifically a business case, prioritisation process, project management reports, and a more detailed construction report. The project scope states that the design will conform to Australian standards.

- **Efficiency:**

In the best case, there is a whole suite of documents which describe the robust project management processes, detail contractor variations, and any changes to scope that affect both contractor and internal labour costs. These were omitted from the submitted documents. The valve replacement evidently had substantial technical challenges and resulted in a cost creep, primarily from Sunwater labour and indirect costs. Procurement processes were not effective to gain appropriate market conditions for material supply and installation. Expenses from previous years were also included which should not be part of this claim. For these reasons, the project was not considered efficient and a minimum of \$90,658 should be deducted.

11ETO06 – Brightley Pstn 1 & 2

Project Overview

Brightly PS comprises critical water supply infrastructure under the Eton Distribution Scheme. In an audit of Sunwater's electrical sites, it was found that the switchboards at Brightly PS 1 & 2 were obsolete due to their age. At the time of the audit in 2009, the switchboards at both Brightly PS 1 & 2 were noted as being 30 years old and in poor condition. The typical serviceable life of electrical infrastructure is 15 years.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$968,264
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$968,264

Background

Brightly PS comprises critical water supply infrastructure under the Eton Distribution Scheme. In an audit of Sunwater's electrical sites, it was found that the switchboards at Brightly PS 1 & 2 were obsolete due to their age. At the time of the audit in 2009, the switchboards at both Brightly PS 1 & 2 were noted as being 30 years old, in poor condition, and non-compliant with current Australian Standards. The typical serviceable life of electrical infrastructure is 15 years. The project is to replace the switchboards at Brightly PS 1 and 2 with switchboards complying with current Australian Standards. This project will also capture improvements in the control system by replacing the superseded relay control with Sunwater's standard specifications and current practices. Furthermore, it will enhance operator safety and improve Sunwater's ability to monitor the PSs remotely. Sunwater have a regulatory responsibility under the Eton Distribution Scheme and would be at risk of not meeting the agreed level of service should the pump stations fail as a result of obsolete switchboards.

Options Assessment

There was no documentation of an options analysis completed for this project. However, the recommended action per the Sunwater: Audit of Electrical Sites suggests the only viable option was replacement of the switchboards. At a minimum, an options analysis should have been completed to consider the consequences of doing nothing, as well as the type of switchboard to be installed (Sunwater standard or otherwise).

Implementation

Cost estimates and actual expenditure went through several iterations. The Cost Estimate 2011 November spreadsheet estimated the combined replacement cost for PS 1 & 2 as \$550,189.

In April 2012, the switchboard replacements for Brightly PS 1 & 2 underwent a competitive procurement process, which was also scoped to include switchboards at two other locations unrelated to the project (Cania Dam and Theodore PS). Three suppliers were invited to tender and two offers were received. The contract was awarded to [REDACTED]. The cost for PS 1 and PS 2 switchboards were \$367,817 and \$335,699 respectively, excluding contingency and GST. The total budget was \$703,516. Adding 10% contingency and GST, the budget was therefore \$852,464. The contractor's fee was representative of market conditions at the time and are justified.

The Prudency & Efficiency 2012 July document shows a new project contractor cost of \$755,718 to account for contractor variations to increase the radio mast heights. These variations included \$46,365.80 for pole supply and install, and \$4,480 for soil testing/footing redesign, both excluding GST. The document lists various other variations but it is unclear whether they apply to the Brightley

PS or the Cania/Theodore locations. The final contractor costs reported in the Total Actual Summary are \$756,868, which indicates the works were delivered as quoted (or close to).

The Prudency & Efficiency 2012 July document describes a disorganized execution and budgeting of the works over the three financial years. It also states the original budget (in the ■ audit) only included switchboard costs, none of the associated equipment, design, supply and installation costs. The document also states that significant expenditure was incurred early in the project prior to construction as a result of indirect costs, procurement and legal. It recommended a maximum of 10% for indirect costs for a project of this type.

The switchboards and controls were commissioned in December 2012. A 2014 Prudency and Efficiency document shows a small increase of \$3,274 after construction had completed. This was for uploading CAD files.

A summary of expenditure, as provided in the Total Actual Costs document, shows the total cost for Contractors – Construction & Minor Works was within the budgeted contracted amount. The total non-direct costs were 27% of the total project costs, representing a reasonable expenditure. The indirect and overhead costs were 18%. Despite no information on what percentage the overhead contributes in the 18%, it is assumed the indirect portion would be close to the 10% figure recommended in the Prudency & Efficiency document.

The total final project cost was \$1,037,850 with \$968,264 being spent in FY12-FY14. Despite being higher than the original budgets, it appears this project was delivered efficiently as a whole.

Findings

- Prudency:

The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Eton River Water Supply Scheme.

- Efficiency:

This project lacked documentation in several key areas that would have justified the replacement works undertaken and the funds that were exhausted. The original budget was under-scoped and underestimated and was not an accurate representation of the final funds spent. Alternatives were not formally assessed. Overall, the quality of documentation is low and did not demonstrate appropriate project management processes were followed. That said, the contractor was competitively bid and matched market conditions. It comprised the majority of the project costs. Final non-direct costs (27%) were lower than typical Sunwater projects. For these reasons, the final project costs appear to be efficient.

12BYR17 – Boondooma Dam

Project Overview

Boondooma Dam suffered extensive damage during the January 2011 floods and was unable to be accessed and managed safely in its post-flood condition. Integral components that were adversely affected include the spillway access road, spillway chute, spillway walls, and erosion control structure. This project is part of a program of works to restore various flood mitigation structures to their pre-flood condition.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim	\$36,628,761
		Standard ✓	Impact of findings on claim	\$0
		Cost ✓	Total Accepted	\$36,628,761

Background

Boondooma Dam forms an integral part of Sunwater’s water management infrastructure under the Boyne Supply Scheme. During the floods in January 2011, the upper and lower spillway chutes were impacted by significant scouring. The design of the dam (i.e. unlined spillway) accepted the risk of scouring during flood events and considered the cost of scouring repairs to be less than the cost of a concrete spillway. The December 2000 Dam Safety Review Report states that the dam already had a history of scouring repairs after flood events such as in 1983, which involved subsequent repairs with 2,200 m³ of concrete for the spillway floor. The 2011 flood led to significantly larger scour damage than previous floods and geotechnical reports and the 2000 Dam Safety Review report concluded that the further scouring could lead to instability of the spillway crest.

Emergency repair works were implemented in FY12 followed by detailed design and construction of a long-term solution, improving upon the pre-flood condition of Boondooma Dam.

Options Assessment

Option assessment occurred throughout all stages of the design. The concept design considered three options. The options, and their cost estimates (+/-50%) were:

- Reinstatement pre 2011 profile (not pursued in study)
- Reinstatement post 1983 essential performance criteria (\$99M)
- Hydraulic jump / stilling basin (\$187M)
- Flip / ski-jump (\$147M)
- Impact block plunge pool (not pursued in study)

It was recommended that further investigation of the consequences of spillway failure be done and if a long-term option is required, the flip / ski-jump option be pursued. It is also noted that lining of the upper spillway chute would be required under any option.

The intermediate phase and preliminary design report studies five options. The options and their cost estimates (excluding contingency) are:

- Option A: improve the spillway chute performance beyond its original state (pre 2010/2011 flood) via hydraulic jump or stilling basin such that it could withstand all future flood events up to AEP 1 in 10,000 years with minimum damage (\$169M)

- Option B: return the spillway to an 'as was' profile. This option aimed to satisfy the essential performance characteristics of the spillway and return the spillway to "as was" functionality (\$102M)
- Option C: Ongoing corrective maintenance only (\$12M)
- Option D: Undertake works to stabilise the spillway upper chute and construction of a new ogee crest upstream (\$77M)
- Option E: Strengthen the existing crest (\$38M)

With the support of a Technical Review Panel, the preferred option was determined to be Option E but since the spillway chute would remain unlined downstream of the crest, the risk of scour remains; therefore, Option E would also require a monitoring of the chute and walls and corrective maintenance when required.

Implementation

The initial flood damage occurred in January 2011, with subsequent damage occurring in January 2013. Photos, geotechnical reports (2011, 2012, 2014 and 2016), and damage inspection reports clearly show the extent of damage and the need for the project. The reports conclude that the spillway had suffered extensive scour damage and the dam is at risk of further erosion and instability.

Emergency repairs were conducted in FY12 in response to the 2011 flood, which involved installation of anchors upstream of the ECS. Additional emergency repairs (filling scour holes with concrete) were conducted following the 2013 flood. In the meantime, an extensive design and peer review process occurred from 2012 to 2017 with the following reports:

- December 2012 - Concept Design Report
- December 2015 – Preliminary Design Report
- July 2016 – Detailed Design Report
- November 2016 – Issued for Construction Addendum to Design Report
- June 2017 – Issued for Construction Drawings

The detailed design report included a cost estimate (-5%/+10%) of \$38M, which involved \$23M in construction works, \$5.9M in owner's cost, and \$8.2M in contingency.

A procurement plan was prepared in June 2016, which recommended engaging one principal contractor to undertake all works as a single contract. It estimated procurement would be finalised and construction started by November 16. The October 2016 offer recommendation report stated seven offers were received. The offers were evaluated on offeror capacity, capability and price. The preferred offer had the highest non-price score and third lowest price at \$13.4M. A budget of \$15.4M was recommended.

The project also included procurement of \$2.23M of various preliminary and supporting services. These are summarised in the table below. While the majority of scope was sole sourced, the higher value scope items were generally competitively procured.

Table 1 Procurement Summary of Supporting Works

Scope	# of Quotes	Quote (Budget)	Exemption / Evaluation Notes
Technical Review Panel Geologist for Option D	1	\$30k (\$36k)	Urgency, replacement of panel member
3D ADV Probe	1	\$19k (\$19k)	Urgency, to allow hydraulic modelling
Geotechnical Design for Option E	3	\$54k (\$60k)	No info on non-successful offeror's prices
Borehole Imaging	1	\$43k (\$43k)	Sole/limited supply
Contract Superintendent	1	\$114k (\$125)	Sole/limited supply (previous experience with Sunwater)
Drilling	3	\$382k (\$459k)	Two successful offerors
Excavation Services 1	3	\$100k (\$120k)	Lowest price and most experience

Excavation Services 2	2	\$46k (\$56k)	Lowest price and most experience
Geotechnical Assessment for Business Case	1	\$26k (\$30k)	No information whether competitive
Geotechnical Drilling	4	\$450k (\$495k)	Two successful offerors
Geotechnical Investigation	1	\$27k (\$34k)	Sole/limited supply
Hydraulic Modelling of Option D	1	\$34k (\$40k)	Urgency
Options Analysis	1	\$139k (\$139k)	Two suppliers declined to submit
Power Pole Relocation	1	\$111k (\$130k)	Sole supply
Probit Advisor	1	\$15k (\$15k)	Standing Offer Arrangement
Seismic Profiling	1	\$32k (\$37k)	Only other supplier declined
Transducer and Data Logger for Hydraulic Modelling	1	\$22k (\$25k)	Urgency
Geological Mapping	1	\$10k (\$10k)	Project familiarity. Sole source (\$23k) previously recommended to other consultant based on project familiarity which is contradictory.
Electrical Services for Operator Houses	1	\$12k (\$12k)	Limited supply
Downhole Cameras	1	\$51k (\$51k)	Limited supply
Cost Estimator	1	\$12k (\$12k)	Cost expected under \$10k
Geotechnical Drilling for Detailed Design	3	\$500k (\$500k)	SPP only, not the ORR. Two successful offerors proposed
TOTAL ALL	-	\$2.23M (\$2.45M)	-

The construction was completed in March 2018 with practical completion in June 2018. Per the Project Closure Report and Post-Construction Report, the total project expenditure was \$37.8M against a revised budget of \$41.2M compared to an original budget of \$51M.

Of the \$37.8M, \$20.6M was attributed to the principal contractor. The final principal contractor cost was \$6.7M higher due to variations. PCRs #2 through #10 documents a total draw-down of the \$9.9M contingency to \$3.15M by May 2018. Several variations were attributed to latent risks being realised during construction. Each variation to the original approved budget was adequately documented and justified. The final executed fee for the project was within the original budget described in PCR #1 and is therefore considered acceptable.

The total project costs at the end of the project are shown in Table 2.

Table 2 Total Project Costs per PCR #10

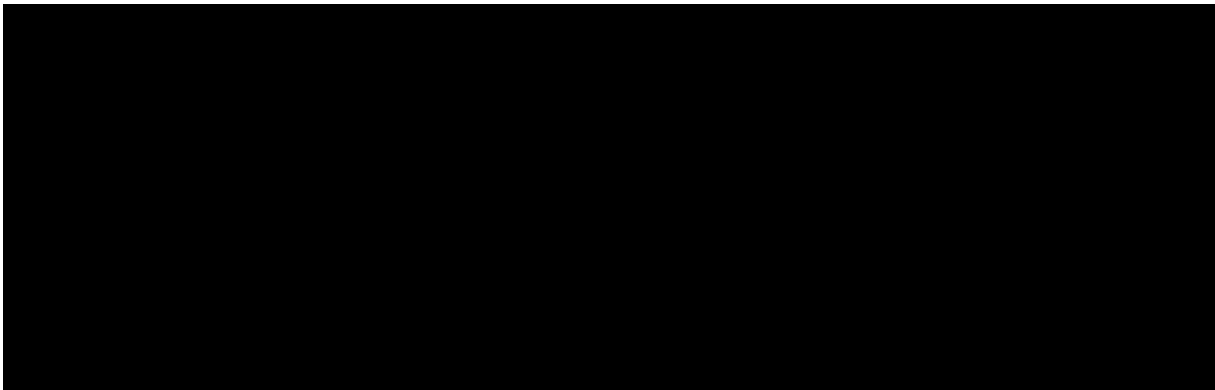
WBS	Original Budget	Revised Budget	Forecast Final Cost
2010/11 Emergency Repairs	\$1,001,769	\$1,001,769	
2013 Emergency Repairs	\$270,405	\$270,405	
Concept Design and Options Analysis	\$3,165,479	\$3,165,479	\$3,165,479
Preliminary Design	\$3,542,786	\$3,542,786	\$3,542,786
Legal Costs (to 30 June 2014)	\$606,267	\$465,370	\$465,370
Detailed Design and Procurement	\$3,665,667	\$3,402,152	\$3,402,152
Construction and Closure	\$29,800,000	\$25,819,842	\$26,201,187
TOTAL (excl. Contingency)	\$42,052,373	\$37,667,803	\$38,049,148

Contingency	\$4,383,569	\$3,532,198	
TOTAL (incl. Contingency)	\$51,052,373	\$41,200,001	\$38,049,148
TOTAL (incl. Contingency and Savings)	\$51,052,373	\$51,100,001	\$38,049,148

It is noted that the total project costs in Table 2 are likely not all included under project 12BYR17. At least three projects (and potentially others) have been used for the project. This includes

- 12BYR11 (\$1,001,948 for the 2011 emergent works)
- 12BYR12 (\$188,899 for geotechnical mapping)
- 16BYR07 (\$591,181 for legal fees)

The sum of these three projects as well as 12BYR17 (\$36,628,761) leads to a total project cost of \$38,410,789 which is close to the reported total in Table 2.



The original design intent of the dam appeared to allow the spillway to incur scour damage during flood events. This involves a trade-off of lower initial capital investment vs larger ongoing repair costs. The 2011 and 2013 floods incurred larger scour damage to the spillway chute and the erosion control structure than previous floods. Through extensive engineering and options assessment, Sunwater has decided to continue a similar approach of reduced capital investment and continue post-flood remedial works. To line the spillway with concrete and build a dissipator, the cost would be close to \$200M (e.g., Option A in the concept design report). The preferred option, instead of preventing scour damage, involves constructing defensive measure to mitigate the scour and risk of failure of the spillway crest. This option had a much lower capital cost of \$38M.

The selection of the preferred option was well documented with significant engineering and the use of a technical review panel. The option was not only the least cost technically acceptable option but it was also delivered below budget.

Findings

- Prudence: The damaged structures are critical to the safe operation of the Boondooma Dam and its role in managing water during flood events. The extent of damage resulting from the January 2011 and 2013 floods was well documented, with several geotechnical investigations supporting its repair. Multiple risks to the structural integrity of the spillway were identified and justified immediate repair works. The project scope was well-defined and its development in time was justified due to additional flooding affecting initial repair works. Extensive engineering and technical review were conducted to conclude the preferred option. In this regard, the prudence of the project scope is justified to a high level of confidence.
- Efficiency: The project appears to have followed a structured project management process. The project scope and cost developed over time due to additional damages from subsequent flood events hindering initial repair works. Throughout the project life, these variations were effectively documented and justified. The quality of documentation provided is of a high quality and thoroughly details the processes undertaken from project inception to completion. Adequate and appropriate procedures were followed regarding project management, design development, technical reviews and procurement. A competitive procurement process was undertaken for the majority of the project value. The total actual project costs were less than the P90 cost estimate provided by a third party. The project has been executed within the total approved budget. For these reasons, the project is considered efficient.

12LFZ12 – Eden Bann Weir

Project Overview

This project forms part of a program of works to undertake non-routine repairs of various water supply infrastructure. As a function of time, the control system which operates the fishlock at Eden Bann Weir has become obsolete. To reduce operational risks, Sunwater seek to upgrade the system.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$139,241
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$139,241

Background

The control system at Eden Bann Weir has become obsolete due to its age. The original programmable logic controller (PLC) and SCADA units were built and installed in 1999. This is in-line with Sunwater’s standard serviceable life of electrical equipment generally being between 10-15 years. Several components critical to the control system have been identified as no longer supported by the manufacturer. These obsolete parts relate to Sunwater’s compliance obligation of operating the control system and fishway under The Waterway Barrier Works Development Approvals (Fish Habitat Management Operational Policy FHMOP 008). This justifies the upgrade of the control system.

Options Assessment

Three options are considered in this analysis:

- Option 1: Replace the control system with Sunwater Standard PLC Hardware (Schneider);
- Option 2: Replace the control system with Non Sunwater Standard PLC Hardware (Allen Bradley);
- Option 3: Do nothing.

The conclusion for this option analysis is a recommendation to select Option 1 because this offers the highest benefit at the lowest cost. Running the fishlock manually was considered but dismissed due to prohibitive labour costs (\$0.5M p.a.).

Implementation

A capital expenditure claim of \$139,241 was made to QCA.

The September 2013 Project Scope document estimated \$35,341 to undertake a site visit, prepare the options analysis, and prepare design and drawings.

The Options Analysis was completed in December 2013 and the preferred option, Option 1, was estimated at \$146,208. Option 1 was chosen based on cost and integration with other PLC software used by Sunwater.

Despite the Options Analysis stating the assets would be procured following Sunwater’s Standard Purchasing Policy, due to the urgency of the project, an exemption from the competitive offering process form was approved. An invitation to offer extended to [REDACTED] for the PLC and SCADA upgrade. The offer was received in September 2014. In March 2014 the contract was awarded to [REDACTED] for \$88,796.24 (ex. GST). A budget of \$97,676 was allocated to include a 10% contingency.

No cost breakdown of final actual costs was provided; however, the Project Closure Report states the work was completed in March 2015 and the asset cost reported at \$88,796.24; therefore, it is assumed there were no contractor variations. It can then be concluded the non-direct costs for the project were 36% of the total project costs, which can be considered low compared to other Sunwater projects. The project was also delivered for less than what was estimated in the Options Analysis. The project cost is therefore deemed efficient.

Findings

- Prudency:

The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade; it is an essential renewal required to maintain a service and forms part of Sunwater's regulatory compliance. As the control system was identified as being obsolete at time of inspection, immediate works are justified. The assessment of the equipment age was in line with industry standards for life expectancy. Project prudency was effectively demonstrated, as failure to operate the fish lock due to obsolete controls would be a breach of Sunwater's regulatory requirements.

- Efficiency:

As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed; however, the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Although the information provided was generally high quality, there was a lack of information regarding incurred project costs. That said, the overall cost generally aligns with the scope of works that is described, was under the original budget, appeared to have no contractor variations, and had low non-direct cost. For these reasons, the project cost can be considered efficient.

Mareeba Supply (BW-MBM)

12MDA57 - Tinaroo Dam Gallery Light Replacement

Project Overview

Replacement of the lighting system within the gallery of the Tinaroo Falls Dam (TFD) was deemed as essential by Sunwater for a number of reasons. An inspection carried out on the lighting system documented it to be in poor condition, Chryotile Asbestos was found to be present in the light gasket material and the system’s electrical layout did not comply with current standards. The scope of the project was to replace the gallery electrical system in full and also separate the emergency lighting so that it was on an independent circuit.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$480,001
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$480,001

Background

In September 2014, a team consisting of five Sunwater employees and electrical sub-contractors inspected the electrical equipment at Tinaroo Dam to determine the condition of the assets, assess their compliance to Australian Standards, and to identify any other opportunities for improvement.

The inspection identified issues which presented health and safety risks to personnel entering the gallery of the TFD, including:

- The lighting system was found to be in an overall poor condition. Sub-contractor’s observations noted deterioration of cables, wiring and junction boxes, excessive corrosion, ingress of moisture, and use of an incorrect power source for emergency/exit lighting;
- Electrical tests demonstrated low insulation resistance, suggesting a high risk of failure of emergency/exit lighting in a power outage scenario, and lighting gaskets were found to contain asbestos and therefore present a health risk;
- The vast majority of assets that make up the lighting system were determined as having reached end of life according to current industry standards ¹.

The team recommended that the issues be addressed as soon as reasonably possible.

Options Assessment

Sunwater considered several potential options to deal with issues observed on the TFD gallery lighting/electrical systems:

1. Engagement of a contractor to replace the distribution boards only, and replacement of faulty bulbs under the maintenance budget;
2. Engagement of a contractor for full replacement of the electrical system and separation of emergency lights to an independent circuit;
3. ‘Do nothing’.

The ‘do nothing’ option was immediately ruled out by Sunwater because the risk of workplace injury had been determined to be high. Option 2 was more expensive than option 1 but was selected as the preferred option because it would significantly lower the risk of injury to personnel through electrical fault or inhalation of asbestos².

¹ Tinaroo Falls Dam , Electrical Conditions Assessment 2014.

² Renewals Detailed Options Analysis, Mareeba – Dimbulah Water Supply Area, 18 March 2015.

Implementation

Over the course of the next 3 years Sunwater revised the project scope several times. The initial scope included removal of asbestos lighting gaskets and replacement of lighting systems, and this evolved to include replacement of lighting, cables, power distribution boards, junction boxes and power outlets, and separation of emergency lighting to an independent circuit.

Sunwater's initial cost estimate was \$10,324 and this was revised to \$155,782 in February 2015 after increasing the scope to factor in all required works. In January 2016 an "Offer Recommendation Report" was compiled by Sunwater referring to two tender offers, both of which were significantly higher than Sunwater's estimate. This cost increase was attributed to the increased quantity of light fittings required to satisfy the Minimum Illuminance Australian Standard (AS1680) and the requirement for upstream distribution modelling and verification (originally omitted at the scoping/budgeting stage of the project). Sunwater selected the bid that offered the best value for money (\$248,182) and increased their total cost provision for the works to \$396,495 in February 2016, noting that the quotes received necessitated an increase in budget to complete the project.

In October 2016, the cost estimate was revised again to \$447,564 citing an additional requirement for final inspections and close-out in FY17. In July 2016 this cost estimate was revised again to \$480,564 (an additional \$33,000). Sunwater later (in an email dated May 20, 2019) clarified mistakes in the Prudency & Efficiency documents, correcting the October 2015 cost revision to \$403,089 (from \$447,564). The July 2016 revision was corrected to \$436,089 (from \$480,564). The May 2017 Prudency & Efficiency document (as corrected by Sunwater) had a final revised budget of \$479,227 to allow completion of engineering drawings, final documentation, and entry to DIS system. The final capital expenditure claim for this project came to \$480,001.

A cost tracking spreadsheet³ provided by Sunwater laid out the project costs in detail and includes associated project costs dating back as far as FY 2012 (although the documentation provided only dates back to April 2014). The breakdown of costs for this project are as follows: \$69,300 in internal Sunwater labour, \$140,400 in Sunwater Indirects and Overheads, \$252,900 in contractors, construction and minor works expenditure. Sunwater's internal costs (labour, indirects, overheads, materials, travel, etc) represent a 47% of the total project cost which is average for Sunwater electrical projects.

Findings

- Prudency:

The project is deemed prudent because it seems clear that the asset had reached the end of its life and posed a risk to the health and safety of the personnel entering the TFD gallery.

The decision to fully replace the electrical system was made based on risk assessment as described in the Renewals Detailed Options Analysis report. The works completed as part of the project were effective in allowing the system to conform to current industry standards. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

The project was delayed (from the initial recommendation) and project expenses were incurred over several years. It is not clear why these delays occurred. The original project cost estimated significantly underestimated the scope of work, particularly the total number of light fittings to meet Australian Standards. Both of the two contractors who quoted on the project had quotes significantly higher than estimated. The preferred contractor was almost \$137,000 less than the other bidder, which emphasizes the importance of competitive tenders. The contractor executed the work without variations. The non-direct costs were 48% of the total project costs. While high, this is typical for Sunwater electrical projects. Overall, the project appears to have been delivered efficiently.

³ 12MDA57 Total Actual Cost Summary

12NMA08 – Tartrus Weir – Flood Damage Repair – Protection and Erosion Works Refurbishment

Project Overview

Reinstatement of the downstream rock protection associated with the Tartrus Weir was deemed essential by Sunwater for a number of reasons. The significant erosion of the left and right bank abutments, undermining the concrete anchor beam to which rock mattresses are attached. The weir assists in the mitigation of floods in the area and the failure of this asset affects Sunwater’s regulatory obligation under the Nogoia Supply Scheme. The scope of the project was to repair the damage to the rock protection to prevent further damage to the asset and scouring of the weir structure.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$229,417
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$229,417

Background

During the 2011 flood, rock protecting the Tartrus weir was damaged and presented safety risks and evidence that this was undermining the weir. Sunwater has classified this asset as “Major” in terms of importance of the asset within the Nogoia Supply Scheme due to its role in preventing floods in the area. Part of the water management protocol is flood mitigation.

Options Assessment

Based on the information available, no options assessment was undertaken. It is likely no other suitable option was available to treat the damages noted in the Annual Inspection Report however a “Do Nothing” or deferring the proposed works should have been considered as part of an options assessment. Repair of the left bank rock mattresses was completed by backfilling rock material and replacing wire lids and rewiring as well as the addition of concrete around the edge of the rock mattresses. The repair of the right bank consisted of reinstating the missing rock protection and protection and stabilisation of the downstream edge of erosion protection. This was completed by the following tasks.

- Placing geofabric over the underlying soil to prevent fine erosion;
- Retrieval of displaced rock and deposited in the stream;
- Trim and profile downstream exposed edge of right bank erosion protection, install geofabric and import rockfill to restore bank profile;
- Remove trees growing through rock protection and all within 6 m of weir structure.

Implementation

The QCA A10 Historical Renewals spreadsheet states a total capital expenditure of \$229,417 was spread over three years. \$15,949, \$191,213 and \$22,255 was spent in FY13, FY14 and FY15 respectively.

An initial budget of \$156,689 was estimated by Sunwater. Sunwater’s initial cost estimate for remedial works during the Preliminary Business Case in October 2011 was \$254,811, including a 20% contingency. A revised cost estimate of \$225,090 was calculated, including a 15% contingency (2013).

In April 2013, the project scope broke down a total estimated cost of \$176,636 into \$72,000 for contractors, \$32,366 for internal labour, \$37,713 for internal overheads, \$31,977 for service charges and \$2,580 for travel and accommodation.

An offer for protection works was awarded to [REDACTED] trading as [REDACTED] for \$49,650 in March 2014 (after a competitive procurement process). Supply of rock from Montrose Mining (on a sole source basis due to proximity) was \$55,000.

The prudence and efficiency form indicates that there was an increase in the financial budget for increased rock and concrete materials and install during construction, from \$173,023 to \$191,000 (July 2014). These costs match with the initial project scope cost of \$176,636 and the QCA FY14 spend of \$191,213. There is little evidence on the expenditure for the Tarrus Weir remediation works in FY13 and FY15, which totals \$38,417. It is assumed this is attributed to internal Sunwater costs as indirect costs.

Findings

- Prudence:

This project is deemed prudent as it posed a flood mitigation risk to the Nogoia Supply Scheme. Loss of flood mitigation would detrimentally affect Sunwater's ability to meet service level agreements with customers. The treatment was suitable to restoring the existing infrastructure. The scope of works defined was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

The contractor/supplier portion of the expenditure (quoted at \$104,650) can be considered efficient as appropriate procurement methods were applied and quotes were within the range of the various cost estimates for direct costs. Approval for an increase in the budget to the supply and install of additional rock was well documented. As there was no breakdown of final project expenditure, no additional conclusions can be made on the remaining cost components. The total expenditure of \$229,417 is below the business case cost estimate and revised cost estimates, therefore the project costs are assumed efficient but document quality is low.

12SGA24 – Investigation and Works Required at Moolabah

Project Overview

The emergency works of the Moolabah Weir was deemed as essential by Sunwater for a number of reasons. The condition assessment provided evidence and justification that the repairs were required. The apron slabs of the weir had been lifted in various places, the clay embankment within the structure of the weir and left abutment was eroded, and several instances of advanced piping resulting in loss of storage through the weir. The weir is a regulating structure for releases from Beardmore Dam and forms a pumping pool for a number of upstream regulators. The failure of the weir presents issues in Sunwater’s Water Management protocol. The scope of the project was to repair the damages described prior to the upcoming wet season.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$639,046
			Standard	✓	Impact of findings on claim	\$45,019
			Cost	✘	Total Accepted	\$594,027

Background

During the 2012 floods, the Moolabah weir suffered damage and experienced its flood of record with a peak flow of 7,400 ML. Piping of embankment in three locations resulted in undermining of the crest and face slabs allowing some of the storage to be lost. Interim repairs were carried out to ensure the safety of the structure. The weir is a regulating structure for releases from Beardmore Dam and would present issue in Sunwater’s water management protocol if repairs were not undertaken.

Options Assessment

Sunwater considered several potential options to deal with issues for the Moolabah Weir and are listed below.

1. Replace weir with similar structure, an embankment protected with crest and face slabs of reinforced concrete;
2. Replace the weir with a steel sheet piling structure;
3. Decommission the weir and raise Beardmore Dam FSL to compensate for loss of storage;
4. Extend the interim repair work to secure the whole structure.

Option 3 involved the decommissioning of the weir, however this would not resolve the flood risk and would ultimately require works upstream at Beardmore Dam. Option 2 was the most expensive option, almost three times the cost of the chosen option. Option 1 was identified as the alternate solution should the dam break study find that there is population at risk. Option 4 was identified as the preferred treatment and was the least cost of the identified solutions.

Implementation

Sunwater’s initial cost estimate (April 2011) for direct and indirect costs of the project was \$207,732. The final report for the Moolabah Weir Upgrade (June 2012) details the options assessment and selected Option 4 as the preferred treatment at an estimated cost of \$530,600. In May 2013, there was a revised cost estimate for Option 4 totalling \$430,351 but this did not include the dam break analysis and is therefore not relevant. Sunwater was approved for exemption from competitive pricing for the various contractors. Many suppliers were sole sourced and short-form Offer Recommendation Reports were generated. Details of the contractors, their quotes, and procurement issues are shown in Table 1.

Table 1 Procurement Summary

Offer Recommendation Report	Contractor	Notes	Quote (exc. GST)	Approved Budget (inc. 10% contingency, exc. GST)
Plant Hire	[REDACTED]	Only provided rate sheet	\$44,000	\$48,400
Concrete Pumping		Only provided rate sheet	\$19,640	\$21,604
Civil Works		Only provided rate sheet	\$87,400	\$96,140
Reinforcement		Only scope item with multiple quotes	\$14,278	\$15,705
Concrete		Unite rates provided verbally	\$96,937	\$106,188
Concrete Cutting		Firm quote based on quantities	\$18,746	\$20,620
Excavator Hire		Hourly rate provided verbally	\$[REDACTED]/hr	\$ 6,380

A budget overrun of \$100,412 was recorded at project completion as per the Budget Overrun Note (May 2014). The report provides a line-by-line comparison for the variances and includes appropriate justification for the overruns. The additional costs were attributed to plant hire, concrete cutting/pumping, steel, survey, the dam break analysis, overheads and miscellaneous items.

It appears that the primary underlying reason for the overrun was improper scoping and errors in the original project cost estimate. Key issues included:

- Original cost estimate had incorrect quantity for concrete pumping;
- Scope was added for a cut-off wall, which affected steel reinforcement and concrete quantities;
- Larger than expected void spaces, which affected concrete quantities;
- Unaccounted for safety hazard for crest slab removals, which affected concrete cutting cost;
- Break-up and removal of waste concrete was not originally scoped;
- More difficult terrain led to 180 additional hours for dam break analysis (Sunwater labour).

That said, the procurement process may also have affected overruns. There were no scoping documents generated. Quoting was generally done by asking contractors for hourly or unit rates (by phone or email). Note that the concrete supply (+\$36,393) can be justified as [REDACTED] is the only local supplier.

The determined overspend that should be absorbed by Sunwater has been calculated as \$36,974 for the dam break analysis overrun quoted in the Budget Overrun Note. Had the work been appropriately scoped, including a site investigation, the work would have been more efficiently executed. Other overruns due to additional quantities required due to uncontrollable circumstances were appropriately documented and justified. They have been accepted.

In the 'QCA Information Request A10' and 'Project 12SGA24 Total Actual Costs Summary', the total expenditure cost has been documented as \$639,046 and differs from the Budget Overrun Note (May 2014) quoting a total expenditure cost of \$631,001. The line items in the Total Actual Costs Summary and Budget Overrun Note do not correspond and it is not clear where costs have changed. As such, the difference between the final capital expenditure cost \$8,045 is allocated as unjustified overspend that should be absorbed by Sunwater.

Table 2 Impact of findings on claim

Overspend Identified	Comment
\$36,974	Poor scoping of works resulting in inefficiency of dam break analysis
\$8,045	Inconsistency between Budget Overrun Note and Total Actual Costs Summary

Total overspend identified: \$45,019

Findings

- Prudency:

This project is deemed prudent as it posed a flood risk and other services and assets were reliant on the operation of the weir. Loss of the weir would affect Sunwater’s ability to service upstream regulators. The treatment was suitable to restoring the existing infrastructure. The scope of works defined was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

There were several inefficiencies observed in this project. Original budget estimations were loosely based on Project Manager experience from previous repair works. There were also errors in the quantities and rates. Cost estimation for material supply and plant hire could have been improved if a competitive purchasing process was adopted. All but one supplier / contractor were sole sourced with no clear scope, so a clear representation of market conditions could not be determined. Poor scoping and budgeting combined with exemptions from the competitive purchasing process resulted in the budget being overrun by 19%. Some of the deviations from the original budget could have been prevented by following the standard procurement process. Therefore, budget overruns should partially be absorbed by Sunwater. Furthermore, the quality of verifications of the quantities in BoQ should be improved to prevent large variances in the actual cost. It is noticed that some of the similar services were awarded to different suppliers. Had service be packaged to a single supplier, Sunwater would have more negotiation power. Furthermore, internal costs for contractor management should decrease. The proposed adjustment of \$36,974 is based on the overruns for the dam break analysis . For this task, had appropriate scoping and site inspection occurred, the work would have been conducted more effectively. Other overruns due to incorrect quantities and uncontrollable site conditions have been appropriately documented and are accepted. Lastly, the total cost from the Budget Overrun document omitted \$8,045 in project overrun. Without justification, this has been considered inefficient and added to the adjustment total. The total is \$45,019.

13BBA04 – Bjelke Petersen Dam

Project Overview

Bjelke Petersen Dam suffered extensive damage during the January 2013 floods and is unable to operate per its intended design. Several critical components that were adversely affected include the valve house, main electrical switchboard and hydraulic control cabinet. This project is part of a program of works to restore various flood mitigation structures to their pre-flood condition.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$386,726
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$386,726

Background

Bjelke Petersen Dam forms an integral part of Sunwater’s water management infrastructure under the Barker Barambah Supply Scheme. During the January floods in 2013, the valve house, main electrical switchboard, and hydraulic control cabinet were all submerged leading to extensive damage. The spillway floor also suffered damage from spalling. Temporary operation of the valves allowed water supply to continue but the risk of customer service interruption, WH&S incidents, and further equipment damage were increased.

Options Assessment

Based on the information provided, options analysis was limited to the type of concrete to be used for the spillway chute spalling repairs. For the remainder of the works, at the very least, a “Do Nothing” or deferring some or all the proposed works should have been considered as part of an options assessment.

Implementation

The flood damage occurred on January 29, 2013.

Three cost estimate tables, dated prior to the project scoping document, were provided for review. The total of the three estimates was \$599,007 although this includes varying levels of contingency amounts (likely done it error). The total without contingency was \$375,14. The estimates are:

- A February 8, 2013 cost estimate for the building clean-out, electrical and hydraulics works, and some minor road works shows total direct and OH costs of \$178,759 and a total project cost of \$357,518 including a 100% contingency.
- A February 8, 2013 cost estimate for replacement of marker buoys shows total direct and OH costs of \$28,293 and a total project cost of \$56,587 including a 100% contingency.
- A February 22, 2013 cost estimate for replacement of valve house repairs (hoist, dehumidifier, lighting, switchboard, etc) shows total direct and OH costs of \$168,093 and a total project cost of \$184,902 including a 10% contingency.

The project scoping document was completed in March 2013. The cost estimate in the scoping document was \$168,328, which does not match the sum of the previous cost estimates. It is noted that an accompanying March 2013 cost estimate showed yet another different project estimate of \$218,808.

A flood damage inspection report (designated inspection no 2) was completed in May 2013 and did not describe any major differences in required repairs.

A May 5, 2013 cost estimate shows repairs to the spillway floor estimated at a cost of \$13,756 including a 30% contingency.

A second project scoping document was created in August 2013 that describes scope to refurbish the concrete spalling on the spillway. The document states that accurate inspection of the damages could not be made in the May 2013 inspection due to high water levels. The scoping document proposed to sawcut, prepare, and apply Renderoc to the damaged areas prior to the December 2013 wet season. An increase of \$20,000 to the original budget was proposed.

A competitive procurement process for the valve house clean-up and the electrical and mechanical repairs was undertaken for a combined program including the Bjelke Petersen Dam site and four others. Three offers were sought and received. The procurement document also states the approved budget of \$342,246 (inc 30% contingency) at Bjelke Petersen Dam. The tender award recommendation was made to the lowest bidder on August 22, 2013.

A September 29, 2014 Prudency & Efficiency document requests an increase from \$21,000 for FY15 works to \$92,000. The increase was stated to be for Sunwater's internal management costs and variations from the contractor. The document appears to have been revised (i.e., second version was dated the same as the first version) to state a previous project value of \$179,696 and an increase to \$292,030 with justifications being the market price for the contractor was higher than budgeted, as well as the fact the original budget did not account for internal Sunwater contract management or the unforeseen contractor variations.

A procurement exemption for competitive quotes for the concreting spalling repairs was approved in November 2013 for up to \$20,000 based on project urgency to complete the works prior to the December 2013 wet season. A contract was awarded for \$19,041 (inc 10% contingency).

The project closeout report shows the project did not commence until March 2014 and stated the contractor was awarded other flood repair works and did not have the capacity to complete the total quantity of works as they were higher than originally estimated. The project was planned for completion in June 2014 but was extended to December 2014. The original contracted amount was \$284,000 and final was \$303,000. The total project cost was \$425,000 including Sunwater costs.

The final actual costs were stated to be \$386,726 including \$323,218 for contractors which roughly equals the sum of the main contractors cost of \$303,000 and the added concrete spalling repair scope of \$19,016. It is not clear why the project closeout report specified higher Sunwater costs than actual. The final costs are higher than those estimated in the project scoping document, but are within the range of the sum of the various February 2013 cost estimates.

The insurance payment summary in the Sunwater Insurance Register showed the claim matched the total actuals costs. The 27.1% deductible was \$104,998 leaving \$281,728 as the insurance proceeds.

Findings

- **Prudency:** The components affected by the floods are critical to the operation of the Bjelke Petersen Dam outlet works. In this regard, the prudency of the project scope is justified to a high level of confidence. The timing of the works was originally planned for prior to December 2013 and the start of the next wet seasons, but the contractor was unable to start until March 2014. It is not known whether the delay led to further damages. The project closure report details all the work done and it appears that the contractor assessed equipment condition and functionality prior to replacement/repair; thereby only replacing/repairing components as required.
- **Efficiency:** The project did not appear to follow a structured project management process and the cost estimation process was fragmented and inconsistent. That said, the final costs of \$386k were within the range of the various sources of original cost estimates. The \$303k of contractor costs were a large portion of the total costs and the bulk of which were procured with a competitive process; therefore, can be considered market price. The contractor variations were not well documented but have been assumed acceptable due to the nature of the remedial work where the full equipment condition and scope of works were not known at the time of quoting. For these reasons, the project has been assumed as efficient.

13BIA47 – Ben Anderson Barrage

Project Overview

The 13BIA47 – Ben Anderson Barrage project was undertaken in response to structural damage which occurred during the 2013 floods. The project involved initial damage inspection and emergent works, followed by major remediation works in response to Sunwater’s assessment of the damage to multiple items. This primarily involved structural repairs and reinforcement of the barrage, cathodic protection system repair, and electrical and mechanical systems repair.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$8,313,310
			Standard	✓	Impact of findings on claim	\$258,806
			Cost	✗	Total Accepted	\$8,054,504

Background

Ben Anderson Barrage forms an integral part of Sunwater’s water management infrastructure under the Bundaberg Supply Scheme. During the 2013 floods, large quantities of concrete rock protection were displaced from barrage’s water-retaining sheet pile. The stability of the barrage relies on the ability of the upstream row of sheet piling to provide a secure water retaining barrier to prevent seepage. If enough material is removed from the upstream side, the piling may become unstable and the toe may move upstream. Seepage could lead to the formation of pipes and eventually failure of the structure.

A probability of failure assessment was completed for the barrage, and the barrage was assessed as being incapable of operating as required. Major remediation works were deemed to be immediately required to rectify the functionality and structural integrity of the barrage. Without repairs, Sunwater would be at risk of breaching regulatory obligations under the Bundaberg Supply Scheme. Further, several safety risks were identified during the Flood Damage Inspection Report. For example, missing fencing and hand/guard railing presented a WHS risk to Sunwater staff and the opportunity for unauthorised access by the public.

The inspection report and inspection images have been sighted, and clearly support the implementation of the works.

Giving consideration to the age of the asset and typical life expectancies, the structure would typically be expected to have had a remaining life of approximately 65 years. However, the immediate timing of the works is considered to be prudent, giving consideration to the probability of failure informed by assessed asset condition, and the criticality of the asset.

Options Assessment

In the project scoping phase, there was clear consideration for alternative options for remediation works with recommendation of the best option.

Four options were investigated for the long-term upstream protection restoration as detailed in the Restoration Options Report Ben Anderson Barrage – Flood Repairs 2013 report dated March 2014:

- Option 1 involved reinstating the asset on a ‘like-for-like’ basis to pre-flood condition, at an estimated cost of \$4,776,000, but floods larger than that experienced could cause extensive damage;
- Option 2 involved pinned concrete blocks or mattresses anchored at the upstream toe with concrete piles, but these were considered to have insufficient weight to prevent uplift during high flood flows;
- Option 3 involved rockfilled gabions, but as with Option 2, it was rejected due to concerns with uplift;
- Option 4 involved providing upstream scour protection by installing sheet piling and concrete infill across the width of the barrage, at an estimated cost of \$6,592,000.

Option 4 was selected as the preferred long-term solution for the barrage repairs, based on its ability to withstand major flood levels which the existing structure could not. It is assumed that the existing unprotected post flood structure before repairs would only provide immunity for a AEP 1:30 flood event, whilst the Option 1 repairs would provide an immunity of better than AEP 1:170 which was the estimated probability for the flood of record in 2013. It was assessed that both options will only achieve the remaining 65 life as this is driven by the age of all other components in the structure.

The options analysis undertaken is considered sound in terms of delivering a scope of works that represents the best means of achieving the desired outcomes. It is also noted that the options were limited to this primary portion of the repair scope, but the report details the other project scope items including reinstating the damaged cathodic protection (estimated at \$1,000,000), geological survey for new sheet piling, backfilling downstream sloping face slab drain, and the shutter repainting program.

Implementation

The flood damages occurred in January 2013. Multiple damage inspections appeared to have occurred, with the fourth inspection conducted on June 5, 2013. The report of the June inspection included a cost of repair of \$2,000,000 (+/- 100%) but the full scope of damage was still not known.

Various scoping documents and offer recommendation reports (ORRs) were created for different scope items from March 2013 to November 2013. These items form the scope of further investigative works and emergency repair works. They total \$650,000 and include:

- May 2013 ORR for crane inspection and repairs (\$50k)
- May 2013 ORR for handrail replacements (\$51k)
- July 2013 ORR for bulkhead gate fabrication and supply (\$13k)
- July 213 ORR for replacement of safety security fencing (\$36k)
- July 2013 ORR for crane hire for debris removal on right bank (\$44k)
- July 2013 ORR for diving services for inspection and desilting of fish ladder (\$108k)
- October 2013 recommendation to add variation to an under-budget contract for flood repairs on other weirs to include work at Ben Anderson Barrage for emergency repairs to upstream rock protection, site clean-up, and access to barrage on the left bank (\$300k)
- September 2014 for gantry crane repair (\$48k)

An options report was completed in March 2014 for the permanent repairs. The report detailed the inspections conducted in September 2013, the root cause of the damage, and options for repairing the barrage. The preferred option included construction of a protective reinforced concrete sloping slab and a new row of sheet piling. Its cost was estimated at \$6,592,200. The report also recommended replacement of the cathodic protection system for \$1,000,000. Other scope items recommended (but not costed) were a geological investigation to assist with the proposed sheet piping, concrete fill to the downstream sloping face slab drains, and to continue the repainting of the 110 shutters in a 10 per year program.

Detailed technical specifications were sighted for all components identified in the scope of works. The standard of work was delivered with reference to relevant technical specifications including Australian Standards. The standard of the works is considered to conform to technical, design and construction requirements.

A competitive procurement processes was undertaken for the preferred option, including tender for contracted works. We note that an exemption of process was applied for cathodic protection testing, gate fabrication, and other smaller project components. The main contract was awarded in April 2015 for the civil works and cathodic protection system for a total of \$4,875,808 (inc. 10% contingency) after receiving offers from 11 bidders. The preferred bidder was considered the best bid on a non-price basis and was one of the lowest price bids.

The final total expenditure of \$8,313,310 is noted to be within the accuracy range (+/-25%) of the original budget of \$6,592,000 for civil works, \$1,000,000 for cathodic protection, and \$650,000 for emergency works. The documentation for approved total and annual budgets is poor as cost estimates and budget approvals are included for individual project components only.

A February 2015 project closure document by the electrical and mechanical contractor shows a total contractor cost of \$453k and a total of \$520k including project management costs. The works completed are stated to include site clean-up, switchboard, control panel, cathodic protection, cables

and cable trays, flood lighting, and gate hydraulics. There was no supporting scoping or procurement documents for this work. It has been assumed this work was in relation to the \$300k in emergent work recommended in October 2013, and budgeted by extending the scope of an existing contract on other weirs.

The April 2017 construction report details the works completed and any variations to the original contract. The total project contractor costs were \$4,789,715, only 8% higher than the tendered price. The variations were generally appropriately justified. Some evidence is provided to show justification of cost variations and associated value of construction efficiencies. The *2016 Prudency and Efficiency* document details a proposed cost variation and includes justification of cost efficiency:

An alternative construction method required the construction of upstream sheet piled coffer dams. This would have been a safe construction method, but would be very costly. The adopted, more cost effective, construction method for the repair of the upstream flood damage involved placing rock and concrete from the left bank and developing a work platform as work progresses across the river.

A full reconciliation of actuals to a final approved cost estimate for the total project is not available; however, a September 2014 preliminary (+/- 25%) cost estimate totals \$8,067,477, comprised of \$6.67M for direct costs and \$1.39M for indirect costs (both including contingency).

The total non-direct costs (Sunwater labour, indirects and overhead) sum to \$2.17M, which represents 26% of the total project costs and has been considered reasonable.

The final actuals for direct costs (contractors) were \$5.92M and therefore underbudget. It is noted that some components of the 2014 cost estimate may have been overestimated. For example, the supply and installation of geotextile used by Sunwater is very high at \$50/m². Typically, the supply and installation of geotextile would be expected to be approximately \$5/m² leading to an approximate over estimation of \$389k. That said, the works were competitively procured, the selected bidder had one of the lowest prices, and the works were delivered close to tendered amounts. The only variation that could be considered inefficient is the \$78,182 related to rework for removing concrete that had been placed too high. It was later clarified that the total costs for the concrete rework was \$258,806, which was also not included in the insurance claim. This rework could have been avoided with more appropriate testing and contractor oversight. The final recommended adjustment is \$258,806 due to the concrete rework.

The insurance payment summary in the Sunwater Insurance Register included three further considerations:

- The total original claim included \$8,054,504 but excluded a WBS line item of \$258,806 for costs which relate to the concrete rework.
- Costs of \$19,743 were considered betterments related to maintenance of shutters, crane, and winch and were not accepted by the loss adjuster.
- The 27% insurance deductible was \$2,181,483

The insurance proceeds received total \$5,853,278.

Findings

- Prudency:

The project was deemed as prudent as it addressed the urgent need for the rectification of structural damage caused in the 2013 floods that could have led to the eventual structural failure of the Ben Anderson Barrage.

- Efficiency:

The project is primarily deemed as efficient in scope and in standard. While the cost documentation level is relatively poor, the total costs appear to be reasonably efficient. A Project Management Plan was provided, but appropriate project management processes appear to have been followed as described in the Post Construction Report. This enabled effective and efficient project execution. Variations to project budgets were adequately justified in places and documented in the Post Construction Report. Only one variation for concrete rework was identified that could be considered inefficient. The majority of work was competitively tendered with more bids than usually required; therefore giving high confidence to overall cost efficiency.

13BIA48 – FD01 (2013) Flood Damage Repairs - Don Beattie PSTN

Project Overview

The repairs to the Don Beattie pump station and rising main, as a result of the 2013 floods, was deemed prudent by Sunwater. The damages included scouring of the embankment, which supported the rising main, as well as other damage to civil, mechanical, and electrical components. The pump station is critical to the Bundaberg Distribution Scheme. The scope of works involved damage inspection, options assessment, procurement and construction of the repairs. The level of documentation for efficiency is of a low quality. A consolidated budget and scope of all works for this project is not available. The total actual costs are much higher than the various budgets stated. It is also unclear why the project construction was delayed 4 years after the March 2013 damages occurred.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$1,272,616
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$1,272,616

Background

The Don Beattie Pump Station (PS) forms a crucial part of the Bundaberg Distribution Scheme. Multiple damages were reported as a result of the 2013 flooding of Burnett River. One of the most critical was scouring of the embankment, which previously provided support and protection to the rising main at Don Beattie PS. Without the embankment, vibration of the pipe and permanent supports have been reported. The vibration has caused some spalling of the supporting concrete. Other damages include loss of the pump station's access road, site drainage, deposition of debris and silt into the pump intake structure, significant scouring around the intake structure, deposition of debris around the pump well base, damage to the septic tank installation, damage to stormwater pipe, damage to pump well sump pump and discharge pipework, and damage to cathodic and lightning protection system.

Options Assessment

The extent of the flood damage was investigated and scoped starting in 2013. It included a geotechnical investigation, a deformation survey, and a slope stability assessment. Various scoping documents were generated for different aspects of the project. A February 2016 report detailing the options analysis shows four options were considered:

- Option 1: Do nothing;
- Option 2: Replace 'like for like';
- Option 3: Concrete encase the rising main pipe;
- Option 4: Denso wrap coating the rising main pipe then fill with free drain material and cap with concrete rockfill.

The preferred option was Option 4, which was stated to achieve the least financial costs, maintain standards, and minimise risks. The pipe would be protected from future flood events.

Implementation

A QCA expenditure claim of \$1,272,616 was made over FY13 through to FY17 with the bulk of the costs and the construction occurring in FY17. There is generally a low quality of documentation with the project being planned, scoped and costed in piecemeal fashion. Table 1 shows the progression of the cost estimates and associated scope.

Table 1 Documented Budget Revisions

Date	Budget	Scope
February 2013	\$209,292	Isis Pump Station Intake Structure - Desilting of Intake Structure and Pump Intake Pipes. Construction of Access to Intake Structure on separate Doc #
February 2013	\$204,849	Reinstate Eroded Bank Section, CP Anodes Lightning Protection Septic Installation at base of Pumpwell Bank Side, Sump Pump Discharge Pipework
February 2013	\$204,339	Reinstate Eroded Bank Section, CP Anodes Lightning Protection Septic Installation at base of Pumpwell Bank Side, Sump Pump Discharge Pipework
March 2013	\$658,000	Reinstate access road, de-silting intake structure, pump well base works, deformation survey Cathodic protection is excluded
July 2015	\$351,077	Clean pump well, replace fill at base of well, rising main repairs, cathodic protection, remove existing facility, new toilet, sump pump discharge pipework, light protection, rainwater pipe works, catch drains, internal costs
May 2016	\$392,143	Option 4: Mob/demob, supply/place fill, supply/place rock, supply/place concrete, denso wrap, indirect costs
June 2016	\$564,300	Mob/demob, project/construction management, pipeline corrosion protection, supply/install free draining backfill, supply/place rockfill and concrete, supply/install stormwater pipework, supply/install sewerage holding tank, supply/install rainwater tank concrete
September 2016	\$898,369	Approval request to increase Feb 2016 approved budget from \$498,369 (exc contingency) to \$898,369 for FY17 to account for higher bid price than estimated.
December 2016	\$898,369	Approved budget for \$898,369 including rising main protection and repair, cathodic protection, new toilet, sump pump discharge pipework, lightning protection, rainwater piping, catch drains Road repairs added to scope

A November 2014 report, *Summary of Works 2013 prior to second peak flood*, states that \$146,941 was spent prior to the March 2013 flood in constructing the temporary road and inspecting and removing silt and debris from the intake as a result of the January 2013 flood. The costs of these emergent works can be considered acceptable due to the urgency.

The second flood occurred in March 2013. It is assumed that the damage from the second flood had a smaller impact to operation of the pump station, since there is no record of any emergent work and no further construction until FY17. It is assumed the FY14-FY16 expenditure is related to investigation, planning and design of the FY17 works.

Procurement documents available show a competitive procurement process with six offers received and a contract awarded to [REDACTED] for the construction of the Don Beattie Pump Station Rising Main and Bridge Pier Works for \$694,761 (\$798,975 with 15% contingency).

While appropriate procurement methods were used to obtain a satisfactory market value for the works, the project was originally significantly underestimated in value with a budget of only \$498,369 (although no record of this budget exists among the documentation). The budget was revised to \$898,369 and the FY17 works were delivered under budget for \$880,058. The construction contractor component was only \$3,000 above their quote of \$694,761. This indicates that the FY17 were efficiently delivered.

Findings

- Prudency:

Sunwater have a responsibility to supply water under the Bundaberg Distribution Scheme. The damages reported as a result of the 2013 flood have directly affected Sunwater's ability to access, operate and maintain Don Beattie PS. As such, this puts Sunwater at risk of not providing the agreed level of service to its customers. There is also a safety risk associated with the existing condition of the site, should site personnel try to access it without remediation works.

- Efficiency:

Based on the documentation provided, there was clear consideration for the best means of repairing the damages at Don Beattie PS. The appropriate processes were followed in terms of defining project scope, consideration of capital and operational expenditure, options analysis and procurement of works. The construction works in FY17 were carried out effectively; however the reason for delay in the start of construction from the 2013 flood is unclear. The planning and design phase was not appropriately defined or budgeted, which may have led to the delay. That said, the overall project non-direct costs were 32% and in line with typical Sunwater projects.

13CVA02 – Callide Dam Gate Rectification Project

Project Overview

During the 2013 flood event, the Callide Dam gates operated abnormally leading to damage of the spillway structure and the automatic gate operation mechanism. Rectification of the gates prior to the following wet season was deemed essential. The likely consequences include loss of storage and overtopping of the dam. The operation of the dam gate is critical to manage water levels downstream. The scope of the project was to retain and protect the functionality of the dam gates prior to the upcoming wet season.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$2,079,855
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$2,079,855

Background

The Callide Dam is located near Biloela in Central Queensland supplying water to customers in the Callide Valley Scheme. On January 25, 2013, the Callide Dam spillway gates were operated due to the flood event (ex-cyclone Oswald). During closing, the variable counterweight twisted and was disengaged from its guide resulting in abnormal events leading to damage of the gate mechanism and other structures. This project was to investigate the extent of damage, repair the gate and associated equipment, and conduct a root cause analysis to prevent future failures. The project was delivered with urgency to allow completion prior to the following wet season. Operation of the dam gates are required to allow maintenance of storage levels and associated implications to dam safety.

Options Assessment

The project was deemed critical and a ‘do nothing’ option was not possible. As part of the scoping process, Sunwater undertook options identification for how the repairs could be safely undertaken. The options included:

1. To chain the gate into the spillway;
2. To chain the gate into the piers;
3. To support the gate by utilising the old hydraulic cylinder connection;
4. To chain gate to a mobile crane/plant;
5. Fill the counterweight pit with sand, so that counterweight will be fully supported;
6. To place enough load onto the gate (sand bags/water containers) to balance any uplift; and
7. To drill a hole in the concrete wall, weld slots on the gate and then slot a bar to hold the gate.

Implementation

The flood damages occurred on January 26, 2013. A flood damage inspection report was completed on February 13, 2013, which detailed the damage to a walkway bridge, gate variable counterweight, variable counterweight cables, and some scouring downstream of the spillway chute though the scouring was not considered critical. The counterweights on the dam gates were the primary issue.

The repairs were estimated at \$1,025,000 (+/- 100%). A February 7 cost estimate, presumably in support of the flood damage inspection report, estimated \$1,002,050 (including a 100% contingency) for counterweight holder and rope replacement, gate structural testing, and gate repairs.

The scoping document was completed on February 28, 2013. It proposed scope to undergo a detailed inspection, conduct an options study for how to restrain the gate in the closed position during counterweight repair, then carry out the preparation and repair/replacement works. It was also

proposed to investigate the root cause of the gate float twisting, walkway displacement, and pier movement. The scoping document included a budget of \$50,100, but this is not consistent with the estimate in the flood damage inspection report and is not considered relevant.

A March 2013 cost estimate re-estimated the project at \$1,261,469 (+100% / -50%), which included an average contingency of 128% for the direct costs.

The procurement plan was completed on February 22, 2013. It authorised spending up to \$330,000 with sole source purchases up to \$100,000 each. The \$330,000 limit was based on a project cost estimate of \$165,000 +/- 100%. An addendum was approved in May 2013 to increase expenditure of to \$470,000. A second addendum in August 2013 increased the limit to \$2,880,450 to account for higher than expected quotes and for additional scope. Despite the original procurement plan sole sourcing approval, multiple offers for the majority of scope items were still obtained.

Quotes were assembled from May to August 2013. The combined total for all purchase order limits was \$1,309,798, which was approximately \$1.5M less than the approved purchasing limit.

The July 2013 memorandum to the Meeting of Directors for all flood damage projects included a line item for Callide Dam repairs for \$599,548 and a proposed increase to \$1,399,548.

The November 2013 Prudency & Efficiency Document proposed an increase from the July 2013 project cost estimate of \$1,399,548 to \$1,684,354 (+/-10%. This excluded contingency which was managed on a whole of program for all flood damage projects. The increase was justified based on additional work arising from the non-destructive testing results.

All work was completed by November 11, 2013. The main civil works contractor cost was \$512,738, which Sunwater had originally allowed up to \$667,573. The final actual project cost was \$2,079,855, of which \$1,026,819 was attributed to consultants and contactors. The project was delivered within the short time frame and at a cost within the final approved budgeted amount as well as within the bounds of the original cost estimate.

The insurance payment summary in the Sunwater Insurance Register included three further considerations:

- The total original insurance claim was \$2,064,085, which excluded \$15,770 related to legal fees and were stated by Sunwater to not be claimable under the insurance policy.
- \$297,813 was deducted from the original total claim since these are the costs, deemed by the loss adjuster and agreed by Sunwater, related to damages/asset failure that occurred prior to the flood damages.
- The 27% insurance deductible was \$479,553

The final insurance proceeds total \$1,286,719.

Findings

- Prudency:

This project is deemed prudent due to the consequences experienced in the 2013 flood event. The risk of a repeated failure at Callide Dam without the investigations and repairs is likely and the consequence during a flood event would be catastrophic. The timing of the project for completion prior to the following wet season was prudent.

- Efficiency:

While there was little evidence and documentation of project management processes, the project was delivered on time within the short timeframe and within the allocated budget. Early definition of the scope and associated cost estimates is difficult before the full extent of damage can be quantified, therefore the high contingencies were deemed appropriate. The project used competitive procurement approaches for the majority of contractor/consultant costs. The combination of testing, planning, engineering, and the associated repairs by Sunwater and its contractors/consultants led to safe, quality, and efficient project outcomes. This was well documented in the contractor delivery report and investigations report.

13DVA06 – Flood Damage Repairs at Neville Hewitt Weir

Project Overview

Neville Hewitt Weir underwent flood damage during the January 2013 floods. Debris build-up occurred in the fishlock causing it to become inoperable. A safety risk is also attributed to a potentially unstable crane. The project was essential as the operation of the fishway is a regulatory requirement as per the Waterway Barrier Works Development Approvals 2012, Fish Habitat Management Operational Policy FHMOP 008. It is also Sunwater’s regulatory obligation to provide water under the Dawson Supply Scheme.

Summary of Findings

Review Summary	Prudent ✓	Scope	✓	Capital expenditure claim	\$164,508
		Standard	✓	Impact of findings on claim	\$0
		Cost	✓	Total Accepted	\$164,508

Background

Neville Hewitt Weir is located on the Dawson River at the southern end of Baralaba. Details of damage to the weir were recorded in a February 2013 Flood Inspection Report after the January 2013 floods. The flood water damaged the mortar pads under the crane columns in the fishlock, silted the fishlock chamber, and caused minor structural damage and instability to the weir.

The operation of the fishway is a regulatory requirement as per the Waterway Barrier Works Development Approvals 2012, Fish Habitat Management Operational Policy FHMOP 008. It is also Sunwater’s regulatory obligation to provide water under the Dawson Supply Scheme.

The scope of the project is to repair/rectify these minor damages and re-instate full functionality and safety of the weir and fishlock.

Options Assessment

An options assessment was completed as part of the Project Scope Definition document. For each part of the repair scope, an alternative option was given, including a ‘do nothing’ option, and a final recommendation with justification was presented. Options were assessed for the following scope:

- Repair fishlock mortar pads under crane columns
- Desilt fishlock chamber, and inspect, clean and repair all valves, pipes, hydraulic cylinders and any other equipment in the fishlock
- Inspect and test electrical equipment (replaced if required) by SunWater electrician
- Re-instate the access road as per original design
- Replace all broken fences and hand rails “like for like”
- Rectify slumping on the left bank
- Rectify loose rocks and gabions with broken wires.

Implementation

The February 13, 2013 Flood Damage Inspection Report formed the basis for the justification for this project. It described the proposed repairs and estimated the total at \$54,000 (+/- 100%). After damage to critical infrastructure of the weir was noted, a Project Scope Definition report was developed with options considered to assess the appropriate course of action to repair the damage. The scope of

work was defined to repair works to return the weir to an operable state, and to rectify safety risks associated with potentially unstable crane and inoperable fishlocks due to silt.

The February 2013 scoping document estimated a total project cost of \$50,100 despite the sum of all the recommended works being \$74,582 (excluding any contingency, PM, OH, etc) in the same document. By July 2013, a revised budget from a budget board paper stated a new estimate of \$168,562. This figure does not match the Significant Procurement Plan from June 2013 which said there was authority to spend up to \$260,000 on the project.

A cost estimate (not dated) for fencing, handrails, and rockfill mattress was \$29,746, including a 100% contingency. Another cost estimate (also not dated) for repairs to the left and rink embankment and the fishlock was \$263,954 including a 100% contingency. The total of these two estimates is \$293,700.

The July 22, 2013 flood damage funding summary for the Meeting of Directors included a line item for Neville Hewitt Weir showing an original budget of \$109,562 and a new revised budget of \$169,562 plus an additional 50% contingency.

The June 12, 2013 procurement plan outlined the estimated value and potential suppliers for the overall repair works. Fishlock repair works were estimated to be \$50,000 with [REDACTED]. Replacement of fences and handrails were estimated at \$11,000 from [REDACTED]. Civil works were estimated at \$60,000 with the potential supplier as [REDACTED]. Ad hoc purchases were estimated at \$9,000. The total estimated contractor costs were \$130,000. The procurement plan estimates had a cost estimate accuracy of +/- 100%; therefore, the plan authorised the project manager to spend up to \$260,000 with various suppliers using an abbreviated process and approaching the market with sole suppliers.

The project notification for closure concludes that the project was carried out on time and in budget.

The QCA A10 Historical Renewal spreadsheet shows expenditure for FY13 and FY14 of \$34,450 and \$130,058 respectively for a total of \$164,508. The final actual cost breakdown shows \$113,920 attributable to contractors.

While the cost estimates in the project scoping document were inadequate, the subsequent cost estimates from the Meeting of Directors memorandum and the Procurement Plan ranged from \$130k-\$146k excluding any contingency. The expenditure claim of \$164,508 is well within the accuracy bounds of those cost estimates. The repair options were assessed and quality standards (e.g., handrail standards) were established in the project scoping document. The project close out documents and the after photos indicate the work was delivered as planned. For these reasons, the project has been considered efficient.

The insurance payment summary in the Sunwater Insurance Register showed the claim matched the total actuals costs. The 27.1% deductible was \$44,665 leaving \$119,843 as the insurance proceeds.

Findings

- Prudency:

The project documentation provides a clear identification for the project need. Both WH&S and environmental compliance were cited as drivers for the project to enable continued operation of the weir and the ability to meet water supply obligations under the Dawson Supply Scheme.

- Efficiency:

The project documentation provided was generally of low quality, especially lacking evidence of project management processes being applied. A procurement exemption was applied for the purposes of urgency, and while reasonable, there did not appear to be sufficient evidence of contractor scope definition and it appears this was left to the contractors. That said, the project appears to have been delivered to appropriate quality and within reasonable cost. For these reasons, the project has been considered efficient.

13LFZ07 – Eden Bann Weir

Project Overview

A significant amount of debris, gravel and silt was deposited within the fishlock chamber and discharge channel at Eden Bann Weir during the flood event in March 2012. The presence of the deposits/debris in the fishlock chamber caused the fishlock to become inoperable. Most of the metalwork items at the weir have also lost their galvanised coatings through abrasion and are experiencing minor to substantial corrosion.

The project's scope is to restore the fishlock to a fully functional state, to clean the fishlock discharge channel downstream of the weir wall, and to repair, replace, and re-galvanise the corroded metalwork.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$493,849
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$493,849

Background

Eden Bann Weir is located approximately 62 km north west of Rockhampton on the Fitzroy River. It was constructed to supply water to Stanwell Power Station. A flood event in March 2013 filled the fishlock chamber with deposits and debris causing the fishlock to be inoperable, as well as damaging the metalwork throughout the weir.

Although not documented, it is known from previous project 13DVA06 that operation of fishway is a regulatory requirement as per the Waterway Barrier Works Development Approvals 2012, Fish Habitat Management Operational Policy FHMOP 008.

To repair the weir, the fishlock system will need to be desilted, refurbished and repaired where necessary. The metalwork will also need to be replaced, reinstalled and re-galvanised where necessary in the weir.

Options Assessment

Although a Flood Damage Inspection Report was completed along with a Project Scope Definition Report, there was no options analysis completed for the project. The "Do Nothing" option was not detailed, although the evidence of an inoperable system was described. This also includes a lack of information to determine if the works conform to an industry standard.

The scope described are consistent with the general existing infrastructure, i.e. like for like repairs.

Implementation

The Flood Damage Inspection Report completed formed the basis for the justification for this project. After damage to the weir was noted, a Project Scope Definition Report was developed to present a scope of work for the repair of the fishlock and metalwork.

Whilst an options analysis was not completed, the works were completed. Inconsistencies in the process were noted due to the lack of documentation in defining the project management tasks throughout the project, with several documents being missing.

The QCA A10 Historical Renewal spreadsheet outlines capital expenditure claims of \$2,076, \$11,808 and \$479,966 in FY13, FY14 and FY15 respectively. The claim total is \$493,849.

A budget board paper in July 2013 stated that there was a revised budget for the project of \$100,408. By May 2014, an Eden Bann Repair Fishway Project Estimate spreadsheet indicated a cost estimate of \$619,090. This figure was then updated, stating an approved budget of \$681,874, inclusive of a 10% contingency.

From the procurement documents available, an offer was awarded to [REDACTED] in March 2014 for works of \$70,000 (ex. GST, incl. 15% contingency) for debris removal. Two offers were sought but only one received.

A form for exemption from competitive procurement shows an offer was awarded to [REDACTED] for hydraulics works totalling \$83,000 (ex. GST) in March 2014. The grounds for exemption was on genuine urgency but also stated that [REDACTED] was successful on a separate Sunwater project that was competitively bid and the same rates were being used. Furthermore, they were original designers and suppliers of the equipment so efficiencies in design should be realised.

Three (3) contractors put in offers for mechanical services and were evaluated on cost efficiency. [REDACTED] was chosen on relevant works history and safety grounds. An offer was awarded to [REDACTED] in March 2014 totalling \$300,000 (ex. GST, incl. 50% contingency). The high contingency was used because the scope of work could not be identified until debris had been removed.

A history record notification states that work for like-for-like repairs was completed in June 2015. There is no report on actual expenditure breakdown but the total expenditure is less than the revised cost estimate of \$619,624 (exc. Contingency).

Findings

- Prudency:

Whilst the project had sufficient documentation with respect to the damage occurred from the flood in the Flood Definition Report, the detail around the statement of regulatory requirement for the fishlock's operation was not included. AECOM understands that fishway operation is a regulatory requirement, therefore the project has been considered prudent but the level of documentation has been considered low.

- Efficiency:

This project is deemed as efficient in scope, standard and cost. The total expenditure claim of \$493,849 is lower than the approved budget from May 2014. While the contractor procurement process included exemptions, it appears to have been for appropriate reasons. Where multiple bids were received, costs were similar, demonstrating costs match market conditions.

13NMA04 – Fairbairn Dam - Investigation of Spillway

Project Overview

Voids were detected in the concrete work of Fairbairn Dam. The stability of the spillway apron may be compromised by seepage under the concrete slab. The Fairbairn Dam is major infrastructure in Sunwater's water resource scheme. It is critical that it operates as intended to manage water levels. Definite signs of deterioration have been observed that need to be addressed to restore the structure to design condition.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$731,843
			Standard	✓	Impact of findings on claim	\$74,364
			Cost	✗	Total Accepted	\$657,479

Background

Fairbairn Dam is an earthfill-filled embankment dam across the Nogoia River located southwest of Emerald in Central Queensland. The dam was originally constructed between 1969 and 1972 from mass reinforced concrete. The standard life expectancy for concrete is 50 years, so the structure is nearing its serviceable life.

The initial observations of the drummy concrete at a previously established repair site was investigated at the dam and was later determined by Ground Penetrating Radar (GPR) to be voids. Multiple voids outside of the initial investigation area were discovered, particularly in the steep, lower portion of the spillway where coloured seepage was observed. Whilst traverse drains were previously installed, the voids observed indicate these drains are not working as intended. Considering the traverse drains were constructed from earthenware pipes, it is possible these have since failed due to age.

Options Assessment

An options analysis was completed after initial investigations to determine the most effective solution for the repair of the dam spillway. As part of the options development stage, a Technical Review Panel (TRP) was involved to provide comment after Sunwater's recommendation was proposed. The TRP made an alternative recommendation to Sunwater's proposed strategy and recommended that a set of emergency works to be undertaken, including an order of priority.

The options are as below:

1. Sunwater's proposed strategy involved installing 900 No. Passive ground anchors upstream of the Ogee Crest, along the Ogee Crest, and covering the entire 1:10 slope of the spillway;
2. The TRP's proposed strategy involved upgrading the existing drainage system to eliminate the effects of transient pressures on the 2:1 slope section of the spillway. The TRP also recommended general sealing of joints, and extra installations of anchor bars to strengthen and mitigate the possible failure of sections in the spillway.

Option 1 was the initial option proposed by Sunwater but was noted to have little to no effect in preventing a spillway failure if a concrete slab on the 1:2 slope was to fail. Given the scope development and advice from the TRP, a non-capex option was not feasible for this project due to the risk of failure of the spillway structure. Option 2 was selected as the preferred option.

Implementation

The initial observations and subsequent thorough investigations of the concrete structure at the dam formed the basis for the justification for this project. A formal technical review process was then completed and determined that the spillway's stability was potentially compromised as a result of the seepage observed. Once the scope of works was determined, it was deemed critical to commence the works as soon as possible to prevent further damage and manage risk of catastrophic failure of the spillway.

The original budget estimate of \$36,591 was determined in April 2012 in the scoping document. The scope of works was expanded in 2014, however the cost estimate within the scoping document was not updated.

In July 2014, an Offer Recommendation Report was compiled by Sunwater referring to the two tender offers received. [REDACTED] provided two offers, \$60,300 and an alternate option costing \$73,490. [REDACTED] provided an offer amount of \$120,519. Sunwater selected [REDACTED] as the bid that offered the best value for money (\$73,490). An expenditure of \$81,000 excluding GST was approved.

A budget increase was required in April 2015 as per the Memo detailing the project update and request for project funding. The budget was \$285,579 as per the document. The project costs up to FY 14/15 has been recorded at \$359,943, an overspend of \$74,364. The overspend (26%) is slightly outside the cost estimate accuracy bounds (20%). Furthermore, the cost breakdown of the initial overspend or any justification were not provided by Sunwater; therefore, it is assumed the overspend was due to inefficiency of work as opposed to a valid change in scope.

Additional funds were requested to cover the overspend and further works proposed. An additional \$404,500 was required to fund further investigations and the options assessment. The appropriate cost breakdown is provided. These increases resulted in a total budget increase of \$478,864 and a total budget estimate of \$764,443.

The prudence and efficiency document (May 2015) details the increase from the previous cost estimate to the current cost estimate. The previous cost estimate in July 2014 is \$285,579 and the revised cost estimate as per May 2015 is \$642,000, an increase of \$356,421. This does not match the cost estimate in the April 2015 memo, and it is unclear how this revised cost estimate aligns with the previously identified scope.

The second phase of funding appears to have been delivered under the requested budget; although no breakdown of actual spend vs budget was provided so no conclusions can be made to the efficiency of how the funds were spent. The total overspend on the initial budget is \$74,364 and will be considered inefficient until Sunwater can provide justification for valid increases in scope.

Findings

- Prudence:

The project is deemed prudent as the significant seepage under the spillway was determined to be undermining the risk of failure. The documentation in relation to justifying the prudence of the project was of high quality and provided a clear technical basis for the dam repairs.

- Efficiency:

The project is primarily deemed as efficient in scope and in standard. However, the cost of this project was not considered efficient as there is a lack of cost breakdown to justify the overspend of \$74,364 against the first phase budget of \$285,279. There is also no cost breakdown for the second phase of the project expenditure, but it appears to have been delivered under budget.

13TMC04 – Flood Damage Repairs at Cania Dam

Project Overview

Damages to the Cania Dam spillway occurred as a result of the January 2013 floods. Scouring of the natural rock structure that forms the spillway chute at the dam occurred. The scope of the project was to investigate the extent of damage, then propose and undertake the repairs. Further scour damage may have occurred if repair work was to be delayed, which could lead to further instability of the dam.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$589,176
			Standard	✓	Impact of findings on claim	\$0
			Cost	✗	Total Accepted	\$589,176

Background

Cania Dam is a dam in central Queensland, 37 km north west of Monto. The dam provides irrigation water for the Three Moon Creek water supply scheme.

The January 2013 floods caused scouring in the unlined rock structure that forms the spillway chute, downstream of the concrete ogee crest and apron. The rock spillway chute itself is terraced in three levels, with each subsequent level exhibiting increased level of deterioration. The scouring was observed to have generally occurred in areas containing poor quality of structural features. The upper terrace was purported to have experienced less damage due to the ogee crest structure reduces the turbulence of the water that transfer onto the terraces. The middle and lower terraces have steeper drops. Furthermore, channelization of the terraces, which had occurred over time, likely concentrated the flow of water amplifying the effect.

The stability of the terraced rock structure after the damage was identified as a potential safety issue if no remediation were to be implemented.

To repair the scoured areas shotcreting was proposed. This would prevent further scouring of the spillway's rock structure in the next flood event. The remediation was noted as required to be completed prior to the next flood season.

Options Assessment

The initial scoping document provided a minor Options Analysis. The options included:

1. Do nothing
2. Send geologist to do further survey.

Option 2 was recommended as the Do-Nothing option was ruled out due to rock stability issues presenting safety risks downstream of the spillway area. Further geological survey of the spillway condition was justified so that a suitable treatment could be designed. The suggested scope of works of the concrete treatment of scoured rock also appears to be consistent with industry standards with a like-for-like repair.

It is noted that this options analysis was only related to further investigation and not options assessment of repair works.

Implementation

The flood damages occurred in January 2013. An inspection of the damages was completed in May 2013. The report details the root causes of the damage and recommendations for further investigation and repairs. This included geological investigations, laser survey, scour hole repairs, assessment of scour potential, a physical hydraulic model, and the design and construction of the final remedial

works to reduce future scour. The report recommended immediate repairs of the upper terrace then, in later years, design and associated repairs to the middle and lower terraces.

An April 2013 scoping document was created but appears to only be related to project management for engaging a geologist. The initial cost estimate for geologists was \$38,180 (no date).

The May 2014 prudence and efficiency form states the previous cost estimate for Phase 2 (August 2013) to be \$38,000, which was then revised to \$55,759 in May 2015. This value is similar to the FY13 and FY14 expenditure which totalled \$46,551. The document also states a 3D laser scan would be undertaken and included in the scope of work for the actual spillway repair. The actual repairs were estimated to be approximately \$550,000 with an additional \$15,000 quoted for the laser scan and \$10,000 estimated for scoping document development.

A Project Management Plan was developed but not dated. The document describes the scope of proposed remedial works to be for the upper terrace only and within 40m of the ogee spillway crest. The document also defines the project team, risk management processes, and other project management approaches. The project was proposed for delivery in the 2014-15 financial year.

A cost estimate was prepared in May 2014 for the remedial works including procurement, safety, environmental, design, construction, site facilities and establishment. The total was estimated to be \$549,956 (-10%/+28%).

Procurement documentation shows a competitive process was predominantly taken although a limited amount of bids were received for the various scope items. The total approved expenditure was \$291,490.

- Two suppliers were evaluated for concrete pumping with the preferred supplier selected based on price, OHS documentation, and terms & conditions. An expenditure of \$44,250 (ex. GST, incl. 25% contingency) was approved for the line pumping services was made in March 2014.
- For the supply and delivery of concrete, two offers from nominated suppliers were received, however the Hanson Concrete Biloela offer was deemed non-conforming due to their terms & conditions. Expenditure of \$190,740 (ex. GST, incl. 10% contingency) was approved for the preferred bidder in March 2014.
- For plant hire services, only one offer was received but Sunwater deemed the rates to be in line with current market rates. Expenditure was approved for \$41,500 (ex. GST, incl. 25% contingency) in March 2014.
- A surveying company were awarded an offer for an engineering survey of the spillway for a lump sum of \$15,000 (ex. GST). Due to urgency with timing and the low risk purchase, an exemption from the competitive offering process form was undertaken.

The February 2015 project closure report states that the survey work was completed in June 2014 and the repair work was undertaken in September and October 2014. The report, however, states that repairs were only done to the upper terrace of the spillway chute. Repairs to the lower and middle terraces of the spillway were not completed as part of the scope.

The final actual cost breakdown shows contractor costs of \$293,142, which is very close to the \$291,490 of approved contractor expenditure. The total non-direct costs (Sunwater labour, indirect and OH) were \$287,740 representing 48% of the total costs. The total project costs were within the accuracy bounds of the project cost estimate and appear to represent market conditions due to the procurement processes used.

The insurance payment summary in the Sunwater Insurance Register included further considerations:

- Costs of \$478,638 were deducted based on the Perry Report which stated the amount is on hold pending engineering review. Sunwater provided clarification that this amount had been declined by the insurers and instead a settlement (currently subject to privilege) was made of which \$64,900 was received for this project.
- The 27% insurance deductible for the accepted claim of \$110,538 was \$30,012.

The final insurance proceeds are \$64,900. The prudence and efficiency of the insurance settlement has been assumed as prudent and efficient. The reasoning for the insurer's rejection of the full claim, as described in the 3 October 2018 insurer's correspondence, was a result of their expert's review and conclusion that there was an 'error in design' or a 'failure of design' in the design philosophy and its implementation. While the documentation (which is currently still under privilege) has not been reviewed, it has been assumed that there was no prior analysis to demonstrate that remedial works

could have been done at a cost less than those spent to repair the 2013 flood damages. For this reason, it has been assumed that no further identification and communication of a financial risk to Sunwater management was made since the original design of the dam.

Findings

- Prudency:

This project is deemed prudent as the Cania Dam damage to the spillway chute had the potential to present a safety hazard due to the structure's instability. The documentation for project prudency, however, was deemed to be of low quality as there was limited to no information provided for statutory or contractual requirements for the proposed works. There was no business case or options assessment.

- Efficiency:

The project appears to have been scoped, designed, and constructed to appropriate standards and scope; although, it is not clear whether the second and third terraces were repaired under separate projects as they formed part of the original repair scope of works. Although the project documentation quality was low, the project costs appear to be efficient for the scope undertaken. The procurement approach led to market pricing, the works were delivered within approved contractor budgets, and the overall project was delivered within the accuracy bounds of the original cost estimate. The original claim amount was not fully covered by insurance due to what was deemed an error in the original design that had not been corrected prior to the flood damage. The insurance letter, however, did not identify any documentation to demonstrate the risk was communicated to Sunwater management since the original design. For these reasons, the acceptance of the original design (and error) have been assumed as prudent and efficient.

13UBP04 – Flood Damage Repairs at Claude Wharton Weir

Project Overview

The flood damage repairs to Claude Wharton Weir were deemed essential by Sunwater due to their regulatory obligation to provide a consistent water supply under the Upper Burnett Supply Scheme. Several damaged items were identified to be critical to the operation of the weir, correlating with immediate WH&S risks and a compromise of site security. Damages were evaluated a month after the floods with immediate site security addressed in 2013. The repairs were completed under a contract shared with two other weirs. Works were predominantly completed by June 2014.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$2,332,308
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$2,332,308

Background

Claude Wharton Weir is used as a barrier to alter the flow characteristics of the Burnett River at Gayndah and is also a site popular for both fish and water sports. Details of damage to the weir were recorded in a Flood Damage Inspection Report after the January 2013 floods. The flood water inundated the site overtopping the weir structure and causing severe damage to the security fencing, fishway, inlet/outlet works and abutment protection works. The controls building including the electrical, SCADA, and hydraulic components were also completely inundated by the flood waters, which represented the primary interruption to the operability of the weir.

The operation of the weir is critical to Sunwater's regulatory obligation to supply water consistently to the Upper Burnett Supply Scheme. The recorded damage to the weir structure and supporting facilities also caused WH&S and security risks. Risks involved a public safety concern due to the lack of locked gate to the facility, a lack of handrails, and a lack of grates over works present currently. The project scope included repair of the damages and solutions to mitigate damage from future floods.

Options Assessment

An Options Study was completed although it appears to be dated towards the end of construction. The assessment included scope recommendations for the repairs, an options costing table, as well as an alternative and motivations for each recommendation. It is noted that the options study did not cover the full scope of repairs.

For the scope items assessed, the alternative was primarily a Do-Nothing option. A stakeholder workshop discussing and reviewing the options was also conducted to ensure effective selection with consideration of cost, risk and long-term performance. The workshop included seven attendees from operations, project delivery, and engineering.

The recommended options for the scope items included:

- Construct new control room at higher elevation above the 2013 flood level (\$150k)
- Do not replace fish tag readers (i.e. do nothing, savings of \$20k)
- Replace handrails and upgrade those perpendicular to the flow to be collapsible (upgrade cost of \$9k)
- Delay replacement of Nappe splitters until trials of a different design are trialled
- Replace grates and improve clamping capability to prevent removal in future floods (upgrade of \$15k)

- Install security cameras to improve security and public safety (upgrade of \$5k)
- Do not repair power points on weir wall (savings minor)

Implementation

The flood damages occurred on January 28, 2013. The damage inspection was conducted on February 19, 2013. The inspection report listed the damages, the risks, and an estimate of \$1.047M (+/- 100%) for the repairs. The inlet tower, weir crest and dissipator could not be inspected so the full extent of damages could not be confirmed. A scoping document was prepared in September 2013 that reiterated much of the damage inspection report.

A May 2013 procurement plan was prepared for three weirs including Claude Wharton. It described four stages to the project involving site security, site clean-up, mechanical and electrical works, and civil works. In May and July 2013, offer recommendation reports were provided for purchase of navigational buoys (\$22k) and installation of the buoys (\$22k), which formed part of the site security stage.

A technical specification and scope of work document for the mechanical and electrical repairs at all three weirs was prepared in October 2013. A single bidder was approached to provide an offer. The offer was evaluated based on the proposed rates being comparable to other current and recent projects. It was noted that the full extent of the scope could not be defined yet, hence why the evaluation was done on a rate basis.

A June 2013 cost estimate was prepared for three weirs. The works at Claude Wharton were estimated to be a total of \$1,651,891. With contingencies, the total was \$2,112,614 split into the four stages:

- Stage 1 – Preliminary Safety Works (\$48k)
- Stage 2 – Site Clean-Up (\$614k)
- Stage 3 – Electrical and Mechanical Repairs (\$1,400k)
- Stage 4 – Civil Package (\$50k)

It was later updated in December 2013 to a total of \$2,158,636, with each stage being:

- Stage 1 – Preliminary Safety Works (\$37k)
- Stage 2 – Site Clean-Up (\$50k)
- Stage 3 – Electrical and Mechanical Repairs (\$1,521k)
- Stage 4 – Civil Package (\$100k)

The document also showed a board approved budget of \$2,082,456 plus a \$304,842 contingency. The estimate was updated in April 2014, but no changes were apparent.

There was no documentation demonstrating project management processes, contractor scope management, or budget and variation approvals.

The September 2014 works summary report describes the works completed. It also made note of some enhancement work completed but funded under a separate project.

The September 2014 prudency and efficient report requested additional funds of \$71,808 in FY15 to complete the works not completed within the last financial year. Practical completion was achieved in April 2015.

The final capital expenditure is \$2,332,308 as per '13UBP04 Total Actual Cost Summary' with an annual breakdown of \$77,874 (FY13), \$2,193,128 (FY14), \$61,973 (FY15), and -\$667 (FY16). The contractor costs were \$1,749,561. The non-direct costs (Sunwater labour, indirects, and overhead) were \$520,995 representing 22% of the total project costs.

The final actual expenditure is greater than the original estimate of \$1M (+/-100%) and subsequent detailed estimates of \$2.11M and \$2.16M in June and December 2013 respectively. That said, the full extent works could not be fully quantified at the time as part of the site was still inaccessible. The final expenditure was also within the board approved budget (plus contingency). While there was no

documentation to show a breakdown of actual contractor costs compared to those estimated, the overall expenditure appears to be delivered efficiently.

The insurance payment summary in the Sunwater Insurance Register showed the claim matched the total actuals costs. The 27.1% deductible was \$633,235 leaving \$1,699,073 as the insurance proceeds.

Findings

- Prudency:

This project is deemed prudent as the Claude Wharton Weir was inoperable and presented WH&S risks to operators and the general public. It also inhibits Sunwater's regulatory obligation to supply consistent water as part of the Upper Burnett Supply Scheme. The damages were appropriately documented and works justified.

- Efficiency:

This project is primarily deemed as efficient in scope and in standard. The extent of damages was documented, where possible, and appropriate technical specifications were prepared for the repairs. The contractor was sole sourced but their rates were evaluated for value based on other current and recent projects. The work was completed without a fully defined scope due to the nature of the flood damages and despite the lack of any documentation showing effective project management processes, the works were delivered within the approved budget and have been considered efficient.

14MAB05 – Coolmunda Dam

Project Overview

Repair of the dam gates at the Coolmunda Dam was deemed essential by Sunwater. The Coolmunda Dam Safety Inspection found that the counterweights used to operate the flood gates were reaching close to the end of their guide within the float well. Should the counterweight rise and catch on the guide, this will jam the gate, potentially damaging the dam, gate and ropes. The operation of the dam gate is critical to Sunwater’s requirement to fulfil regulatory obligations as part of their water management protocol. The scope of the project was to retain and protect the functionality of the dam gates prior to the upcoming wet season.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$283,434
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$283,434

Background

In 2008, it was reported that the wheels of the gate system had extended past the guides and it was suspected that it was as a result of steel rope creep. The Coolmunda Dam Safety Inspection in 2013 found that the counterweights, which operate the flood gates at the dam, were getting close to the end of their guide within the float well chamber. Coolmunda Dam operates in a very similar manner to Callide Dam. If the counterweight wheels are below the existing guides, there is a risk that in a flood event when the counterweight rises in the float chamber, it will catch on the guide and jam the gate. This incident previously occurred at Callide Dam, therefore increasing urgency for improved counterweight functionality at Coolmunda.

Options Assessment

Sunwater undertook full options identification and multiple criteria analysis as part of the scoping process. A cost-benefit and risk analysis was completed to support the assessment.

Part one of the assessment was to determine the degree of refurbishment required.

1. Do Nothing;
2. Full Refurbishment;
3. Carry out rope adjustments.

It was determined that a full refurbishment was required and the following options were considered.

1. Tighten turnkey bolt at top of counterweights to lift gate 100-150mm;
2. Monster Crane – remove floats and perform fix up;
3. Temporary formwork structure over hole to lift float out, place beams under for support and fix;
4. Purchase new ropes and replace;
5. Shorten existing ropes if possible;
6. Put second rope on float and tie off to a beam. Work under the weight with scaffold arrangement;
7. ‘Do nothing’.

The 'do nothing' option was disregarded as it was determined not to be in Sunwater's best interest based on the precedent at Callide presenting an unacceptable risk. Based on previous experience, Option 1 may not be effective as previous works in November 2013 using this method showed that the counterweight could only be raised by 45 mm due to debris, thread galling or elongation of the threads. Option 2 and 3 was discounted due to the cost and timing required to implement. Option 3 also involved personnel working under suspended loads and deemed unacceptable to Workplace Health and Safety. The lead time to acquire replacement ropes for options 4 and 5 was seen as an issue and was not a permanent solution. Option 6 was chosen as it provided a permanent solution at a low cost.

Implementation

No original cost estimate was provided by Sunwater, however the Detailed Options Analysis document (Last Revision Sep 2013, New Revision Sept 2015) details the cost breakdown. The cost estimate for Option 6 was \$144,820.

This project was exempted from the competitive offering process on grounds that genuine urgency exists as per the State Procurement Policy and Sunwater's Purchasing Policy and Guide. The Procurement Exemption document (Jan 2014) quotes an estimated expenditure of \$180,000 (excluding GST) for this project and was not expected to exceed this value.

In February 2014, [REDACTED], Sunwater's contracted maintainer of cranes, provided a budget estimate price of \$78,075 for the scope of works as per the Project Planning Document.

The Prudence and Efficiency Document (n.d.) captures the change in cost estimate from \$143,285 at Phase 1 in July 2013 to a revised and current cost estimate of \$283,484.00 in March 2014, an increase of \$140,226. The justification of change in cost estimate is based on the fact the original \$143,285 was allocated without any scope or cost estimate. It was simply the funds available in the NSP for the budget year at that time. The final \$283,434 costs were described as prudent due to costs associated with resolving WH&S issues to ensure the project is undertaken in a safe manner. In the demonstration of efficiency section, Sunwater states "The project was completed at no risk for \$283,434. The options analysis estimate was close to \$2,000,000". There is no mention of any option with an approximate cost of \$2,000,000 in the options assessment document provided and has been used to justify the increase in cost estimate. No supporting documents are available for this two million figure.

The January 2014 Construction Report documents a total of 23 work days but does not provide a breakdown of final actual cost expenditure. The contractor quote was \$78,075 and identified a 5-day program of works. It appears the contractor quote was underestimated. It is unclear how much of the final project expenditure was attributed to contractor costs but due to the schedule in their quote vs the construction report, it is assumed that their costs are significantly higher than quoted.

The options assessment appears to have estimated 21 work days, which is closer to the actual work days expended. The cost estimate was \$144,820 and it was assumed this was estimated based on self-performed work. The lack of and quality of documentation with regards to project planning, project management, and cost reporting as well as the fact the contractor was sole sourced, leads to a risk that the project may not have been performed efficiently. That said, the final expenditure is within the accuracy bounds of the options analysis cost estimate (+100%) and the number of work days projected are close to actual work days. For these reasons, the project cost has been deemed efficient.

Findings

- Prudence:

This project is deemed prudent due to the failures of the Callide Dam in 2013 and the similarities in issues observed with the rope creep. The risk of a similar failure in Coolmunda Dam is likely and the consequence during a flood event would be catastrophic. The option chosen to repair the gate was effective in protecting the asset from further damage in flood events. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

The project is primarily deemed as efficient in scope and in standard. While the quality of documentation and project management appear to be low, the total actual cost expenditure is within the accuracy bounds of the options analysis cost estimate albeit at the upper end.

Furthermore, the biggest consideration for the project was safety and was a key cost driver. The project appears to have been delivered carefully and without incident. For these reasons, combined with the number of construction work days versus what was projected, the project cost has been deemed efficient.

14MDA13 – Mareeba-Dimbulah Water Supply Scheme

Project Overview

The SCADA control system that services the Mareeba-Dimbulah Water Supply Scheme is obsolete and requires replacement. There are 50 sites in the current integrated channel control system, a change in supplier and/or components will necessitate duplication of system components. The cost and logistics of this is great considering that for many of these 50 sites only a refurbishment and recommissioning is required. It was concluded to maintain the [REDACTED] system with most sites being refurbished, recommissioned and documented with some sites replaced if the cost benefit of the discreet site warrants. [REDACTED] was contracted as a sole supplier. Their quote was higher than expected, therefore part of the program scope was deferred to remain in the allocated budget. The project is ongoing and as a result there is no supporting documentation to show scope completion.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$876,952
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$876,952

Background

The Mareeba-Dimbulah Water Supply Scheme (MDWSS) encompasses the towns of Atherton, Walkamin, Mareeba, Mutchilba and Dimbulah. It provides water for agricultural land and two hydro power stations: Tinaroo Dam and Barron Gorge. The Mareeba Distribution SCADA control system was installed in 1995 to provide automatic and remote control and monitoring of key water control locations in the scheme. The equipment is now 20 years old. The SCADA assets are responsible for regulating gateway control of the system. As the system is obsolete, it is necessary to upgrade to reflect modern technologies.

Options Assessment

Five options were considered as part of a Detailed Options Analysis. These include:

1. Do nothing;
2. Remain with [REDACTED] system and refurbish, partially replace and recommission;
3. Replace all with [REDACTED];
4. Replace all with [REDACTED] based and/or other systems;
5. Partial replace with [REDACTED] and/or other systems - operate with multiple systems.

The preferred option was determined to be Option 2. As there are 50 sites in the current integrated channel control system, a change in supplier and/or components will necessitate duplication of system components. The cost and logistics of this is great considering that for many of these 50 sites only a refurbishment and recommissioning is required.

The detailed analysis of these options as above identifies that the best option is to continue with the [REDACTED] system with most sites being refurbished, recommissioned and documented with some sites replaced if the cost benefit of the discreet site warrants.

Implementation

The budgeting and scoping of the project is not clear. The scope was modified and scoping documents, cost estimates, and project management documents were not revised. The R&E Options Analysis estimated the project at \$810,000 in FY14, comprising \$500,000 initially then \$100,000 every three years for 15 years. The 2014 cost estimate spreadsheet has multiple tabs with different total costs. It is not clear what they represent. The first sheet (Summary based on Audit) totals \$396,720. The next sheet (Mareeba SCADA works list costs) totals \$398,400 for the various scope at all 56 sites, then another \$684,930 for the 56 sites for annual R&E over five years. The full program totals \$1,083,330.

A March 2015 memo proposes a budget of \$739,200 across FY15 and FY16, of which \$496,100 is earmarked for [REDACTED]. These include a 10% contingency.

The first Prudency and Efficiency document (2014) identifies the initial cost estimate for replacement of the SCADA control system was \$640,339, however this was revised several times with the final June 2016 Prudency and Efficiency document requesting budget approval for \$874,770.

The procurement process was generally sole sourced as [REDACTED] is the sole supplier. In May 2015, \$18,900 was awarded to [REDACTED] for the installation of latest [REDACTED] software. In January 2016, \$438,860 (10% contingency to \$483,000) was awarded to [REDACTED] for the SCADA refurbishments. The originally quote (not provided) was above the project budget. [REDACTED] scope was reduced from 49 sites to 18 sites for the FY16 year in order to meet the budget. The remainder of the sites would be deferred to the FY19 and FY20 R&E schedules. Lastly, in January 2016, \$25,760 (no contingency proposed) was awarded to [REDACTED] for concrete works. Two quotes were sought but only one received due to timing of the works.

As documented in the FY15 Prudency & Efficiency, the first cost estimate revision was based on refinements resulting from initial scoping conducted by Sunwater and [REDACTED]. The estimate was increased from the previous cost estimate of \$640,339 to \$767,667.

In the subsequent Prudency & Efficiency FY16 document, additional funds of \$40k were required for the development of complex tender documents which were previously under estimated. The offer received from [REDACTED] was critically assessed with costs higher than the budget of the time, partially attributed to low initial estimates and existing RTU's being obsolete. The scope of contract was reduced to the installation of six flume gates and replacement of 12 RTUs to be within the tender budget. Additional works including concrete structure modifications, screening, safety handrailing (\$20k) and overheads on the tender (\$22k) were not taken into consideration in original estimated. Some of this cost was offset by the contingencies allowance. The revised cost estimate became \$826,000.

The third and final cost revision was documented in Prudency & Efficiency FY16 which allowed for \$30k for site final fit-outs, engineering sign-offs, asset creations/tidy up and completion. The revised cost became \$874,775.

It should be noted that there were discrepancies in the figures provided for previous costs and revised costs from Prudency & Efficiency FY16 June and November documents. The cost estimate for Phase 7, \$826,000 (June) was documented as \$855,186 (November). It appears as though the latter is the correct figure based on the additional \$40k, \$20k and \$22k documented in the June revision. This is something that should be rectified by Sunwater to ensure accuracy and transparency of cost estimations.

Based on the information supplied in the Prudency & Efficiency documentation, all changes to the project budget could be justified based on scope changes and variations. The total final spend was \$876,952, of which there was \$18,900 for software and \$424,975 for contractors. The software matches the quote and the contractor work by [REDACTED] and [REDACTED] appears to be less than quoted. There is no documentation to show what work was completed and whether the contractors fulfilled their scope.

The total non-direct costs on the project make up 45% of the total project costs, which appears high. The Prudency & Efficiency documents state that tendering became more complex than envisioned.

Findings

- Prudency:

The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the MDWSS.

- Efficiency:

Based on the information provided, the appropriate processes for effective project management were originally adhered to but were not carried forward through the project. Five options were assessed against an appropriate MCA framework. The preferred option presented the best cost with most benefit as Sunwater was familiar with the [REDACTED] System currently in place. The project scope, direct costs, and non-direct costs were all underestimated, and the project scope was reduced as a result. Considering [REDACTED] is a sole supplier, the revised scope appears to be cost efficient; however, this is assuming the contracted scope was completed. Final non-direct costs (45%) are within the average range for Sunwater electrical/controls projects.

14MDA33 – Copper Sulphate Research Project

Project Overview

This project involves research into the use of copper sulphate to control filamentous algae in irrigation supply channels. Without copper sulphate dosing, algae growth would be uncontrolled and may negatively impact Sunwater's ability to supply water for irrigation purposes to its customers under the Mareeba Dimulah Water Supply Scheme.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$436,167
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$436,167

Background

Sunwater uses Copper Sulphate to control filamentous algae in irrigation supply channels and in January 2003 applied to the Australian Pesticides and Veterinarian Medicines Authority (APVMA) to register copper sulphate as an algaecide for use in irrigation channels to maintain reliability of water supply. The activity is currently carried out under an existing Off-Label Permit previously issued by the Queensland Government for which responsibility was later transferred to APVMA. The permit was set to expire in March 2013 and so the works were required to determine forward management strategies for algae control in Sunwater's open and closed water supply channels, the prepare the regulatory submission.

Options Assessment

An options analysis was not completed as this is a research project. The works undertaken were necessary to proceed with the permit approvals process.

Implementation

A Project Brief was prepared in November 2011 to seek consultant quotes for research into control options for the filamentous algae, and for preparation and submission of the regulatory application to APVMA. There was no documentation to show how the procurement outcome, but the February 2012 Status Update document states that [REDACTED] was assisting Sunwater in the application. There was no further documentation to show deliverables were completed by this consultant. That said, the expenditure claim for this project starts in FY14. The total actual costs show a total of \$29,365 for consultant services with the majority spent in FY18.

The February 2015 memorandum states that the permit expired March 2013 and a 2-year research permit was obtained. This research permit was then extended to March 2017; although the permit itself shows an end date of March 2018. The full application date was targeting December 2015 with hopes of an approved permit by July 2016. The estimated budget for FY16 was \$135,000 but no breakdown was provided. The total actual costs show \$68,417 was expended in FY16. It is not clear whether the proposed scope was completed.

The Prudency & Efficiency 2015 August document shows a previous 2012 estimate of \$304,464.66. It was proposed to increase this to \$455,000.00. The justification for this increase was that the original concepts for monitoring did not provide the anticipated results. The application to the APVMA could not be completed until information suitable for the submission was gathered and confirmed.

The Purchase Order Increase 2015 October document recommends an increase of \$10,040 excl. GST (from \$79,960) to the [REDACTED] laboratory services purchase order to allow additional tests to support permit approval. The original offer from 2012 had a value of \$67,337 covering FY13, FY14, and FY15. There is no documentation showing an original purchase order of \$79,960 for FY16 onward.

The project continued through FY18 and FY19. The Project Request Change 2018 September document requested a budget increase of \$8,804 from the original \$40,000 budget to facilitate timely turn around in the provision of information required by APVMA for permit approval. There is no documentation showing what the original \$40,000 entailed; however, this is unrelated to the FY12-FY18 project sample assessment.

The Project Request Change 2019 February document requested an increase of \$19,709 from the original \$40,291 budget. The justification for this was similar to the previous request. It is assumed that the September 2018 project request change was not processed, and this February 2019 request supersedes it.

The RFI supporting information spreadsheet stated that \$50,000 was estimated to be required in FY20 to work with Queensland Government in developing a Code of Practice to compliment the project's research findings.

The final budget for FY12-FY18 inclusive of requested funds appears to be \$455,000 from the Prudency & Efficiency document. The [REDACTED] purchase order increase has been assumed to have been budgeted for. The Total Actual Costs show a total project expenditure of \$436,167 for FY12-FY18. Documentation for scope, budget, and breakdown of costs was low on this project.

Findings

- Prudency:

This project was initiated to ensure that Sunwater could continue the control of algae in open and closed channels as part of their irrigation supply under the Mareeba Dimbulah Water Supply Scheme. The project was required to obtain an operating permit from APVMA that was due to expire. In 2013, instead of new operating permit, a research 5-year research permit was sought and issued instead. Sunwater engaged a specialist consultant to provide advice on a recommended strategy for progressing its application to APVMA. The consultant assisted Sunwater's environmental team in developing a sound understanding of the technical details of the scheme, monitoring data as well as the proposed treatment approach.

- Efficiency:

The technical components of this project are in accordance with industry standards. Sunwater demonstrated project efficiency in engaging with APVMA and other federal agencies early on in the permit application process. The project has predominantly been self-performed. A consultant, DT Services, was used for professional guidance and it was unclear whether the services were competitively procured and what their intended scope was, but their total costs was \$29,365 thus a small project impact. The overall quality of documentation for establishing scope and budget was low, and as a result it is difficult to assess project efficiency. The final budget appears to have been \$455,000 and actual costs were \$436,167; therefore, it is assumed as efficient.

15CVA16 – Review of Dam Operation as Callide Dam

Project Overview

As part of the Inspector-General Emergency Management (IGEM) project initiated by the Queensland Government, the performance of Callide Dam was assessed. The 2015 Callide Creek Flood Review Volume 1: Report determined that a number of recommendations were to be implemented by various agencies that included Sunwater to improve response to future flood events. The project was split into two parts, Phase 1 involved the review of information and Phase 2 was the implementation of the recommendations.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$1,545,858
			Standard	✓	Impact of findings on claim	\$135,858
			Cost	✗	Total Accepted	\$1,410,000

Background

The flood impacts from Tropical Cyclone Marcia instigated a review by the Queensland Government to determine what role, if any, the Callide Dam played in the event. A number of recommendations which were to be implemented by Sunwater were provided.

Options Assessment

No options assessment was undertaken as part of this project as the recommendations were already provided by the outcomes of the Government's Review Report. Stage 1 of the project consisted of preparing a response to the IGEM review and requests for information. The Stage 2 deliverable involved implementing relevant recommendations from IGEM. The recommendations that Sunwater were required to implement are listed below.

- Recommendation 1 – Sunwater undertake necessary studies to determine whether it is feasible to operate Callide Dam as a flood mitigation dam.
- Recommendation 4 – Sunwater to provide downstream residents with easily understood information regarding operation of the dam, and the personal impacts of various outflows.
- Recommendation 5 – Sunwater assist Department of Energy and Water Supply in seeking clarification of dam owners' legal obligation to comply with Emergency Action Plans and if required, investigate how a more flexible approach could be adopted.
- Recommendation 6 – Sunwater jointly identifies the requirements for a suitable gauge network for the Callide Valley to allow meaningful and timely flood warnings. Review should include the identification of key stakeholders, examine potential funding sources and include a cost benefit analysis.
- Recommendation 8 – Sunwater and Banana Shire Council jointly develop a multi-channel, common warning strategy for residents downstream of Sunwater assets prior to September 2015.
- Recommendation 9 – Sunwater and Banana Shire Council ensure Emergency Alert messages are pre-formatted, consistent, polygons are identified according to risk and tested and practiced with the State Disaster Coordination Centre.

Implementation

The costs involved in this project are primarily Sunwater labour costs as this was not a construction project. A number of external services were engaged for the following

- Project Director for Stage 2 Works
- Legal Works
- Hydrology, Flood Reviews and Modelling
- Project & Stakeholder Management

Documents are available for the request for offer (No.15SW4577 27 Jul 2015) for a Project Director for Stage 2 works. A July 2015 procurement plan provides justification for sole source arrangements with the project director and the hydrology and hydraulic modelling consultant.

The final expenditure claim was \$1,545,858 according to the Project Cost Plan (31 March 2018). The original budget approved for Phase 1 (review works) was \$850,000. The actual cost of Phase 1 came under the budget at \$835,110. The original budget approved for Phase 2 (implementation) was \$560,000 (excluding contingency). Due to budget constraints, the contingency amount of \$119,136 was not approved. The Stage 2 works had actual costs of \$710,748.

A Prudency and Efficiency document summarises the additional costs in FY16 for Stage 2 being attributed to additional work on improved flood mitigation warnings, coordination and EAP review (\$21k), further hydraulic modelling and flood mapping by the modelling consultant (\$19k), and increased project management including the contracted project director for ongoing review with Banana Shire Council (\$113k). A savings of \$10k was achieved across other works.

The reported line items from the *Project Cost Plan* are shown in Table 1.

Table 1 Stage 2 Budget to Actual Variance by WBS

WBS Description	Budget (\$)	Actual (\$)	Variance (\$)
Hydrology & Flood Ops - Review (staff)	\$35,000	\$38,390	\$3,390
Hydrology & Flood Ops - Rev (contractor)	\$0	\$3,570	\$3,570
Flood Mitigation, Warnings & EAP (staff)	\$91,000	\$120,334	\$29,334
Flood Mitigation, Warn & EAP (contractor)	\$10,000	\$28,545	\$18,545
Project Review, Ops, Gauging - BW SD	\$38,500	\$10,912	-\$27,588
Design - M&E - Review of Gates (staff)	\$0	\$2,462	\$2,462
Procurement Mgt	\$6,000	\$7,475	\$1,475
Procurement - Legal Review	\$0	\$2,656	\$2,656
Project & Stakeholder Mgt - AD (staff)	\$217,000	\$317,275	\$100,275
Project & Stakeholder Mgt - Cons (contractor)	\$112,000	\$129,162	\$17,162
Proj & Stakeh Mgt - Travel & Media	\$40,500	\$31,895	-\$8,605
Proj & Stakeh Mgt - Hyd Model (contractor)	\$10,000	\$14,388	\$4,388

The total overrun for Phase 1 and 2 combined was \$135,858, but the overrun may only have been due to an underestimated budget which was allocated on scope not fully defined and without a contingency. As such, the total costs have been assumed as efficient.

Findings

- Prudency:

The project is deemed prudent as it was initiated by the Queensland Government and Sunwater were given recommendations to implement. The scope of works defined by the IGEM review was comprehensive and clearly demonstrated the value of the benefits of implementing these recommendations for future flood events.

- Efficiency:

The project was deemed efficient in terms of both scope, standard, and cost. The project included specialty technical expertise and a modelling contractor familiar with the site. A procurement plan was approved to engage these contractors on a sole source basis. The Stage 1 costs were under budget and the Stage 2 costs were over, although the original Stage 2 budget may have been understated due to the lack of a contingency amount constrained by annual annuity budgeting limitations. For these reasons, the project appears to be efficient.

15DAW01 – Moura Offstream Storage (MOSS)

Project Overview

Replacement of the existing PLC and SCADA control system at MOSS was deemed as essential by Sunwater for a number of reasons. The PLC controller and RTU modules are obsolete and no longer supported by equipment manufacturers. Replacement parts will be difficult to obtain from the markets should a component fail. The scope of the project was to upgrade the control system required to maintain service.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$260,693
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$260,693

Background

MOSS is a part of the Dawson Valley Supply Scheme and failure of the control system will result in Sunwater being unable to fulfil their regulatory requirement to manage water resources at MOSS. The scheme supplies 153 customers and it is essential to maintain service. An inspection identified the control system to be obsolete and immediate works were recommended. The works are to comply with the following.

- Fitzroy Basin ROP (2006);
- Dawson Valley Water Supply Scheme ROL;
- Standard Supply Contract;
- Asset Management Policy;
- WH&S Requirement; and
- ROP environmental requirements.

Options Assessment

Sunwater considered several potential options for the renewal of the control system. These included:

1. Replacement of PLC and SCADA software with Allen Bradley;
2. Replacement of PLC and SCADA software with Schneider;
3. Do nothing.

The 'do nothing' option was disregarded as the operational risk posed significant consequences. Sunwater would be at risk of breaching their contractual obligation resulting in negative stakeholder relations as well as risk during a flood or emergency. Option 2 was chosen as Schneider matches with Sunwater's standard PLC system, personnel would not require additional training and there would be no need for PLC Programming Software licencing.

Implementation

The initial budget is quoted at \$52,258 by 'QCA Information Request A42_15DAW01' based on the completion of an options analysis and preparation of technical specifications and design. This conflicts with the Scope of Works document (March 2015) that details the cost at \$32,258.

The April 2015 Options Analysis provided a cost estimate for the implementation of the preferred option (Option 2) and was quoted at \$127,790 with a confidence level of +/- 75%. This included an estimate for direct costs at \$69,370.

In May 2016, an Offer Recommendation Report was compiled by Sunwater referring to the three tender offers received. Sunwater selected the bid that offered the best value for money (\$78,544) with an approved expenditure of \$98,180 (excluding GST) to include 25% contingency. [REDACTED] was selected as a result of having the lowest price and strong relevant experience in performing the type of works effectively.

Based on actuals to date and the contractor quote, the cost estimate was revised to \$117,588 in October 2016 and then to \$150,612 in November of 2016.

In December 2016, there was a contract variation approved for a total expenditure of \$110,728 (increase of \$12,548). [REDACTED] were required to return to site to complete outstanding approved variation and an unapproved variation, totalling \$14,124. The unapproved variation was a flow meter repair replacement at a total cost of \$1,636.

The Prudence and Efficiency document (December 2016) noted an increase to the project cost estimate. The document quotes the previous cost estimate at concept design (June 2016) at \$277,995, a figure which is not found in other documents provided. This cost estimate is explained by Sunwater as comprising of the cost estimate at November 2016 of \$150,612 and the costs incurred up till FY16 \$127,385 (\$28,560 in FY15 and \$98,825 in FY16 as per 'QCA Information Request A10_Attachment 1_Historical Renewals'). The FY15 and FY16 costs are assumed attributable to project planning and development. The March 2015 Scope of Works document states the FY15 & FY16 deliverables were the options analysis and the design, scope of work and cost estimate for the implementation phase. It is noted that this represents 48% of the total project costs and may be high.

The Prudence and Efficiency document proposed a revised total project cost estimate of \$294,639. This is an increase of \$16,644 and represents cost to complete of \$34,306 less the funds remaining of \$17,661. The revised budget for FY17 is therefore a total of \$167,256 (\$150,612 and \$16,644). It is assumed that this comprises the design and construction phase of the project. The additional works and contractor variations noted in the document are deemed to be justified and the cost breakdown is sufficient. The total design and construction phase (FY17 and FY18) are within the accuracy bounds of the cost estimate from the Options Analysis.

Findings

- Prudence:

This project is deemed prudent as it posed an operational risk to the MOSS and would affect the Dawson Valley Supply Scheme. Loss of operation would detrimentally affect Sunwater's ability to meet service level agreements with its 153 customers. The option chosen to replace the existing control system was effective. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

This project is primarily deemed as efficient in scope and in standard. As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. The cost estimates are revised several times but contractor variations appear well justified. The final construction phase costs (FY17 and FY18) are within the accuracy bounds of the cost estimate from the options analysis. The FY15 and FY16 project development costs are 48% of the total project costs and may be high, but overall the project has shown good cost efficiency.

15PIO06 – Teemburra Dam

Project Overview

The control system which operates the release of water from Teemburra Dam, the Tannalo offtake, the Palmtree Outlet and the fishlock at Dumbelton Weir has become obsolete. Subsequently, it is necessary to upgrade to reflect modern technologies.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$472,207
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$472,207

Background

The Teemburra control system forms part of the operational infrastructure used in the Pioneer Valley resource operations plan (ROP). If the system fails, Sunwater would be in breach of contractual obligations and this would have a negative impact on stakeholder relations. Sunwater also provides water to several customers downstream as part of their Standard Supply Contract in the Pioneer River Water Supply Scheme. Other requirements include conformance with Asset Management Policy, WH&S Requirement, and Environmental Requirement.

Sunwater's standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1997, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for Sunwater engineers nor PLC Programming Software licencing.

Options Assessment

Four options were identified and assessed in the detailed options analysis document. Option 1 and 2 was the replacement of PLC and SCADA software with Allen Bradey and Schneider brand equipment, respectively. These options do not include the replacement of the RTUs and repeater stations' equipment and adopts a replace-when-required approach. Option 3 is similar to Option 2, replacing like-for-like with Schneider equipment, however it included replacement of the entire system. Option 4 was the do-nothing option.

A do-nothing option was considered, however there are significant consequences in not proceeding. Sunwater will be in breach of contractual obligations which is likely to have negative impacts on stakeholder relations if the control system fails and water cannot be supplied in accordance with the contract. Other consequential outcomes of not proceeding may include financial losses and environmental impacts. Sunwater would also fail to meet public safety if the aged system failed during a flood or another emergency. Based on cost and risk, it was more beneficial to replace the entire control system with Sunwater Standard PLC Hardware (Schneider), Option 3.

Implementation

During the options analysis stage in April 2014, four (4) options were put forward, with Option 3 preferred. Option 3 was estimated to be \$165,257 including design, project management, procurement, site supervision, supply, and installation. The line items for direct costs (supply and install) totalled \$101,170.

Request for offers was released to five selected suppliers, four vendors responded with offers, [REDACTED]. Two evaluation panels assessed the offers. [REDACTED] was chosen for their price, capability, experience, program of works and safety system. A request for best and final offer was sent to [REDACTED], who agreed to reduce the price by \$2,500. The offer awarded was priced at \$179,105.90. The approved budget including 10% contingency was \$187,116 (ex. GST).

The Prudence and Efficiency document details the project budget increases due to a range of variations each with appropriate justifications. In general, the technical complexity was not completely understood during options analysis or the business case stages. An initial cost estimate was quantified at \$221,836 in August 2015. This was then revised to \$484,980 during FY16, due to the variations and contingent item purchases. The final contractor costs were \$247,609 and the total project cost of \$472,207 was slightly under the revised budget. The variations were reviewed by stakeholders and costs were reviewed by the project manager and technical leads. There was clear analysis during each step of the process with a high quality of documentation, therefore expenditure is found to have been efficient.

Findings

- Prudence:

The appropriate procedures were followed for project scope development. Based on the high-quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudence was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Pioneer River Water Supply Scheme.

- Efficiency:

As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Further, the best operational outcome and lowest risk of system failure could be achieved by replacing the entire control system. A significant procurement plan was completed for this project. Four offers were received for this invitation, with all offers similar and within \$10k of one another. The quotes provided appear to consistent with the prevailing markets. Multiple variations (refer to HB# 1874294) to the original project scope were cited. An increase of \$69k was documented for additional contractor costs, while Sunwater had an additional \$84k to the original budget estimate. Project Management accounted for \$30k, while other costs and resources (such as procurement, travel, etc) was \$80k. These additional costs were broken down and provided in the revised cost estimate. The information provided was high quality, and variations to the original budget estimate could be accounted for and justified. Based on the information provided, suitable processes were followed to demonstrate project efficiency.

16BYR07 – Boondooma Legal Insurance

Project Overview

This project was created to capture legal costs associated with the Boondooma Dam Spillway Repairs Project Insurance Claim. There was no project documentation associated with this project.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$591,181
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$591,181

Background

This project was created to capture legal costs associated with Boondooma Dam Spillway Repairs Project Insurance Claim. There was no project documentation associated with this project.

Options Assessment

Options assessment is not applicable as this project only involves legal costs incurred as part of the insurance claim.

Implementation

The November 2018 submission documented \$233,118 incurred over FY16 and FY17. The 'QCA Information Request A42_16BYR07 supporting information (2)' file stated there was an initial budget of \$430,000 and actual expenditure of \$591,181.

Sunwater have stated that legal costs related to a claim are not covered under the insurance policy.

Findings

- Prudency:

The legal costs associated with the Boondooma Dam flood damages insurance claim should have been captured under the flood damages project (12BYR17). A per documentation from 12BYR17, the insurance claim was originally rejected in full due to the insurer's stance that Sunwater had knowledge that the dam had design errors and omissions but elected not to remediate the scouring risk. Sunwater eventually received a settlement for a portion (estimated to be ~\$4M) of the original claim (assumed to be \$38M). The \$591k in legal costs were deemed prudent in order to reach the settlement.
- Efficiency: A review of efficiency of the legal costs is not possible; therefore, it has been assumed as efficient.

16CUW02 – Allan Tannock Weir

Project Overview

Estimated leaks of 1 ML/day were identified at the outlet works of Allan Tannock Weir by Paroo Shire Council. Amid concerns from the community regarding this water loss, Sunwater commenced repair works to stop leaking. Attempts to repair the gate seals were unsuccessful, as was the replacement gate installation. This project was initiated as a result of the failed corrective actions so that the gate could be properly repaired.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$25,903
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$25,903

Background

The Cunnamulla township receives water supply from the storage at Alan Tannock Weir. Leaks estimated to be 1ML/day were identified by Paroo Shire Council at the outlet works of the weir. Amid concerns from the community regarding this water loss, Sunwater commenced repair works to stop leaking. Attempts to repair the gate seals were unsuccessful, as was the replacement gate installation. This project was initiated as a result of the failed corrective actions so that the gate could be properly repaired.

In its original state, the weir gate is non-compliant as it is leaking, resulting in significant water loss and risk to the long-term water security of Cunnamulla. Repairs are required to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme. Immediate works were required in accordance with the corrective order.

At the time of the observations, the asset was 25 years old. Mechanical parts typically have a serviceable life up to 20 years, so the gate was likely due for replacement. Before photos clearly show active water leak from the weir outlet works. A special meeting held between Sunwater and Paroo Shire Council noted that readings from the Allan Tannock Weir indicate approximately 7.69 ML/day storage loss is occurring through the valve, seepage and evaporation.

Options Assessment

Emergency works were required to repair the leak at Allan Tannock Weir. Initially, the proposed treatment was seal repair of the existing gate; however, undocumented modifications resulted in this being unfeasible. The following action was replacement of the gate entirely. No formal options analysis process was undertaken and the processes for corrective action were reactive. A non-capex solution, such as a “do nothing” option, was not feasible as not proceeding with corrective works would put Sunwater in breach of their regulatory obligation under the Cunnamulla Weir Supply Scheme.

Implementation

There is little documentation on the capital expenditure as this project was not planned, instead was the result of a corrective order. The leaking gate may have resulted with an impact on the water supply for Cunnamulla, so temporary solutions were provided until a new gate could be fitted. In February 2016 a cost estimate was set at \$20,000. This was revised to \$37,000 in March 2016. [REDACTED] fitted a new gate, however this did not seal properly and had to be welded shut. During a period of low flow, [REDACTED] returned and replaced the gate with one that sealed properly. It is unclear what costs were incurred, what was quoted by the contractor, and whether the contractor billed Sunwater for the failed attempts.

The risk assessment provided is not sufficient to detail and confirm safe work methods were implemented during repair works. It was noted in the documents that there was concern the Sunwater staff, the contractors on site and members of the public (with ready access to the site) may have been at risk if the isolation had failed. Sunwater could face considerable legal liability if death or serious injury would have occurred. Furthermore, the Prudency & Efficiency document states that designs and any asset modifications must have RPEQ sign-off to ensure safety. There is no documentation showing RPEQ participation and the As-Built drawing does not show RPEQ sign-off.

The quality of documentation is very low and it is not clear if spending was efficient in scope, standard and cost. The Project Closure Report states expenditure totalled \$30,737 in June 2016, however the QCA claim stated a total of \$25,903. Given that this figure is higher than the claim amount, there is no impact of findings on the claim.

Findings

- Prudency:

The leaks observed at the Alan Tannock Weir pose a serious threat to the water security of the Cunnamulla township. It is evident, based on the information provided, that this project is prudent to the continuation of the town's secure water supply. Without repair works, Sunwater will be in breach of their regulatory obligation to provide a consistent water supply under the Cunnamulla Weir Supply Scheme. Given the urgency of the project, some processes were not adhered to and documentation such as the Project Plan, Design Brief, Scope of Works, and Budget Estimate were not submitted. The overall quality of documents could be improved.

- Efficiency:

Appropriate processes for project management, scoping of works, budget estimation, procurement, and general record-keeping were not followed, resulting in inefficient project execution. There was insufficient information to properly justify the project expenditure and conclude whether the treatment was appropriate for the repairs required. Despite the documentation issues and given the relative materiality of the costs, the scope of work and costs incurred can be considered appropriate. Furthermore, the claim amount of \$25,903 is less than the project closure report expenditure amount of \$30,737; therefore, it is assumed that a reduction in claim has already been applied.

16MVA01 – Mary River Barrage

Project Overview

Reinstatement of the downstream rock protection of the Mary River Barrage was deemed as essential by Sunwater for a number of reasons. The displacement of rock protection could lead to damage of the downstream row sheet piling which supports the crest of the barrage. Crest failure would lead to an uncontrolled release and loss of storage, threatening the water supply of the Lower Mary Supply Scheme. The scope of the project was to repair the damage to the rock protection prior to the wet season to prevent further damage to the asset and scouring of the rock protection.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim	FY16-18: \$386,652
		Standard ✓		FY19: \$587,287
		Cost ✓	Impact of findings on claim	FY16-18: \$0
			Total Accepted	FY16-18: \$386,652 FY19: \$587,287

Background

During the 2009 flood, rock protecting the downstream toe of Mary Barrage was displaced. The rock was replaced in December 2014 prior to the wet season. The 2015 floods subsequently displaced this rock again and temporary repairs in December 2015 were undertaken to prevent further damage in the upcoming wet season. These repairs did not reinstate the downstream area to its original profile. The historical damage indicated that displacement was likely after significant flood events and that rock protection is prudent to the water security of the scheme.

Options Assessment

Sunwater considered several potential options to deal with the Mary Barrage flood damage. They are listed below.

1. 'Do nothing';
2. Replace rock as done in 2014:
 - a. Replace with 600 mm rock;
 - b. Replace with 800 mm rock.
3. Use of concreted rock fill to EL 0.0 and inject with concrete;
4. Replace rock with a concrete slab;
5. Replace rock with tetra blocks (pre-cast concrete) or similar.

The 'do nothing' option was disregarded as there was an unacceptable risk of the Mary Barrage failing and losing storage supplying the Lower Mary Supply Scheme. The cost of Options 4 and 5 were substantially higher and the long term benefits did not differ significantly from the remaining options. Option 2 was the same repair method that has been utilized by Sunwater in the past and would likely result in repairs being required every 1 to 2 years (as has been experienced in the past). Option 3 provided the robust protection without frequent repairs at a relatively low cost. It was the preferred option.

Implementation

Sunwater's initial cost estimate (September 2015) for Phase 1 and 2 was \$98,692; although, it is noted that this cost estimate did not include construction costs. The options assessment revised the cost to \$1,297,029.

In February 2017 an “Offer Recommendation Report” was compiled by Sunwater referring to the six tender offers. There were two non-conforming offers (submissions were incomplete and significantly insufficient) and the remaining four offers were assessed against the evaluation matrix. Two tenderers were shortlisted, one offer was rejected due to the use of existing material in their chosen methodology (does not conform to specification) and one offer had limited information in the methodology and a lack of experience for similar works. Sunwater selected the bid that offered the best value for money (\$383,571) from the remaining two short-listed. The chosen bid aligned with Sunwater’s internal estimates and was inclusive of all scope of works outlined in the specification.

Sunwater included a variation amounting \$39,787 citing additional requirements for demobilisation/remobilisation, additional materials, and minor repairs as part of a variation that the Evaluation Committee determined was required, resulting in a total approved amount of \$423,358 (excluding GST).

Construction commenced in 2017. Rock base was established, a small section of concrete was poured, then a rain event cancelled the work and rock was displaced. This not only caused rework, but also a slight redesign, which increased concrete quantities. Work restarted in October 2018, rock was reinstated and a steel concrete pumping line installed, then another wet weather event forced the project to be postponed. Rock was again displaced. Work restarted in February 2019 and rock was reinstated and concrete poured to 85% of the area. Tidal conditions then delayed work for another two weeks, but conditions returned to favourable and the work was completed in March 2019.

A Sunwater non-routine project change request form was submitted 27 Feb 2019 to request the increase to the project budget and purchase order. The original approved project budget and revised project budget is cited at \$397,200 and \$589,000 respectively resulting in a total budget variation of \$191,800. This does not align with the total variation increase and decrease amount totalling \$193,700. Additional concrete quantity and price increases led to a variation increase of \$173,000. An increased concrete rate is quoted at █████/m³ implying the required quantity of concrete of █████m³, however the quantity of concrete cited in the report does not align with this number. The purchase order value is also quoted in this non-routine project change request form. The original approved purchase order value and revised purchase order is cited at \$413,172 and \$620,000 respectively resulting in a purchase order variation of \$206,827.

Sunwater’s final capital expenditure claim is cited at \$973,938. The FY16, FY17, FY18 capital expenditure cost is cited at \$386,652, implying a \$587,287 spend in FY19. The FY19 actual expenditure was later confirmed to be \$587,287. This is close to the revised project budget quoted in the project change request form. No information regarding the breakdown of costs for the capital expenditure claim prior to FY19 is available; however, the total project costs were under the original \$1,297,029 estimate from the options analysis report, and this was despite all the rework, redesign, and multiple mobilisations/demobilisations due to the wet weather events.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

This project is deemed prudent as it posed a water security risk to the Lower Mary Supply scheme. Loss of storage would detrimentally affect Sunwater’s ability to meet service level agreements with customers. The option chosen to repair the rock protection was effective in restoring and protecting the asset from further damage in future weather events. The scope of works defined by the options assessment was determined as the best means of achieving a safe working environment for personnel.

- Efficiency:

The project was deemed as efficient in terms of both scope and standard. The works were clearly assessed for their appropriateness and completed in accordance with relevant standards.

The total project cost is also deemed efficient. Appropriate procurement processes were used to engage the contractor. The contractor variations were all well justified and documented. The total project cost, despite all the rework, still amounted to less than the cost estimate from the options analysis.

Note that the capital expenditure claim is \$386,652. This excluded the FY19 works for \$587,287, which when included increases the total to \$973,938.

16PRO03 – Peter Faust Dam

Project Overview

This project forms part of a program of works to undertake non-routine repairs of various water supply infrastructure. Damages observed at the spillway and right training wall of Peter Faust Dam may worsen without intervention and ultimately lead to failure of the structure.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$607,160
			Standard	✓	Impact of findings on claim	\$0
			Cost	✓	Total Accepted	\$607,160

Background

Peter Faust Dam provides regulated releases for downstream irrigation and urban usage from the Proserpine River and through the Kelsey Creek Pipeline and provides a degree of flood mitigation. Damages observed at the spillway and right training wall may worsen without intervention and ultimately lead to failure of the structure. The works are required to maintain compliance with Sunwater's Asset Management Policy, WH&S Requirement, and Dam Safety. Peter Faust Dam is classified as an Extreme Hazard Dam in accordance with Guidelines on Assessment of the Consequences of Dam Failure (ANCOLD 2000b) and QLD Guidelines on Acceptable Flood Capacity for Water Dams (DEWS 2013). Sunwater have a regulatory obligation under the Proserpine Supply Scheme, Resource Operating Plan (ROP), and Organisation Reputation. Further investigation of the spillway was required to determine the most appropriate corrective action. The timing of the expenditure was appropriate with works to be completed prior to the following wet season to prevent further damage from occurring.

Peter Faust Dam was constructed over a two-year period, completed in 1990. Given the serviceable life of concrete is typically 50 years, it can be concluded that the asset life is not consistent with standard run-to-failure life expectancy. However, the damages observed to the concrete components of the spillway chute may be a combination of spills over the dam and seepage issues resulting from blocked weep holes which have caused voids under the concrete structure.

Options Assessment

A “do nothing” option was considered, however disregarded as the consequences of not proceeding would have resulted in greater costs in the future as well as significantly increased risk to safety and water resource management. With consideration of timing, cost, benefits and risk, the preferred option was determined to be Option 1 (the only alternative to “do nothing”), which was to proceed with the repair of potential voids under “drummy” spillway slab, path Spillway Chute Flood and Right Training Wall cracks and reinstate the existing spillway drainage system.

Implementation

An expenditure claim of \$607,160 was made to the QCA. The project progressed into two distinct stages which occurred in 2016 and 2018.

Options analysis compared the benefits of repairing the spillway to doing nothing in March 2015. Repairing the spillway was estimated at \$101,000. Business case in November 2017 priced undertaking a spillway investigation at \$335,000, with \$260,000 going towards a site investigation.

For Investigation of Anchors, Concrete and Drainage Works offer awarded to [REDACTED] for the sum of \$111,245 (ex. GST, incl. 10% contingency) in January 2016. [REDACTED] also submitted a tender, however it was after the closing date so the offer was not evaluated.

In June 2016, [REDACTED] had an offer rewarded for the reinstatement of two anchors of \$42,751 (ex. GST). An exemption from competitive procurement was obtained for the contract due to urgency in getting a contractor to site. [REDACTED] had previously been engaged by Sunwater for anchor testing, in turn the price offered was deemed acceptable.

The Prudence and Efficiency report for May 2016 stated that the previous cost estimate of \$149,643 in July 2015, however this was revised to be \$264,643 for the 2016 scope of works. The increase was due to an increase in contractor, supervision and travel costs. All work was carried out by an experienced contractor using an acceptable methodology, and costs were deemed to be efficient. It was noted that the intended scope was not completed because concrete depths were thicker than anticipated and core drilling was taking longer. The drainage pipe could not be located in the first excavation attempt. For these reasons, the scope was cut short to maintain the allocated budget. The remaining scope (and new additional) was planned for 2018.

In February 2018, three offers for the spillway investigation were evaluated. [REDACTED], [REDACTED] and [REDACTED] all submitted offers. [REDACTED] was chosen as the most cost efficient with a price of \$229,480 (ex. GST, incl. contingency of \$60,000). This [REDACTED] price combined with estimations for supervision, day staff, project management, accommodation and year-to-date costs came to a total of \$308,051, under the approved budget of \$336,700 for the 2018 stage of works.

The Prudence and Efficiency report for June 2018 stated a previous cost estimate created at the commencement of the spillway investigation in March 2018 of \$336,700 be revised to \$349,751. The investigation methodology was in accordance with the project scope and no other more cost efficient was identified.

Findings

- Prudence:

It is evident, based on the Inspection Report, Options Analysis and Business Case, that further investigations are required to determine the extent of damage at Peter Faust Dam and subsequently the most appropriate treatment. There was clear demonstration of prudence given the high quality, detailed information provided.

- Efficiency:

There were several unplanned material changes to the scope and budget throughout this project. It is clear that because the appropriate PM processes were in place, these changes were effectively managed, and the project was successfully completed. The relevant approvals were provided in accordance with Sunwater's delegations (via SAP workflow / digital signature). The high-quality documentation provided was adequate in demonstrating project efficiency.

17BBR04 – Eungella Dam

Project Overview

This project forms part of a program of works to undertake non-routine repairs of various water supply infrastructure. The main outlet conduit forms an integral part of the Eungella Dam's operation. Sunwater's inability to maintain it warrant works to restore the conduit to its intended design. Further, leaks through the stoplogs which seal the inlet tower were identified as a risk to the dam in the long term.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	FY17-18: \$408,257 FY19: \$1,315,000
			Standard	✓	Impact of findings on claim	FY17-18: \$0 FY19: \$869,924
			Cost	✗	Total Accepted	FY17-18: \$408,257 FY19: \$445,076

Background

In its current state, the Eungella Dam outlet conduit does not comply with dam safety schedule requirements, as Sunwater are unable to inspect the conduit, guard valves and associated fittings. Sunwater have a regulatory obligation to provide water under the Bowen Broken Supply Scheme. Failure of the conduit would result in a lack of ability to supply water, thus potential expensive legal costs to Sunwater and customers that are dependent on the supply of water from the Eungella Dam. Works were required to minimise the possibility of further increases in leakage through the stoplogs and non-compliance to the dam safety schedule requirements. Dive investigation found water visibility of less than 300 mm on upstream side, but the face of the stop logs reported to be undamaged concrete structure. The downstream side had 50% of the stop log front faces with gaps ranging between 2 mm to 20 mm. Silt deposit inside the inlet tower base was measured between 1.2 m and 1.5 m deep. The condition assessment of the stoplogs support the project need.

Options Assessment

Five options were identified and assessed as part of the scoping process. These options include placing mass concrete upstream; installing upstream formwork, reinforcement and concrete; installing upstream stoplogs, installing upstream metal baulk, and doing nothing.

A "do nothing" option was considered, although multiple constraints and risks were identified which negated its feasibility. The flow rates through the stoplogs would continue to increase without intervention, critical infrastructure could not be inspected in accordance with Sunwater's dam safety schedule, risk of failure to supply water to customers within the short to long term period.

The best option was determined from an MCA based on the criteria of benefits, timing, net cost, customer/client, and risk. From this, the recommendation from Sunwater was to proceed with Option 1, which was to place mass concrete upstream.

Implementation

The documentation quality has been deemed low. The project information is predominantly only available from the Business Case document.

In August 2016 during the scoping works, the planning cost estimate was evaluated at \$42,361. The business case (dated March 2018) stated that a total of \$295,273 had been spent across FY17 and FY18 on project initiation, site investigations, options analysis, business case development, and tender document preparation. During this phase, a competitive procurement process appears to have been completed for the dive inspection and options development; although only one bid was received. No details were provided on the actual bid other than an informal cost breakdown. A procurement exemption was also used for [REDACTED] to provide a third party technical review of the options.

The business case (March 2018) included an estimate of \$558,059 (ex. GST, incl. 50% contingency) for the design and construction phase of the selected option. There was no evidence provided on the procurement of the design/construction contractor nor was there a breakdown of actual expenditure; therefore, it is not clear what the final contractor costs were. A practical completion certificate was included that identifies works completed in October 2018.

Based on the March 2018 business case, the final budget is \$853,333 for all phases of the project, which included a large contingency. The historical project CAPEX claim is \$408,257 (i.e. actuals to date in QCA Information Request A42_17BBR04 supporting information). The future (or transitional years) CAPEX claim is \$672,553 in FY19. The FY19 actuals were later updated to be \$1,315,000. The combined total is \$1,723,257, which is \$869,924 over budget. Considering the design and construction estimate had a large contingency built in, coupled with the lack of any documentation and justification for the overrun, an adjustment of \$869,924 is recommended for FY19.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

Based on the information provided, Sunwater would be in breach of their dam safety requirements due to the unsafe access for inspection and repair of the outlet conduit, guard valves and associated fittings. Failure of the outlet conduit would lead to the inability to supply water. Sunwater are required under the Bowen Broken Supply Scheme to provide water supply from the Eungella Dam to customers. There is reasonable justification for the scope of works described under this project. The overall quality of documentation provided is medium.

- Efficiency:

For historical years (i.e., before FY19), it is identified as an efficient project (pending design and construction phase documentation). The documentation quality for the project development phase is high. Business case and detailed cost estimate have been done, and the costs are reasonable for this project. Since there is no evidence provided for the procurement of the design and construction phase, or any breakdown of project actual expenditure, the documentation quality is deemed low. This also has a significant impact on the project cost efficiency. A practical completion certificate states October 2018 project completion. It has been assumed that the project cost claim of \$408,257 includes the design and part of the construction phase up to end of FY18. The FY19 CAPEX claim was \$672,553, and later updated for actual expenditure of \$1,315,000. The combined CAPEX claim would be \$1,723,257, which is \$869,924 above the budget set in March 2018. Considering this budget had ample contingency built in, coupled with lack of documentation and justification for budget overruns, an adjustment of \$869,924 is recommended for the FY19 year. The FY17-FY18 component has been assumed reasonable.

17BRI31 – Giru Weir Outlet Works

Project Overview

Giru Weir is located in the Haughton River, just downstream of the township of Giru. The weir storage level is generally maintained at or about 3.1 to 3.5m AHD to enable surface water access to Sunwater customers. The 'nominal operating level' in the Burdekin ROP is 3.0m AHD with a minimum operating level of 2.25m AHD. Giru Weir in its present configuration and management regime is not able to comply with pass flow under the Burdekin ROP. The outlet works upgrade involved a buried left abutment bypass pipeline complete with upstream offtake structure and regulating gate, in-line EM meter and pit, and downstream bubbler type overflow.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim	\$766,806
			Standard	✓	Impact of findings on claim	\$144,517
			Cost	✘	Total Accepted	\$622,289

Background

Giru Weir is located in the Haughton River, just downstream of the township of Giru. The weir storage level is generally maintained at or about 3.1 to 3.5m AHD to enable surface water access to Sunwater customers. The 'nominal operating level' in the Burdekin ROP is 3.0m AHD with a minimum operating level of 2.25m AHD. Giru Weir in its present configuration and management regime is not able to comply with Section 88 Part (3) of the Burdekin ROP. The required works consisted of a buried left abutment bypass pipeline complete with upstream offtake structure and regulating gate, in-line EM meter and pit, and downstream bubbler type overflow.

Options Assessment

Four options were considered as part of the project scoping phase. These include:

1. Design and install weir bypass pipeline and meter (manually operated);
2. Design and install weir bypass pipeline and meter (remotely operated);
3. Design and install on-weir pipeline and meter (manually operated);
4. Design and install on-weir pipeline and meter (remotely operated).

After considering the functional requirements, risk profiles and whole of life costs, Option 1 was determined to provide the most appropriate arrangement and is the recommended option for further consideration for detail design and construction. A do nothing and a temporary pump arrangement option have been rejected due to unacceptable WHS risks and the inability to properly meet the ROP requirements.

Implementation

The Options Analysis estimated a project cost of \$230,134 but the Project Scoping Document used a budget of \$514,299, which was based on costs derived from designs completed under project 10BRI08 in 2012. The budget used has a (+/- 50%) contingency included.

The Project Management Plan identified that a contractor would construct the project, but to maintain the proposed schedule, Sunwater proposed to purchase long lead time materials directly. Sunwater requested procurement exemptions to sole source \$45,000 of sheet pile, \$20,000 of DN630 PN6.3 poly pipe, \$12,500 [REDACTED] flow meter, and an \$18,916 [REDACTED] DN600 butterfly valve. The construction was competitively tendered with five bidders. [REDACTED] was awarded a \$426,013 lump sum contract based on their technical suitability, their pricing, a clear schedule, and inclusion of contingency for the dewatering risk.

In the Briefing Note dated 2 March 2017, an additional funding of \$246,464 was requested to be sourced from the unspent annuity for the [REDACTED] contract and added to the approved budget for project 17BRI31. The budget with additional funding becomes \$760,764. The increase in cost was due to the higher costs of the materials and contractor pricing, as well as \$240,000 in project development costs already incurred. The \$240,000 does not align with the final project actual costs, which total \$173,233 for all non-contractor costs. It appears that the justification for the price increase is inaccurate.

The December 2017 Prudency and Efficiency document stated the previous June 2017 cost estimate was \$749,400 and a proposed increase of \$33,968 to a budget of \$783,368. The cost increase was justified by an increase in dewatering machinery necessary to complete the project. A strict deadline of the end of FY17 prevented the option of delaying until water levels were lower. This price increase could be considered unjustified, as the procurement recommendation for [REDACTED] was partially made due to the inclusions of contingency for dewatering.

The Project Closure Report stated works were completed in April 2018. The final total expenditure was \$766,806. The contractor and material costs totalled to \$633,378, which was higher than the combined totals of \$522,429 specified in the procurement documents. There are no itemized variation reports and justifications for materials or contractor costs. This \$110,949 difference is considered an unexplained overrun and should be absorbed by Sunwater. Furthermore, the \$33,968 variation requested for dewatering should also be absorbed by Sunwater (or its contractor), as this risk was already accounted for in the contractor pricing. In total, an adjustment of \$144,517 is recommended.

Findings

- Prudency:

Changes to Giru Weir are necessary to meet the flow requirements under the Burdekin ROP. Inability to rectify this puts Sunwater at risk of persecution for breaching their regulatory requirements. As such, these works are considered to be prudent and immediate works are justified.

- Efficiency:

To meet the requirements under the Burdekin ROP, the appropriate project management processes were in place to enable efficient project delivery. Several options were assessed against an MCA as part of a High-Level Options Analysis. The preferred option was progressed to detailed design and construction, with all works completed in accordance with Sunwater technical specifications and current industry standards. The detailed design report captured all aspects of the construction works, with as built drawings provided at project completion. The contractor and materials costs appear to have incurred overruns beyond their original quotes. Lack of appropriate justifications for the overruns have led to the conclusion that an adjustment of \$144,517 is warranted.

Appendix B

Project Reviews for
Transitional and
Forward Renewals

13NMA02 – Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower

Project Overview

This project involves the investigation and stabilisation of the rock face and slope below the lookout at Weemah inlet tower. The slope has experienced numerous rock falls, which poses a safety to risk to both staff and the public. Damage to guardrails and meteorological equipment has occurred. Investigations, assessment, and design have been completed in FY14 through to FY17 to define the proposed solution to the slope instability. The final scope of work and budget is unclear, but it appears to have been postponed to FY23.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY21-24: \$486,960
		Standard ✓	Impact of findings on claim (\$FY19)	FY21-24: \$0
		Cost ✓	Total Accepted (\$FY19)	FY21-24: \$486,960

Background

Fairbairn Dam was designed by the Snowy Mountains Engineering Corporation and constructed in 1972. The main dam is a 46 m high earth-fill structure, extending for 823 m between abutments. An un-gated concrete lined spillway is located at the left end of the embankment against the left abutment. The intake tower is located adjacent to the right abutment and discharges to a concrete lined channel downstream of Selma Road.

Instability of the slope immediately below the right bank lookout has been noted in an inspection undertaken in 2009. Subsequent intermittent slope failures have been recorded. Slope failures typically occurred as discrete rock falls onto the access track to the intake tower with the rocks being of sufficient size to damage the Armco guardrails. The most recent failure resulted in damage to a guard rail and Bureau of Meteorology monitoring equipment located close to the toe of the slope beyond the existing guardrail. During previous inspections, voids were identified and could be traced into the slope for in excess of a metre.

An internal project (13NMA02) was initiated to investigate the Rock Face Stability which included Survey, Geotechnical Mapping, Drilling and Testing to facilitate the assessment of the stability of the rock slope below the lookout. A June 2014 memorandum summarizes the visual inspection conducted that year and provides technical review of the instability. It recommended temporary safety measures and a longterm solution to the instability. Based on the hazard assessment, the slope was recommended to be stabilised as soon as possible.

This part of the project focuses on the last phase of the rock stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.

Options Assessment

A September 2016 annual dam safety inspection sign-off document shows that the Stage 1 (Options Study) was completed in FY16 but not details were provided. The March 2017 cost estimate also costs out four options, but doesn't correlate the options to any options assessment process.

Implementation

The 2014 Fairbairn Dam Annual Inspection Report included a recommended line item in the 2016-2020 refurbishment program for this project (13NMA02) at a cost of \$298,374 to be completed in FY16.

A September 2016 annual dam safety inspection sign-off document shows that the Stage 1 (Options Study) was completed in FY16. The site works were planned for FY17. The total budget for Stage 1 and Stage 2 appear to be \$317,000. The document requested a change to the project completion date to June 2017. The approved budget for FY17 was \$243,111.

Issued for Construction design drawings were completed in December 2016, then revised to reduce the scope in April 2017. This reduced scope included removing the rock face stabilisation fence and retaining wall.

A March 2017 Phase 3 Cost Estimate includes four different estimates:

- Option 1 (General site clearance, signage, and barriers) - \$213,690 (+/-50%)
- Option 2a (Reprofile slope and improve lateral and cross drainage) - \$914,057 (+/-10%)
- Option 2b (Reprofile slope and improve lateral and cross drainage) - \$369,180 (+/-10%)
- Option 3 (Install bolts/anchors and face treatment) - \$591,801 (+/-50%).

Based on the Issued for Construction drawings, it appears that either Option 2a or 2b was pursued. The drawings do not show any evidence of bolting and shotcreting as per Option 3. Option 1 does not include any reprofiling of the slopes.

The drawings show a cumulative cut volume of 720 m³. Option 2a has a total of 1,300 m³ for excavation and reprofiling for a total of \$337,900. Option 2b calculates excavation by [REDACTED] as opposed to volumetric rates. It has a total of \$58,000 for an excavator and tipper. Based on the cost, it appears Option 2b allowed for approximately [REDACTED]. Neither of these match the estimates in the drawings.

Option 2a also had a concrete retaining wall for \$92,000. The drawings do not appear to have any scope for a concrete retaining wall. It is therefore assumed that Option 2b was the preferred option but has underestimated the cut volume. Scaling the cut volume up to 720 m³, the total project cost becomes approximately \$528,000 (in \$FY17). Converted to \$FY19, this is \$546,420.

The CAPEX claim for FY23 is \$532,860 in nominal dollars (\$486,960 in \$FY19). As this is less than the scaled cost estimate, it appears to be a reasonable estimation of the scope.

That said, it is unclear whether any works were completed in FY17, FY18 or FY19, and what the actual scope of work planned for FY23 involves. For the purposes of this review, it has been assumed that the full works as described in the documentation have been delayed to FY23.

Findings

- Prudency:

Rock instability of the right abutment adjacent to the Weemah inlet tower poses a safety risk. Given that a series of rockfalls have been recorded at this location, immediate works are justified to minimise the risk of further rockfalls. There is sufficient evidence in the documentation provided to consider this project as prudent.

- Efficiency:

For the proposed rock stabilisation works, there is insufficient information provided to comment on project efficiency. No alternatives were formerly identified. The cost estimates do not match the Issued for Construction drawings. There were no technical documents provided including procurement details despite it being understood that the project is in its final stages and was supposed to be delivered in FY17. Assuming all works have been delayed to FY23 and scaling the Option 2b cost estimate for higher excavation/reprofiling quantities, the CAPEX claim would appear to be reasonable.

15LFZ01 5 Yr Dam Comprehensive Inspection Weir Program

Project Overview

The Eden Bann Weir has been assessed as “high risk” in the Risk Assessment of Sunwater Weirs. The potential failure of the weir could have severe implications to operations of a key customer (Stanwell Power Station) and impact the greater community as part of the Lower Fitzroy Scheme. The scope of the project is undertaking inspection and is to be delivered in 2022 and every 5 years thereafter. The level of documentation is of a low quality and the underlying basis for carrying out the inspections is not clear as there is conflicting information in the documentation provided.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$0
			Standard	✓		FY21-24: \$41,899
			Cost	✓		FY25-53: \$259,985
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$0 FY21-24: \$41,899 FY25-53: \$259,985

Background

The Eden Bann Weir is part of the Lower Fitzroy scheme. The weir is not a referable structure under the Queensland Dam Safety Management Guidelines, so the project does not have a regulatory driver. Instead, as a result of the Moolabah Weir incident in February 2012, a formal review of Sunwater weirs was undertaken with a January 2014 report titled *Risk Assessment of Sunwater Weirs*. The report assessed the weirs for risk, classified their criticality, and recommended risk mitigation measures to be applied.

The Eden Bann Weir was identified as “high” risk as the consequence of its failure would affect the Stanwell Power Station, thus impacting the greater community. Appendix C lists the asset criticality as Major.

Section 2.2 of the Risk Assessment Report states that 'minor' weirs undergo 5-yearly inspections. Section 3.3 suggests that any weirs with a “high” risk rating for service delivery should be inspected annually (also reiterated in Section 5 Recommendations). Table 3-2 lists these weirs, which includes Eden Bann Weir. Based on this, it appears the current 5-yearly inspection frequency could be increased to annually.

It is also noted that the asset register (June 2019) shows the Eden Bann Weir was rated at 2 (moderate) in 2018.

While the scope of works for the study/inspection is unclear, the available documentation makes reference to the use of Sunwater’s methodology for Condition Assessment of Assets and that there will be an assessment and review against the Queensland Dam Safety Management Guidelines which detail the key requirements.

Options Assessment

Options assessments are not relevant to a study/investigation.

Implementation

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. The weir is smaller and less complex than a large scale dam. The average capital expenditure claim of \$43,000 (\$FY19) per investigation/study is approximately one third that of the other 5-Year Dam Inspections, therefore it is considered reasonable. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

This project is deemed to be prudent as it serves as a risk reduction method to the water security risk for a key customer as part of the Lower Fitzroy Scheme; however, there is inconsistency and a lack of detail in the documentation provided. It appears the inspections had been proposed to be annual. The scope of works is not defined clearly and the general documentation quality of this project is low.

- Efficiency:

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and considering its size vs a large dam, the cost is less (one third) than other 5-Year Dam Inspection projects. As such, it has been considered reasonable.

16BAL12 – Beardmore Dam – Thuraggi Channel Repair

Project Overview

Beardmore Dam is the major storage for the St George Water Supply Scheme. Recent condition assessments reveal evidence that the Dam structure may be compromised due to active piping and seepage which is undermining the structure. This project involves the proposed remediation works to prevent further damage to the channel and restore it to its original condition.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY16-18: \$874,315 FY19-20: \$6,275,000
			Standard	✓	Impact of findings on claim (\$FY19)	FY16-18: \$437,158 FY19-20: \$241,139
			Cost	✗	Total Accepted (\$FY19)	FY16-18: \$437,158 FY19-20: \$6,033,861

Background

Beardmore Dam is the major storage for the St George Water Supply Scheme and is located 21 km upstream of the town of St George. The dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. The dam also has minor flood mitigation ability.

In July 2015, the outlet to Thuraggi Channel was dewatered and an inspection was undertaken. Damage to the rock mattresses were identified, sand boils had formed, and seepage on the outlet right bank training wall. A short term solution was necessary to reduce the hydraulic gradient on the outlet structure, while a long term solution was developed. The rock mattresses were repaired in FY16, a temporary coffer dam was installed. Temporary works continued to be carried out to meet service levels and protect the channel.

The current condition of the channel was determined to be a safety and operational risk that could put SunWater in breach of their regulatory requirement under the St George Bulk Scheme. Several key conclusions from the Risk Assessment include:

1. There is evidence that an active piping process has developed within the foundation sands below the outlet structure;
2. The estimated probability of failure of the outlet structure is very high (1 in 6). The dominant failure mode is backward erosion piping through the foundation sands below the structure;
3. The societal risk for the outlet structure in its existing condition plots about half an order of magnitude above the limit of tolerability for existing dams, and therefore the risks are assessed to be unacceptable according to the ANCOLD guidelines;
4. SunWater have already implemented interim risk reduction measures to manage the risk in the short term, and this includes operational restrictions on water levels in the channel, more frequent inspections and stockpiling of emergency materials at site;
5. The preferred upgrade option is to infill the channel downstream of the outlet structure. This option is predicted to reduce the risk to negligibly low levels.

Beardmore Dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. These works are required to maintain strategic alignment with Sunwater's Corporate Plan and Statement of Corporate Intent which is to, "Operate and maintain Sunwater's existing water infrastructure assets to ensure continued delivery of water to customers and communities in line with shareholder expectations." Ultimately seepage leading to instability of the dam embankment is a dam safety issue that needs to be addressed.

A Needs Analysis by Sunwater in the Detailed Options Analysis shows that the works are required to ensure compliance with ROP/ROL, Asset Management Policy, WH&S & Dam Safety, and Reputation.

Options Assessment

Four options were identified in the scoping phase. This includes:

1. Extend outlet culvert downstream;
2. Construct upstream clay blanket;
3. Construct sheet piling cut off;
4. Do nothing.

The preferred option was to proceed with Option 1. This involves construction of a base slab in the channel bed then installing two barrels of 1500 x 1500 box culverts for 40m. The channel would then be backfilled to effectively move the outlet 40 m downstream. A set of rockfill mattresses would be installed at the conduit exit for score control in the earth channel. This is supported as the long-term remediation option in the Final Geotechnical Report.

Not proceeding could lead to failure of the embankment resulting in Sunwater being unable to supply water to customers in the St George Irrigation Area.

Implementation

A November 2015 cost estimate describes a project to install a filter zone between the Thuraggi inlet and outlet for a cost of \$193,152. Issued for Construction drawings in August 2016 describe works to remove existing rock mattresses and geofabric, excavate the bed and banks, add a new sand filter, and concrete rockfill to placed. The works were cancelled due to high storage levels and predicted inflows.

The June 2017 Project Scoping Document estimated a project cost of \$1,500,000 including a 50% contingency. An increase in the current budget of \$361,358 would be required. Planning and design were scheduled for FY18. Construction would occur in early FY19.

In late 2017, risk assessment was sole sourced to ██████ for \$49k based on their expertise and the project urgency. Two quotes were obtained for drilling for cone penetration testing, each around \$17,000. Geotechnical investigation was sole sourced to ██████ for \$8,000 based on their existing knowledge of the project.

A total of \$450,866 were incurred in FY17, of which \$30,282 were considered scheme costs and the remainder dam safety improvement costs.

In FY18, temporary works were completed to mitigate short term issues. Design of the long term solution continued. Total costs incurred as of February 2018 were \$262,287 of which all was considered dam safety improvement costs.

The June 2018 concept drawings show a sketch of a 40m long channel outlet extension and a new outlet structure.

A November 2018 briefing note recommended a FY19 project budget of \$4,000,000 (including \$175,000 in contingency), which involved an increase from the \$1,338,648 budget to \$3,825,000 (exc contingency). The document also describes an RFO that was issued in October 2018, with two offers received. Both exceeded the previous budget allowance. The preferred supplier was \$3,500,000 with an 8-week construction schedule. Based on the higher cost and longer schedule than expected, Sunwater proposed to revisit the options. A staged approach was then recommended, which would allow the increased schedule, but would not reduce cost.

The scope of work and RFO was updated to reflect the staged approach in December 2018.

The January 2019 briefing note reiterated the same budget increase to \$4,000,000 (inc \$175,000 in contingency). The total existing approved budget across all financial years was \$2,212,963. The total project cost to date across all years at the time of the briefing was \$1,040,874 with only \$166,559 incurred in FY19 (as at January 2019). The requested budget for FY19 was \$3,825,000.

A Project Management Plan, dated February 2019, was started but is predominantly template text.

A June 2019 budget approval annexure document describes another increase in budget to account for various activities not anticipated during the original budget forecast. An increase of \$2,282,950 to a total revised budget of \$7,157,265 was required. The breakdown of the previous budgets and proposed increases are shown Table 1.

Table 1 Project Budget Breakdown

#	Item	Cost
Preliminary Project Phase		
1	Project Phase up to end of FY18	\$874,315
Delivery Phase for Thuraggi Channel Outlet Improvement Works		
2	Design and Construction (Contractor and Sunwater Costs)	\$4,000,000
Additional Design and Construction Project Requirements		
3	Removal of existing flow meters	\$45,000
4	Slope stability analysis of existing embankment	\$100,682
5	Construction engineering supervision	\$103,000
6	Groundwater pump testing and continuous monitoring	\$353,750
7	Allowance for possible acceleration costs	\$300,000
Additional Storage Management and Dam Safety Requirements		
8	Management, engineering, engagement and legal fees for lowering FSL	\$410,518
9	Stakeholder engagement	\$120,000
10	Low level pumping to reduce storage level (Mallawa Irrigation)	\$65,000
11	Storage water pumping to off-stream storages	\$450,000
12	Upstream coffer dam design, permitting, and construction	\$335,000
TOTAL FORECAST BUDGET REQUIREMENT		\$7,157,265

The additional works were required due to a longer construction period and a rainfall event in April 2019. This led to additional measures to mitigate risk and maintain customer. This involved construction of a coffer dam, pumping to off-stream storages, customer and water authority engagement, and additional engineering.

The Information Request FR52 states that Sunwater had previously agreed with customers to absorb 50% of the costs up to FY18 due to project inefficiencies as well as the costs of the downstream rock protection works (assumed to be in FY19 and FY20). We have not identified any further inefficiencies; therefore, the revised budget of \$7,157,265 less the two adjustments already agreed by Sunwater and its customers appears to be reasonable. It also noted that the CAPEX claim for all periods is \$7,149,315 which is slightly less than budget stated above.

Findings

- Prudency:

Beardmore Dam forms a critical part of the St George Bulk Scheme. Piping of the outlet right bank training wall among other issues such as erosion and sand boils present sufficient evidence that the dam's structural integrity is at risk. With a high chance of failure predicted for the dam (1/6 probability), it is evident that these issues must be rectified immediately. Given the consequence of dam failure both in terms of flood mitigation and irrigation supply, this project is therefore considered prudent.

- Efficiency:

A defined project scope has been provided and a detailed options analysis completed. While the procurement process appears to have been competitive, the two offers were not provided for review. It has been assumed that they match current market conditions and the initial project cost estimate was significantly underestimated. Due to an unanticipated longer construction schedule and a large rainfall event in April 2019, \$2.28M in additional works were required above the former \$4M construction budget. Sunwater has previously agreed with customers on adjustments for inefficiencies in works prior to FY19 as well as \$241,139 for downstream rock protection works. These had not been deducted from the CAPEX claim and therefore require adjustment.

**17BBR02 – FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP
Replenishment - Condition Based (Rfr DS Insp Rpt #2288631)**

Project Overview

The Gattonvale Offstream Storage embankment was damaged by Cyclone Debbie in 2017. This project involves the rectification of these damages through placing of sand gravel bedding on the storage walls, followed by placement of riprap.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19: \$574,135
		Standard ✓	Impact of findings on claim (\$FY19)	FY19: \$0
		Cost ✓	Total Accepted (\$FY19)	FY19: \$574,135

Background

The Gattonvale Offstream Storage (GOSS) embankment is part of the Bowen Broken Rivers Water Supply Scheme, which includes Eungella Dam, Bowen River Weir. Water is harvested during flood periods and released back to the weir to meet water demands. In 2017, the site was damaged by Cyclone Debbie. Along the majority of the damaged section, the rock protection has moved downgradient within the storage forming a bench, with sliding enabled by the surface provided by the geofabric installed directly onto the embankment. This fabric has been rolled as a result of wave action, leaving the embankment material directly exposed to the waves. Within the damaged zone, limited notching of the embankment material has occurred. In the northeast corner of the embankment, the notching is significant with the embankment having been removed by wave action to the inner wheel track of the crest roadway, marginally reducing the width of the embankment at a few locations. Remedial works have been identified and planned under project 17BBR02. Sunwater has scheduled re-armouring works of a 1,400m length of the storage inner wall in 2019. Until these works are completed, the storage is being operated at a reduced level.

Options Assessment

An April 2018 memorandum describes the repair works for the damaged sections and the options considered. The options included:

- Option 1 - Like for like replacement (geofabric, sand and gravel);
- Option 2 – ArmorMax (turf reinforced and anchored mats);
- Option 3 – Dumped rock riprap (bedding layer with stones and rock fragments dumped in place on top);
- Option 4 – Other solutions (grass, soil cement, gabion, etc.).

Option 3 was the preferred option using sand and gravel bedding. Assessment of costs and other decision making factors were not included in the memorandum. It appears the decision was made on high level pros and cons.

Implementation

A project scoping document for the options study was completed in May 2016. There doesn't appear to have been any work progress until March 2018, when the Annual Inspection Report was completed which included a recommendation for upstream slope protection for an estimated cost of \$600,000.

In April 2018, the options assessment memorandum was submitted. A July 2018 technical specifications provides the design and construction requirements for the preferred solution of rock riprap. Design drawings were completed in August 2018.

Meeting minutes from October 2018 summarize the evaluation of the contractor bids received from [REDACTED] and [REDACTED]. [REDACTED] were selected as the preferred bidder based on better hourly rates and cheaper mob/demob costs. A November 2018 Contractor Determination document identifies a contract value of \$478,480 plus a 10% contingency of \$48,000. The intent of the document is to nominate the contractor as principal contractor (as opposed to Sunwater).

The CAPEX claim in FY19 was \$586,391 and actual expenditure was \$574,135. This allows for approximately \$60,000 in Sunwater costs (10%) for project management and any other indirect costs. This may be prudent as Sunwater have nominated the contractor to be the principal contractor. The project costs are within the original budget estimate and the project used a competitive tender process for the contractor. For these reasons, the costs appear to be reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

The Gattonvale Offstream Storage forms a critical part of the Bowen Broken Rivers Scheme. The embankment structure has experienced significant damage caused by Cyclone Debbie in 2017 and has since been operating at a reduced storage level. Access to the GOSS has also been impacted, with the erosion extending to the inner track. Based on the importance of the GOSS within Sunwater's Bowen Basin Scheme and the extent of damaging to the embankment, this project is considered prudent.

- Efficiency:

The project included a high level options analysis, and high quality technical specifications were prepared based on the preferred option. A high level original budget of \$600,000 was set but no documentation was included to support it. The project underwent a competitive procurement process with two bids received. The project will be delivered with the contractor as principal contractor; therefore, Sunwater non-direct costs are expected to be low. The total planned and actual CAPEX costs in FY19 are within the original budget and appear reasonable.

18BDK06 – Installation of Transformer 12 – Burdekin Falls Dam

Project Overview

Transformer 12 at Burdekin Falls Dam is proposed to be replaced in FY19 as part of Sunwater’s forward planning renewals.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19: \$110,577
		Standard ✓	Impact of findings on claim (\$FY19)	\$0
		Cost ✓	Total Accepted (\$FY19)	FY19: \$110,577

Background

Burdekin Falls Dam Caravan Park and Dam facilities are powered via two Transformers TX11 and TX12. The transformers are 11KV/415V 300KVA and pad mount types. Transformer 11 (TX11) is supplying power to Housing, Office, Workshop, and Caravan park and entertainment area. Transformer 12 (TX12) is located near Dam Crest and it is supplying power to Dam facilities.

The transformers are required to maintain operation of the Burdekin Falls Dam Caravan Park and Dam facilities. An emergency generator is located in the Burdekin Falls Dam intake Structure which is providing back up power to dam facilities during a power outage. This generator can supply power to dam facilities via the Main Switchboard in case Transformer TX12 fails, but the emergency generator is a secondary and costly means of supply and it is not reliable source of energy for a long period of time.

A needs analysis was completed, and each of the compliance/standard requirements were identified as justification for the works, each associated with unplanned and length service interruption from breakdown of the transformer. The transformer enclosure is also badly corroded and unprotected putting the public safety at risk. Lastly, it is unbundled therefore presents an oil leak risk.

The transformers were manufactured in 1980 and 1979. At the time of proposed replacement, the transformers will be approximately 40 years old, which is beyond the standard serviceable life of electrical equipment (per WSA 03 Section 1.2.6). Images of the transformers demonstrate their poor condition. Based on the condition of the transformers, immediate replacement is justified.

Options Assessment

A detailed options analysis was completed for the Burdekin Falls Dam Power Transformers. Four options were identified in the scoping phase. These include:

1. Refurbishment and upgrade transformers;
2. Replace transformers;
3. Refurbishment of transformers at site;
4. Do nothing.

The preferred option was determined to be Option 2 as it scored the best compared to the options considered based on addressing the needs of the project, net cost, benefits, and risks. The preferred option, to replace the transformers, provided the most cost benefit. An additional 20 years’ service was identified compared to the next closest option which was refurbishing the transformers.

Based on the current condition of transformers if no preventative maintenance is undertaken, the transformers are going to break down and the Burdekin Haughton Water Supply Scheme will be disturbed. The consequences of not proceeding may be anything from regular inspections, oil test and analysis to transformer failure that requires transformer replacement. The lead time to supply new transformer is above 20 weeks.

Implementation

The project (18BDK06) for transformer TX12 was executed in combination with project 18BDK07 for transformer TX11. This included project planning, design and project management. The original budget for both projects was \$340,595 as per the February 2018 Project Management Plan.

Two offerors were invited to submit a quote for the supply and delivery of two substations to Burdekin Falls Dam. A quote was only received from [REDACTED] for a price of \$78,000. The installation was awarded to [REDACTED], but no evidence of competitive tender was provided. Both quotes were within the project budget.

A June 2018 cost estimate showed an original budget of \$175,508 for 18BDK06. The FY18 costs were \$24,734 (as of April 2018). The forecasted requirement for FY19 was \$126,766. The total budget would therefore be \$151,500.

The original proposed CAPEX claim was \$123,706 and actual expenditure was \$110,577. This appears to be reasonable for the scope of the project (TX12 only) and the June 2018 cost estimate.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

Sufficient information was provided to demonstrate project prudency. The two transformers at Burdekin Falls Dam are critical to the operation of the Caravan Park and Dam facilities. Power is supplied by these transformers to Housing, Office, Workshop, Caravan Park, entertainment area, and dam facilities. The transformers were observed as being improperly maintained and subsequently in poor condition, requiring replacement. The replacement is justified to ensure compliance with the Resource Operations Licence.

- Efficiency:

A defined project scope has been provided and a detailed options analysis was undertaken. The cost estimate in the Project Management Plan was detailed. While an attempt at competitive procurement was made, it appears only one quote per scope item were received. That said, the quotes were within the allocated budget. The project cost has been considered reasonable.

**19BBR05 – Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE
- Replace & Refurb Life Strategy (#956033)**

Project Overview

This project involves the replacement of the compost toilet block at Eungella Dam, which was recently destroyed by fire.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19: \$19,144
		Standard ✓	Impact of findings on claim (\$FY19)	FY19: \$0
		Cost ✓	Total Accepted (\$FY19)	FY19: \$19,144

Background

Toilet Block 1 is a compost system that is part of the amenities at Eungella Dam. It was installed in 1993 and was last valued in 2008. In 2018, it was totally destroyed by a fire and subsequently requires replacement to restore amenity to the area. The toilet facilities are necessary to provide sanitation. This project addresses compliance obligations regarding safety with respect to hygiene and basic health. The most recent condition assessment of the asset was completed in 2018. The toilet facility was given the worst possible rating of 6, which reflects the destroyed state that it is in as a result of fire.

Options Assessment

No alternatives were identified. There is no evidence that a scoping process was undertaken. Various toilet technology options are available, and a do-nothing option should still be considered as a non-capex consideration. The consequences of not proceeding would form part of the justification for progressing with the toilet block replacement.

Implementation

According to asset information in the document QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx, the replacement cost for the toilet block based on its 2008 valuation is \$186,529 plus \$1,374 for the greywater pump. In \$FY19 this is \$236,952. Costs of \$229,343 were originally planned for the replacement in FY19; however, the actual expenditure was \$19,144. It has been assumed that full replacement was not completed and instead a minor refurbishment was undertaken.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:
Toilet Block 1 at Eungella Dam was completely destroyed by fire in 2018. This project was initiated to replace the toilet block and restore the area's amenity. Given the importance of toilet facilities for general health and wellbeing, including proper sanitation, the project is considered to be prudent. Sunwater need to clarify the anticipated expenditure date for this project as FY19 is now complete and no planning or design documentation was provided.

- Efficiency:

For the proposed toilet block replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The originally proposed FY19 project costs were close to the asset register replacement value were therefore considered reasonable; however, the actual expenditure was \$19,144. It has been assumed that full replacement was not completed and instead a minor refurbishment was undertaken.

19BBR09 – Refurbish Pump 1 - Gattonvale PSTN

Project Overview

Pump 1 at Gattonvale Pump Station is proposed to be refurbished in FY19 and every 6 years thereafter.

Summary of Findings

Review Summary	Prudent	x	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$32,633 FY21-24: \$0 FY25-53: \$451,000
			Standard	✓		
			Cost	x		
					Impact of findings on claim (\$FY19)	FY19-20: \$32,633 FY21-24: +\$10,000 FY25-53: \$411,000
					Total Accepted (\$FY19)	FY19-20: \$0 FY21-24: \$10,000 FY25-53: \$40,000

Background

The model C3531/985 Flygt pump (620mm) at Gattonvale Pump Station was installed in 2005. It is proposed this pump, Pump 1, is refurbished in FY19, then every 6 years thereafter. The cost per refurbishment ranges from \$70,000 to \$93,000 in \$FY19, although actual costs for the refurbishment conducted in FY19 have been updated to be \$32,633.

Options Assessment

No alternatives were identified.

Implementation

The pump is considered a low risk asset according to the risk register. Based on this, the replacement cycle for a submersible pump (from QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls) is 30 years and the refurbishment cycle is 6 years.

The proposed 6-year cycle matches the asset management strategy, but it appears it has not accounted for replacement cycles (i.e., refurbishments should occur 6 year cycles from the replacement year). If the pump was installed in 2005, the refurbishments should occur in 2011, 2017, 2023, etc. The proposed schedule has it occurring in 2019, 2025, etc. (i.e., offset by two years). A previous refurbishment could have been delayed, which caused an offset in the schedule, but no information was provided to show this. Furthermore, the refurbishment cycle should account for 30-year replacement cycle. A pump does not need refurbishment in the year that is replaced. The pump is due for replacement in 2035; therefore, refurbishment would be required in that year and not until 2041.

The proposed cost of refurbishment also does not match the replacement value in the asset register. The cost of refurbishment should be less than that of replacement. The asset register replacement value is \$18,378 valued in 2015. In \$FY19, this is \$19,656. Assuming refurbishment is 50% of the cost of replacement, the cost would be \$10,000.

Table 1 provides a comparison of the proposed and a recommended schedule and cost of refurbishment.

Table 1 Refurbishment Program Cost and Frequency (\$000 in \$FY19)

	Install Year	1	2	3	4	4	5	6	7	Total
Proposed	2005	?	2019	2025	2031	2037	2043	2049		
	Past Cost	Past Cost	\$33	\$85	\$92	\$93	\$92	\$89		\$451
Recommended	2005	2011	2017	2023	2029	2035	2041	2047	2053	
	Past Cost	Past Cost	Past Cost	\$10	\$10	Replace	\$10	\$10	\$10	\$50

Based on the table above, a significant adjustment to the CAPEX claim is recommended. Costs have also been shifted into the price path period.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

Refurbishment of the pump is justified based on asset management strategy for 6-year refurbishment cycle for a low risk asset. In this regard, the project's prudency is demonstrated; however, the timing of the proposed refurbishments do not align with the install date of the pump. Without information on the date of the last refurbishment, a revised schedule is recommended to match the asset strategy. Furthermore, the replacement cycles were not accounted for in the refurbishment cycle. As such, an unnecessary extra year of refurbishment was included.

- Efficiency:

A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. The proposed refurbishment costs do not align the replacement costs as documented in the asset register. Three adjustments are recommended – one for the timing of the refurbishments, one for removing a refurbishment close to the year of replacement, and one for the individual cost of a refurbishment.

19BDK01 – Refurbish Hydraulic System and cylinders - Stage 3

Project Overview

This project involves the refurbishment of the hydraulic cylinders that control the flap gates on the Clare Weir. An options analysis recommended an approach to purchase 29 hydraulic cylinders to increase the number of cylinders that could be swapped out and refurbished each year. The project would then form a 4-5 year rolling program to refurbish the 150 cylinders.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$247,070 FY21-24: \$0 FY25-53: \$426,370
			Standard	✓		
			Cost	✓	Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$247,070 FY21-24: \$0 FY25-53: \$426,370

Background

Clare Weir on the Burdekin River at Clare has 150 hydraulically operated flap gates on the weir crest to provide an increased upstream pool level for pump stations of the Burdekin Irrigation Area. Failure to maintain upstream water level at Clare Weir puts Sunwater at risk of breaching their regulatory requirement to manage water under the Burdekin Haughton Bulk Scheme.

Failure events were recorded in 2012 and 2013. Risk and condition assessments of the asset have classified the asset as having an "extreme" risk with the gate seals and cylinders requiring refurbishment to reduce the risk to an acceptable level. The previous failures in 2012 and 2013 have resulted in several hazards identified. These include:

- Failure of the weir;
- Failure of a gate bank;
- Failure of a single gate;
- Unsafe access;
- Oil loss to environment;
- Impairment of fishway function.

This project aims to rectify these hazards. It is proposed that the hydraulic system and cylinders at Clare Weir are refurbished in FY20 for an estimated cost of \$252,010 in nominal dollars. This project forms part of a rolling program which was stated to currently be at "Project Phase 4 - Preliminary Design".

Options Assessment

Several options were identified to address the risks, including:

1. Removal of the gates and lowering of the weir;
2. Permanent raising of the weir;
3. Refurbishment of mechanical equipment by a contractor;

4. Refurbishment of mechanical equipment by Sunwater direct management;
5. Do nothing;
6. Addition of PLC and SCADA control to the weir.

The recommended option to proceed with is Option 3, a project to procure 29 hydraulic cylinders to give a total of 36 spare, then swap out a bay of cylinders at a time for refurbishment while also replacing the seals and hoses on each gate in the bay. This leads to a 4-5 year refurbishment program.

Implementation

The June 2016 Options Analysis estimated the capital cost to be \$2,555,000 (+/-75%). This included \$2,200,000 for the direct supply and install costs.

The January 2019 Scope document only describes the scope for setting up the supply and refurbishment contract. The budget was \$30,824. The document does, however, provide some information on the wider program. It states that:

- Stage 1, completed in FY18, involved the replacement of the hydraulic hoses and counter-balance valve on each of the 150 cylinders.
- Stage 2, would be the refurbishment of cylinders for the next several years starting FY20.

A maintenance strategy and proposed design modifications were stated to be in development in FY19 but no supporting information was provided. Furthermore, the project title references a Stage 3 for the CAPEX claim but no information on what Stage 3 represents was provided.

As per the Procurement Process & Rec 2019 March document, a competitive tender was completed in November 2018. Four offers were received, of which three were technically compliant. [REDACTED] was deemed the preferred contractor. The contract was rates based and no details of the quoted rates were provided. Sunwater estimated an annual contract value of \$50k-\$150k. The total over four financial years would be \$160k-\$380k and would vary based on the number of cylinders to be replaced and/or refurbished each year. A budget of \$400,000 was allocated but no scope was defined.

The CAPEX claim for the Stage 3 works has two entries:

- \$252,010 nominal (FY19\$247,070) in 2020
- \$907,610 nominal (FY19\$426,370) in 2050

The FY20 allowance does not match the budget in the procurement document nor does it match the cost estimate in the Options Analysis. We note that this project has been treated as a rolling program of works (with 19 different stages occurring until FY36, with no consistent project identifier contained in the submission). As there is no documentation to identify what the FY20 works include, the following assumptions are made:

- Based on the asset register replacement value, the cost of a single cylinder is approximately \$60,000. Assuming 95% ownership costs, the direct cost is approximately \$30,000. 29 new cylinders would therefore be approximately \$870,000.
- The Options Analysis recommended a purchase of 29 cylinders and refurbishment of all 150 cylinders for a total direct cost of \$2,200,000. Subtracting \$870,000 for the purchased cylinders, the refurbishment allocation is approximately \$9,000 per cylinder. Adding ownership costs back, it is \$17,000 per cylinder.
- The FY20 amount of \$252,010 would allow refurbishment for up to 14 cylinders, but there is a restriction of 7 cylinders per year due to the current number of spares. The \$252,010, therefore, roughly translates to the purchase of two spares and the refurbishment of seven cylinders.

If this logic is applied, the FY20 costs could be considered reasonable, noting that remaining cylinders are being budgeted for under separate stages of the rolling program.

For the 2050 cost claim, the 30-year refurbishment interval matches the original asset management strategy in the Bulk Water Asset Object Type Strategy document, but it is unclear how the cost is established. It does not correlate with the assumed FY20 refurbishment costs and appears to be insufficient to refurbish all 150 cylinders.

Findings

- Prudency:

Sufficient information was provided by Sunwater regarding the refurbishment of the flap gates at Clare Weir. The failure history, hazard assessment, and condition inspection inform the need for the project. The refurbishments form part of rolling works to reduce the high level of risk currently identified for the weir to an acceptable level. In this regard, the project's prudency is demonstrated.

- Efficiency:

For the proposed hydraulic cylinder refurbishments, there is insufficient information provided to comment on project efficiency for Stage 3 of the works alone. However, noting that this project has been treated as a rolling program of works, and given the quality of the options analysis and procurement process, the project costs have been assumed as reasonable.

19BUN10 – Reinstate 10 refurbished and build & install 10 new shutters at Ben Anderson Barrage

Project Overview

This project involves the refurbishment of ten shutters and manufacture and installation of a further ten shutters at Ben Anderson Barrage. These works are in response to the damages sustained after the 2013 January floods. This includes the 2019 (project 0000076177) and 2020 (project 0000067246) works.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$549,618
			Standard	✓	Impact of findings on claim (\$FY19)	FY19-20: \$0
			Cost	✗	Total Accepted (\$FY19)	FY19-20: \$549,618

*Note: expenditure claim is inclusive of 2019 (project 0000076177) and 2020 (project 0000067246) project samples.

Background

During the January 2013 floods, the Ben Anderson Barrage was severely damaged. Flood water inundated the site causing damage to the entire site infrastructure. This included the collapsible steel shutters, which are designed to collapse when the storage level exceeds 0.3 m above full supply level (FSL). Emergency civil works were commenced to remove 20 shutters to commission the barrage to an operational standard, but more work is required for the shutters under the renewals budget. A rolling program of shutter refurbishment was created. This involved removing 10 shutters, sand blasting, repainting, and replacing failed components, then during the following year’s shutdown, they are swapped out for the next 10 shutters. This project forms part of a longer-term annual strategy to restore all 110 shutters. In terms of historical projects; 10 shutters were refurbished in 2015 (project 15BUN08) at a cost of \$114,611, 10 shutters refurbished in the following year (project 16BUN04) at a cost of \$104,870, and 10 shutters refurbished under project 17BUN08 at a cost of \$433,535.

The refurbished shutters have a nominal life of 10 years. The corroded and damaged shutters pose a risk of leakage and loss of water, thus reducing the ability to meet agreed service levels under the Bundaberg Bulk Scheme. This project involves a change in approach to the program by replacing shutters instead of refurbishing. The project is split into two years, each with its own maintenance key.

Options Assessment

Three options were identified as documented in the Business Case for this project. These include:

1. Swap out and refurbish 10 shutters each shut down;
2. Fabricate 10 new shutters and then have 20 shutters ready for swap out;
3. Do nothing.

It was recommended in the Business Case that approval be given for Option 2 to proceed. It includes redesign, fabrication and installation of 10 new shutters and involves the following works:

- Contractor design - investigation and redesign of the shutters;
- Presentation of three price options for the fabrication of the shutters;
- Sunwater to choose the preferred option, based on price, maintainability and expected life;
- Fabrication of 10 new shutters;
- Installation of the 10 new and 10 already refurbished shutters;
- Continued fabrication of 10 new shutters per year and associated installation.

Option 2 is the preferred option for the following reasons:

- It provides a long-term solution to ongoing corrosion;
- It provides a much longer life of each new shutter compared to the remaining life of refurbished shutters. It is expected to receive a 20-year life warranty from the fabricator and an expected 40 to 50-year life of the new shutters, compared to an existing 10-year remaining life of refurbished shutters;
- Fabricating new shutters is not much more expensive than refurbishment but provides twice or more the life;
- The current budget comfortably allows for this option.

A do-nothing option was considered, however disregarded as the consequence of not proceeding would delay the progress of rectifying the corrosion issues which currently affect the shutters. That said, it was also mentioned that the shutters may not be needed pending a resolution regarding the Paradise Dam project in FY19.

Implementation

The Nov 2017 Business Case estimated \$439,107 for the fully stainless steel option. The base case of painted mild steel, which is closer to a like-for-like replacement, was \$100,000 less.

The March 2018 cost estimate was \$461,397 including 10% contingency, \$250,000 for ten shutters (including the \$100,000 upgrade to stainless steel), \$56,000 for design, \$24,000 for installation. The estimate references a March 2018 quote from [REDACTED]

The February 2019 cost estimate was \$249,176 including a 5% contingency, \$185,000 for ten shutters, and \$11,000 for their design. It is noted that the costs were based on the highest cost option of the stainless steel. If lower cost options are pursued, the total costs should decrease.

The February 2019 Project Scoping and Management Plan includes \$249,274 for 8 shutters as a trial. They are not expected to be installed in FY19, so this is for the design and costing of three options (mild steel, partial stainless steel, full stainless steel), and their fabrication.

The work has been sole sourced to [REDACTED], whom have sole sourced an engineering consultant for the design. [REDACTED] was the company awarded the existing refurbishment contract, which was originally competitively tendered but only resulted in the one offer from [REDACTED].

The cost claims are \$243,216 in FY19 and \$306,402 in FY20 (both in \$FY19). These do not match the business case or cost estimates, and no justification has been included to support the higher costs in FY20. It is recommended the \$249,274 be allocated for FY19 as budgeted in the February 2019 Project Scoping and Management Plan. The higher cost in FY20 is assumed to be required to allow installation of both the new and previously refurbished shutters. The March 2018 cost estimate costed the installation at \$25,000. Adding this and another \$25,000 for two additional shutters to the \$249,274 FY19 budget total, the cost allocated for FY20 appears reasonable. The FY19 actual costs are less than the budget; therefore, no adjustments are recommended.

Findings

- Prudency:

Sufficient information was provided by Sunwater regarding the proposed replacement of 20 collapsible steel shutters at Ben Anderson Barrage. Replacement is justified based on the poor condition of the shutters and the criticality of their role in storage capacity within the Bundaberg Bulk Scheme. Replacement reduces the risk posed by a shorter life refurbishment option. In this regard, the project's prudency is demonstrated.

- Efficiency:

A defined project scope was provided with clear consideration for alternative strategies. The preferred refurbishment option had the highest capital expenditure, however presented project efficiencies which would in turn result in least net costs over the project lifetime. Detailed cost estimates, including supplier quotes for the shutters, were provided and appear reasonable. The actual FY19 expenditure was less than the budgeted amount and the higher costs in FY20 appear to be justified due to the additional number of shutters; therefore, it has been considered efficient.

efficiencies which would in turn result in least net costs over the project lifetime. Detailed cost estimates, including supplier quotes for the shutters, were provided and appear reasonable. The expenditure cost claim in FY19 was \$133,726 higher than the cost estimate, originally without explanation. It was later clarified that investigation and design review costs had incorrectly been included when they had already been completed under a previous project; therefore, an adjustment is proposed.

19CHW03 – Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir

Project Overview

This project forms the forward planning for a study into the recreational use storage management plan at Chinchilla Weir.

Summary of Findings

Review Summary	Prudent	x	Scope	x	Capital expenditure claim (\$FY19)	FY19: \$43,368
			Standard	x	Impact of findings on claim (\$FY19)	FY19: \$43,368
			Cost	x	Total Accepted (\$FY19)	FY19: \$0

Background

Chinchilla Weir forms a critical part of the Chinchilla Weir Scheme. Sunwater have proposed a study into the development of a recreational use storage management plan for Chinchilla Weir. No documentation or justification was provided, therefore the driver for this project is not clear. There is no linkage to the Chinchilla Weir service levels, or any legislative, compliance, safety, or environmental requirements.

As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.

Options Assessment

No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.

Implementation

The proposed capital expenditure claim was originally \$75,000 (in \$FY19), but there was no supporting information provided to describe the contents or extent of the proposed study that could be used to justify the proposed cost. Information in the asset register on the Chinchilla Weir would not be relevant to the assessment of the proposed cost.

Actual costs for FY19 were \$43,368.

Findings

- Prudence: As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.
- Efficiency: For the proposed study for recreational use storage management plan, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. More information is required to assess the project’s efficiency.

19ETO06 – Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - [REDACTED] Options Study Review Report' Doc Ref #2242568 Option #4

Project Overview

This project involves the forward planning replacement of the controls system at Victoria Plains Pump Station. The proposed timing of replacement is 2019, and again in 2039, for estimated costs of \$180,470 and \$335,174 respectively. Note that actual costs for 2019 were \$220,092.

Summary of Findings

Review Summary	Prudent	x	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$220,092 FY25-53: \$335,174
			Standard	✓	Impact of findings on claim (\$FY19)	FY19-20: \$0 FY25-53: \$0
			Cost	✓	Total Accepted (\$FY19)	FY19-20: \$220,092 FY25-53: \$335,174

Background

The Victoria Plains Pump Station discharges into the Victoria Plains Balancing Storage, which feeds the gravity pipelines that service the area. The Victorian Plains Operational System has 129 metered offtakes supplying 76 customers.

A condition and risk assessment was completed in 2016 by [REDACTED]. The control console, logic control panel, cubicle, and control relay were all assessed with a score of 5, which indicates major deterioration to the point of inoperability. It was noted in the condition assessment that Elpro RTU modules are no longer available on the market, should they need replacing.

The Sunwater asset strategy for control systems equipment is to replace on 15-year intervals based on condition or risk. This is also often driven by technology obsolescence. Sunwater’s asset strategy for switchboards is to replace on 35 year intervals. The switchboard and controls equipment were installed in 1989. At the time of proposed replacement in 2019, the equipment will be 30 years old.

The works are necessary to comply with safety requirements. Continuing the operation of the existing switchboard presents a considerable WH&S risk. Furthermore, unplanned shutdown, as a result of electrical or controls failure, would lead to service interruptions and risk not meet agreed service levels. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

An options assessment was completed by [REDACTED] in July 2017. It was updated by Sunwater in July 2018. Four options were considered in the 2018 R&E Detailed Options Analysis. These include:

1. Base Case - maintaining current operating procedures, infrastructure and maintenance routines;
2. Refurbishment case - refurbishing or replacing all switchboard and control system infrastructure with comparable equipment;
3. Replacement case - replacing all current infrastructure with upgraded equipment suitable to accommodate pump VFDs;
4. Partial replacement - replacing certain deteriorated, critical and failure prone switchboard and control system infrastructure or components with new modern equivalent equipment.

Option 4 was determined to be the best means for achieving the desired outcomes based on the detailed options analysis undertaken. It was also the least cost option at \$222,000 (other than the do-nothing option).

A non-capex solution was considered in Option 1, where Sunwater would maintain current operating procedures, infrastructure and maintenance routines. Doing nothing was discounted as it presented the greatest risk, especially in terms of safety because it is not current with modern safety standards.

Implementation

After the 2016 condition inspection, [REDACTED] was retained to complete an options analysis. Three options were proposed (do nothing, refurbish, replace). An MCA was used to select the preferred option of replacement. In July 2018, Sunwater revised the options analysis by adding a new option for partial replacement. It scored higher and was the new preferred option. It reduced the capital cost from \$729,000 to \$222,000.

It includes the replacement of:

- Incomer ACB (\$15,000);
- Motor management relays (\$8,000);
- Starting contactors (\$10,000);
- Energy meters (\$1,500);
- Light and power distribution board (\$7,500);
- Control system (\$180,000).

In November 2018, Sunwater prepared a briefing note to recommend yet another alternative and way forward. This was in response to a site visit conducted in October 2018. The new recommendation was to replace the 415V switchboard and distribution board and transfer control function to PLC. The cost was estimated to be \$259,353.

Technical specifications were prepared in November 2018 for the controls and switchboard. A procurement plan was written in December 2018, which stated that four suppliers would be approached for quote. A Request for Offer was completed in January 2019, but none of the quotes or bid evaluation was provided.

A March 2019 estimate costed the option at \$259,353 (matching the briefing note), but after obtaining a contractor quote (which was 33% higher than budget), the estimate became \$332,754.

According to *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value for the control equipment is \$175,925 (\$188,155 in \$FY19) and the electrical switchboard is \$172,773 (\$184,787 in \$FY19).

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

Sufficient information was provided by Sunwater regarding the proposed replacement of the switchboard at Victoria Plains Pump Station. Replacement of the system could be justified based on the age, condition and risk of the asset having exceeded the typical serviceable life for electrical/SCADA equipment. It is in line with Sunwater's asset strategy, and in this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

A detailed options analysis was undertaken, and the preferred option was identified as being partial replacement of the control system. The options analysis was later revised twice more, essentially returning to the original recommendation of full replacement; although at a lower cost. It appears a competitive procurement process was used. Both the final cost estimate and actual FY19 costs appear to be reasonable and less than the asset register's asset replacement value for the control system and switchboard.

19ETO12 – Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)

Project Overview

This project involves the refurbishment of AVIS Gate, which forms part of Sunwater's strategy of 10 yearly rolling refurbishments. The proposed refurbishment year is 2019 and every 10 years thereafter for an estimated average cost of \$38,000 per refurbishment (in \$FY19).

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$41,114 FY25-53: \$109,260
			Standard	✓	Impact of findings on claim (\$FY19)	FY19-20: \$0 FY25-53: \$0
			Cost	✓	Total Accepted (\$FY19)	FY19-20: \$41,114 FY25-53: \$109,260

Background

The Scheme provides irrigation water for customers located within the Sandy Creek catchment and services some 15,000 hectares of irrigated sugar cane. The main artery for the Scheme is Oakenden Main Channel which extends for a distance of 34.8 kilometres and has a carrying capacity of some 553 ML/d. The Scheme utilises a number of various types of assets to regulate the flow in Oakenden Main Channel, 3 sets of overshot gates in the first 10 kilometres and 9 float controlled regulating gates in the remaining 25 kilometres of channel. The location of the gate requiring refurbishment is at 19,180m along Oakenden Main Channel.

This project forms part of Sunwater's strategy of 10 yearly rolling refurbishments. The timing of regulator gate refurbishments is cyclic. After refurbishment or replacement, asset condition decays at an assumed rate (2 condition points over 10 years) until reaching the particular Options trigger score (4) before intervention.

This project addresses compliance obligations. Float controlled channel regulator gate arrangements provide reliable and cost-effective channel regulation. Refurbishment will include:

- Removal, blasting and painting of all external surfaces, protection of all threaded bolt holes from paint intrusion;
- Replacement of bearings and all fixings;
- Reassemble, clean and grease pivot points to reduce WH&S risks associated with routine maintenance activities.

Sunwater's Asset Management Policy (AM01) objectives are to 'manage assets in a sustainable manner to meet Sunwater's business objectives of safeguarding asset integrity and ensure continuing asset serviceability.

The gate has been in service since 1983. It was last refurbished in 1999. At the time of the proposed refurbishment, the gate will be 36 years old. Based on the asset condition score and asset age presented in the Options Study, the gate is due for refurbishment. The proposed timing is in accordance with Sunwater's rolling strategy of 10 year rolling refurbishments.

The last condition assessment was documented in 2013. At the time, the gate was rated as having an overall score of 3, which indicates it is in fair condition. This aligns with the condition deterioration figure provided in the Options Study.

Options Assessment

Several options were considered in the Options Study for Float Regulating Gate Refurbishment Strategy. These include:

- a. Existing refurbishment strategy;
- b. Patch Paint and Extend Refurbishment Period;
- c. Mechanical Overhaul and Extended Refurbishment Period;
- d. Run to Failure and Replace.

The preferred strategy for float gate refurbishment was determined to be Option A. In a planning sense, there is little benefit in changing the medium to long-term strategy away from the base case (Option A).

Option D is run to failure, which is the equivalent of doing nothing. Sunwater has recognised that this presents considerable risk in terms of safety, cost and reputation and was subsequently disregarded.

Implementation

The Project Initiation document describes the scope a:

- Blast cleaning of all exterior surfaces;
- Painting in accordance with 'Protective Coating Specification' # 930006;
- The replacement of bearings, fixings and sacrificial anodes as per original design;
- Gates are to be rebalanced and commissioned upon reinstallation in accordance with the appropriate procedure detailed in 'Regulating Gates Balancing Procedure' Doc #1880853;
- Pivots points are to be greased as per manufacturer's specifications;
- Remote grease lines to be installed on all pivot points to reduce WH&S risks associated with routine maintenance activities.

The refurbishment cost was estimated at \$41,000 (+/- 15%).

The March 2019 scope document reiterates the same scope and states that work must be done by May 2019.

The March 2019 Procurement Process and Recommendation document shows a budget value of \$41,509 and an estimated contract value of \$30,000. Two quotes were received (\$25,650 and \$48,880) and the contract was awarded to [REDACTED], the least cost bidder.

The average refurbishment cost of \$38,000 in the CAPEX claim appears reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

Sufficient information was provided by Sunwater regarding the proposed refurbishment of Regulator Gate 4 of Oakenden Main Channel. Refurbishment is justified based on the 10-year rolling strategy by Sunwater and the latest observed condition of the structure. In this regard, the project's prudency is demonstrated.

- Efficiency:

A thorough Options Study was undertaken to determine the most appropriate rolling refurbishment strategy for the floating regulator gates in the Oakenden Main Channel. Based on the criteria for assessment, the best strategy was to continue with the existing process. A competitive procurement process was completed, and the preferred contractor was awarded based on least cost and demonstrated ability to complete the works. The CAPEX claims appear to be reasonable and in line with the cost estimates generated.

000008492 – 19TIN07 Study: 5 Yr Comprehensive Inspection – Tinaroo Falls Dam

Project Overview

The Tinaroo Falls Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2019) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$91,081
			Standard	✓		FY21-24: \$158,014
			Cost	✓		FY25-53: \$875,237
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$91,081 FY21-24: \$158,014 FY25-53: \$875,237

Background

The Tinaroo Falls Dam is a part of the Mareeba-Dimbulah Bulk Supply Scheme and supplies water for irrigation and urban use. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater’s *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;

- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of \$168,000 (\$FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY19 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

19UC003 – Study: 5 Yr Comprehensive Inspection – Leslie Dam

Project Overview

The Leslie Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Jun 2019) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$60,267
			Standard	✓		FY21-24: \$117,670
			Cost	✓		FY25-53: \$650,904
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$60,267 FY21-24: \$117,670 FY25-53: \$650,904

Background

The Leslie Dam is a part of the Upper Condamine Supply Scheme and supplies water for irrigation, town water supply and industrial use. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections.

Implementation

Per Sunwater’s *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;

- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While no information was provided to show how the methodology was applied, the methodology itself appears reasonable. The average study cost of \$125,000 (excluding FY19 actuals) is also within range of other 5-Yr Dam Inspection projects.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY22 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

19BYR09– Study: 20 Yr Dam Safety Review – Boondooma Dam

Project Overview

The Boondooma Dam supplies water for irrigation for Boyne River irrigators, Burnett River irrigators, and Tarong Power Station. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 June 2019) as well as a safety review report.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$218,859
			Standard	✓		FY21-24: \$0
			Cost	✓		FY25-53: \$355,420
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$218,859 FY21-24: \$0 FY25-53: \$355,420

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines. The next review is required by 1/6/2019.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater’s Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the Procurement Process and Recommendation document, an open tender process was adopted with eight contractors invited to provide quote for Dam Safety Reviews at Boondooma Dam, Cania Dam and Fred Haigh Dam.

A cost effectiveness ratio (CER) was determined based on Total Cost / Total of Weighted Score for the quotations provided. The offer with the lowest CER is an indication of the best value for money. The outcome of this assessment was that [redacted] was the preferred supplier.

The contract value for Boondooma Dam Safety Review was recorded as \$97,695 but Sunwater added 50% contingency to account for likely variations. There was no budget breakdown for the overall project budget, but with a total of \$147k allocated to [redacted] and assuming 100% markup for indirects and Sunwater labour, a total budget of approx \$300k is estimated. Since the [redacted] proposal at \$150k was still much lower than the other 6 bidders, for additional risk contingency, the original CAPEX claim of \$336,607 appears reasonable. The actual expenditure was lower at \$218,859.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

A dam safety review of Boondooma Dam is required by 01/06/19 and every 20 years thereafter, and is prudent to Sunwater's compliance with the dam safety requirements prescribed in Queensland Dam Safety Management Guidelines (Feb 2002).

- Efficiency:

While the scope and standard appear to be reasonable, there was insufficient information to provide a strong determination of cost efficiency. The consultant proposal was \$97k but Sunwater added 50% contingency to account for likely variations. There was no budget breakdown for the overall budget, but with a total of \$147k allocated to [REDACTED] and assuming 100% markup for indirects and Sunwater labour, a total budget of approx \$300k is estimated. Since the [REDACTED] risk adjusted proposal (at \$150k) was still much lower than the other 6 bidders, for additional risk contingency, the original CAPEX claim of \$336,607 and the actual expenditure of \$218,859 appear reasonable.

20LOW13 – Owanyilla PSTN - Refurbish - PUN2-PUMP - PUMP - Replacement & Refurbishment Life Strategy

Project Overview

This project considers the forward planning for replacement of Pump 2 at Owanyilla Pump Station, which is proposed to be replaced in 2020, then again in 2040, for an approximate cost of \$130,000 per.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$128,000 FY25-53: \$134,860
			Standard	✓	Impact of findings on claim (\$FY19)	FY19-20: \$0 FY25-53: \$0
			Cost	✓	Total Accepted (\$FY19)	FY19-20: \$128,000 FY25-53: \$134,860

Background

The Owanyilla Pump Station forms part of the Lower Mary River Distribution Scheme. It is proposed the 600mm Kelly and Lewis centrifugal pump is refurbished in 2020 and again in 2040 for an estimated cost of \$130,000 per refurbishment. The pump was originally installed in 1986. No information was provided on the time of the last refurbishment.

According to the document *QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes*, low risk centrifugal pumps (>150mm) have replacement period of 60 years and a refurbishment period of 15 years. Based on a start-up year of 1986, refurbishments would be scheduled in 2001, 2016, and 2031. Replacement would then be due in 2046; therefore, no refurbishment would occur in that year.

A high-level condition assessment was completed in 2016 for the pump in question. It was given an overall rating of 2, which indicates that it is in good condition. The items assessed include the external coating, surface, bolts, foundation and/or baseplate, pump, casing & gland, and pump unit. It is assumed that due to condition, the refurbishment was not completed in 2016 and instead pushed out to 2020 as per the proposed CAPEX claim. The subsequent planned refurbishment is in 2040, which is inconsistent with the Whole of Life Maintenance Strategy of 15 years; therefore, may need to be brought forward.

The *QCA Information Request A58_All projects supporting documentation* document stated that the pump should be refurbished at the same time as the full train of assets (pump, motor, valve). While this appears reasonable, it is not completely consistent with the Whole of Life Maintenance Strategy, since butterfly valves are to be refurbished in 20-year periods compared to pumps and motors at 15 years. It appears that Sunwater has proposed to push out the 15 year refurb of pumps and motors to 20 years as opposed to bring valve refurbishment forward. That said, it should be driven by condition assessment closer to the planned refurbishment year.

Options Assessment

There were no options scoped as part of the forward planning process. Standard operating procedures and specifications were provided to define the scope of a pump refurbishment.

Implementation

According to the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value of the pump is estimated to be \$1,068,149 (\$1,142,405 in \$FY19). The proposed capital expenditure claim is \$130,000, which is approximately 10% of the replacement value and has been considered reasonable for refurbishment cost.

As the pump is due for replacement in 2046, the refurbishment year of 2040 may need to be revisited.

Findings

- Prudency:

The proposed pump refurbishment timing appears reasonable but is not completely consistent with the whole of life maintenance strategy. It appears Sunwater is proposing to push out the pump refurbishment cycle from 15 to 20 years. A refurbishment was due in FY16 but appears to have been pushed out to FY20. It has been assumed this is due to the favourable condition score in FY16. The proposed refurbishment in 2040 should be coordinated with a planned replacement in 2046.

- Efficiency:

For the proposed pump replacement, there is insufficient information provided to fully comment on project efficiency. No cost budget estimates were included in the documentation from Sunwater. The asset replacement value of the pump is estimated to be \$1,142,405. The proposed capital expenditure claim is \$130,000, which is approximately 10% of the replacement value and has been considered reasonable for a refurbishment cost.

**21ETO10 – Oakenden MC - Replace - ETO-OMC-FMTR - Replace Meter - Material Project (QCA)
Control Equip Option Analysis AM11_G04**

Project Overview

This project comprises the replacement of an ultrasonic flowmeter at Oakenden Main Channel Distribution in FY21 for an estimated cost of \$159,360.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY21-24: \$159,360
			Standard	✓		
			Cost	✗	Impact of findings on claim (\$FY19)	FY21-24: \$116,959
					Total Accepted (\$FY19)	FY21-24: \$42,401

Background

It is proposed that the ultrasonic flow meter at 548m chainage along the Oakenden Main Channel Distribution within the Eton Distribution is replaced in FY21 for an estimated cost of \$159,000.

Sunwater's strategy for bulk water flow meters per their Overall Strategy Common to all Irrigation Schemes by Object Type is for a portfolio refurbishment based on condition, risk and compliance. Replace at full replacement cost using standard asset lives by object type (typically 20 years).

The flow meter was installed in 1981. At the time of proposed replacement, it will be 40 years old. The flow meter is overdue for replacement. The timing of works are justified based on the asset's age having exceeded the standard run-to-failure life expectancy.

Options Assessment

An options assessment is proposed for FY20. No further information is provided.

Implementation

According to *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost is \$2,366 valued in 2015. In \$FY19, this is \$2,530. The proposed capital expenditure claim is \$159,360. There is clearly a discrepancy in the recorded replacement value and actual replacement cost. The size of the flow meter is not identified in the asset register. From the *QCA Information Request A40_Meter replacement supporting information* document, the range of replacement costs for ultrasonic flow meters are \$6,934 for a 100mm flow meter up to \$42,401 for a 1500mm flow meter. Piping within the Oakenden Main Channel Distribution scheme is listed ranging from 225mm up to 1800mm. Assuming 1500mm, an adjustment of \$116,959 is proposed.

Findings

- Prudency:
Sunwater's Overall Strategy Common to all Irrigations Schemes for bulk water flow meters is for replacement at full replacement cost once entire asset life has been achieved (typically 20 years). Although information pertaining to the condition of the ultrasonic flow meter was not provided, based on asset life of 40 years, this project appears to be complying with Sunwater's Asset Strategy.

- Efficiency:

For the proposed flow meter replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor have any alternatives yet been identified. There is no basis for the cost estimate and there is insufficient information in the asset register to establish a replacement value. An adjustment is proposed to match a replacement cost estimate for a 1500mm flow meter as costed in the *QCA Information Request A40_Meter replacement supporting information* document.

22MDA01 – West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)

Project Overview

This project proposes to refurbish the mechanical weed screen on the WB7 pipeline inlet on West Barron Balancing Storage in 2020 and every six years thereafter for an estimated average cost of \$48,000 per refurbishment.

Summary of Findings

Review Summary	Prudent	x	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$47,054
			Standard	✓		FY21-24: \$0
			Cost	✓		FY25-53: \$240,860
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$97,570
					Total Accepted (\$FY19)	FY19-20: \$47,054 FY21-24: \$0 FY25-53: \$143,290

Background

The rotating weed screen within the West Barron Distribution is proposed to be refurbished in FY20 and every six years thereafter for an estimated average cost of \$48,000 (in \$FY19).

Per Sunwater’s Overall Strategy Common to all Irrigation Schemes, the new strategy suggests that the screens should be patch painted, with minor in-situ repairs every 5 years and replace at 20 years unless condition / material warrants a different approach. The reasoning behind the strategy was that aluminium screens are good for 30 years, whereas galvanised items are only suitable for 10 to 15 years. In essence, the screens should have their life extended with patch painting, although should be replaced when the condition warrants it.

The rotating screen was installed in FY05, therefore its refurbishment schedule aligns with the FY20 refurbishment. The remaining 6-year cycles appear to be consistent with the Whole of Life Maintenance Strategy document, but not the Asset Strategy.

A high-level condition assessment of the screen was completed in 2018. The asset was observed as having failed, with a rating of 6 (the worst score in Sunwater's condition rating system). Immediate repairs are justified based on this.

The scope includes:

- Strip and clean;
- Repair chain tracks and all other metal sections that require replacement or repair,
- Sandblast and paint all components;
- Replace carrier chains and wipers;
- Replace all sprocket and bearings and shafts as required;
- Overhaul hydraulic motor;
- Test run;
- Installation.

Considering the condition of the screen has been rated as failure, as well as the fact it may be nearing a replacement cycle, the FY26 refurbishment cycle may not be needed. On the same principle, of not needing to refurbish during a replacement cycle, the FY44 refurbishment may also not be necessary.

Options Assessment

There were no options scoped as part of the forward planning process. High level options were likely analysed during the development of the asset strategy.

Implementation

Following, the condition inspection in 2018, a Non-Routine Work Initiation Document was completed in December 2018. The document states that works shall be completed before June 30, 2020. The unit was removed from service and a temporary screen put in its place. The cost of refurbishment was estimated at \$50,000 (+/- 15%).

According to the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost for the screen is \$183,560. The proposed capital expenditure claim under this project on average is \$48,000, which is 26% of the replacement cost. The CAPEX claim is within the accuracy bounds of the December 2018 cost estimate and considered reasonable.

Findings

- Prudency:

Sufficient information was provided by Sunwater regarding the proposed refurbishment of the rotating weed screen. The 6-year refurbishment cycle matches that in the Whole of Life Maintenance Strategy but not the Asset Strategy, which recommends 5 years. The FY20 repairs are further supported by observations in the latest condition assessment which indicates the screen is in the worst possible condition and has reached failure. In this regard, the project's prudency is demonstrated. The 6-year refurbishment cycle does not appear to have accounted for the years when the screen will be replaced (every 20 years pending condition). As such the FY26 and FY44 refurbishments may not be necessary. An adjustment of \$97,570 is recommended to remove refurbishment from these years.

- Efficiency:

The scope of refurbishment appears to be reasonable, but there was insufficient information to assess standard. For example, no documentation showing type of surface preparation or coatings was provided. The cost estimate provided was very high level and the basis for its estimation could not be determined. That said, the CAPEX claim is within the accuracy bounds of the refurbishment cost estimate and appears reasonable.

24LOW03 – Owanyilla PSTN - Replace - ELEC-SWB2 - SWITCHBOARD 2 - Repl & Ref Life Sty (#956033) & Irrig Com Strat (Item 1.1)

Project Overview

This project comprises the forward planning for replacement of Switchboard 2, which proposes the asset is replaced in 2024 for an estimated cost of \$358,000.

Summary of Findings

Review Summary	Prudent ✘	Scope ✓	Capital expenditure claim (\$FY19)	FY21-24: \$440,600
		Standard ✓		
		Cost ✓	Impact of findings on claim (\$FY19)	FY21-24: \$0
			Total Accepted (\$FY19)	FY21-24: \$440,600

Background

Owanyilla Pump Station forms part of the Lower Mary River Distribution Scheme. It is proposed that the switchboard is replaced in FY23-FY24. The switchboard replacement project comprises of two stages; this project review relates to Stage 2 of the works, for an estimated cost of \$440,600 (in \$FY19).

A risk rating was completed in 2016 for the switchboard. The outcome was the switchboard has a moderate rating with the highest risk category being Production/Operations. This superseded a desktop risk assessment done in 2009, that assessed it as a high risk rating for WH&S regarding the lack of a window on the cabinet.

A high-level condition assessment was completed for the switchboard in 2017, with the overall rating being 3 which indicates it is in fair condition.

The Sunwater asset strategy (from the *Overall Strategy Common to all Irrigation Schemes by Object Type*) is to replace on 35 year intervals based on condition or risk. The switchboard was installed in 1987. At the time of the proposed replacement, the switchboard will be 37 years old; therefore, on age alone the project is prudent; however, based on risk and condition, the expenditure could be delayed. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

An options assessment is planned for FY20. Based on the information provided, replacement of the switchboard is likely the most appropriate option given the age and condition of the switchboard and compliance with Sunwater’s Asset Strategy.

Implementation

According to the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost of the switchboard is estimated to be \$962,936 (\$1,029,878 in \$FY19). The proposed capital expenditure of \$224,610 (in \$FY19) for Stage 1 and \$440,600 (in \$FY19) for Stage 2 of the works are together less than the full replacement cost of the asset. If the intention is for full replacement of the switchboard, then the proposed expenditure may be underestimating the funds required to complete the works.

Findings

- Prudency:

Replacement of the switchboard is justified based on the age of the asset. It will have reached the end of its serviceable life for electrical switchboards. In this regard, the project's prudency is demonstrated; however, based on condition and risk, there is opportunity to delay the project. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

For the proposed switchboard replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided. The cost estimate was very high level and the basis for its estimation could not be determined. The CAPEX claim (for Stage 1 and Stage 2 works combined) is lower than the asset register's replacement value. Based on this, it is noted that the proposed budget may be underestimated.

000001332 – Study: 5yr Dam Comprehensive Inspection – Burdekin Falls Dam

Project Overview

The Burdekin Falls Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 June 2022) and report (due 3 months post completion of inspection). The level of documentation is of a low quality.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$0		
			Standard	✓		FY21-24: \$110,027	FY25-53: \$719,832	
			Cost	✓		Impact of findings on claim (\$FY19)	FY19-20: \$0	FY21-24: \$0
					Total Accepted (\$FY19)	FY19-20: \$0	FY21-24: \$110,027	FY25-53: \$719,832

Background

The Burdekin Falls Dam is a part of the Burdekin Haughton Bulk Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater’s *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;

- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of \$118,000 (\$FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY22 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

0000001060_0000076265 – Study: 20Yr Dam Safety Review – Burdekin Falls Dam

Project Overview

The Burdekin Falls Dam requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 Jun 2021) as well as a safety review report. The project is a single project that has been split into two planning orders (0000001060 and 0000076265) for planning, reporting and budgeting purposes.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$275,666
			Standard	✓		FY21-24: \$0
			Cost	✓		FY25-53: \$298,750
					Impact of findings on claim (\$FY19)	FY19-20: \$25,325 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$250,341 FY21-24: \$0 FY25-53: \$298,750

Background

The Queensland Dam Safety Management Guidelines (QDSMG) states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20-year intervals, providing a copy to the Department of Natural Resources and Mines.

A comprehensive dam safety review for the Burdekin Falls Dam is scheduled to be completed by 1 Jun 2020 to comply with condition DS12 of QDSMG. Sunwater had originally allocated funding in FY19 (\$142,860) and FY20 (\$145,680) for a total of \$288,540. The actual expenditure for FY19 was \$129,986. The revised FY19-20 total is then \$275,666. The subsequent 20-year review has been allocated \$298,750 in FY39-40.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater’s Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

██████████ was engaged as a sole supplier to undertake the comprehensive dam safety review based on their previous experience with Burdekin Falls Dam and similar inspections on a suite of other projects. Sunwater have a working relationship with ██████████ and are currently collaborating on the Saddle Dams and Monolith Improvements – Preliminary Design. Based on ██████████’s established knowledge of Burdekin Falls Dam, Sunwater engaged ██████████ for project efficiency.

Based on the September 2018 Briefing Note regarding SOA for Burdekin Falls Dam Safety Review – Sole Supplier, the combined planned/approved budget for FY19 and FY20 was \$293,215. The estimated costs under the SOA with [REDACTED] were \$200,000. Hand written mark-ups to the briefing note show an estimated new budget of \$263,215, comprised of \$230,000 for the dam safety review, \$24,215 for project management, and \$40,000 for a geotechnical investigation.

The October 2018 [REDACTED] proposal included a fee of \$98,050. It is assumed that the allocation of \$230,000 in the briefing note budget not only includes this consultant fee, but also Sunwater labour and indirect costs. The budget of \$263,215 appears reasonable.

The original capital expenditure claim of \$288,540 is \$25,325 higher than the budget and doesn't appear to take into account the supposed savings for sole sourcing [REDACTED]. An adjustment of \$25,325 is proposed for FY20 (project 0000076265) to reflect the revised budget. No adjustments are proposed to the FY39/40 costs since the same cost efficiency (from [REDACTED]) may not be available at the time.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 Jul 2021. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

Sunwater has identified savings with the approach of utilising a sole supplier for the project based on their knowledge and experience with the dam. The savings are reflected in the revised budget, but they are not reflected in the original CAPEX claim. An adjustment is recommended for the FY20 year, but not for the future FY39/40 year as the same opportunity for savings may not be available at the time.

000002872 – Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2019).

Project Overview

This project is in the forward planning phase with an allowance for a comprehensive dam inspection at Cania Dam which is to be completed every five years for compliance with the *Queensland Dam Safety Management Guidelines – February 2002*. The next inspection is scheduled to be completed by 01/12/19 for an estimated cost of \$125,000.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$122,155
			Standard	✓		FY21-24: \$0
			Cost	✓		FY25-53: \$736,437
					Impact of findings on claim (\$FY19)	FY19-20: \$0
					FY21-24: \$0	
					FY25-53: \$0	
				Total Accepted (\$FY19)	FY19-20: \$122,155	
					FY21-24: \$0	
					FY25-53: \$736,437	

Background

Cania Dam is situated on the Three Moon Creek at AMTD 110.1 km. It is an earth and rockfill embankment dam located approximately 40 km north-west of Monto. The dam was completed in 1982 mainly to supply irrigation water and recharging alluvial aquifers around and downstream of the Township of Moonford under the Three Moon Creek Supply Scheme.

The comprehensive inspection is a regulatory compliance requirement as regulated by the Water Act and Development Conditions for the Integrated Planning Act. The Development Conditions for the Dam nominates that a comprehensive inspection in accordance with the Queensland Dam Safety Management Guidelines (Feb 2002) is required to be completed by 01/12/19 and every 5 years thereafter.

Options Assessment

No alternatives evaluated as this project is complying with regulation. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater’s *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document QCA Information Request *A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;

- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;
- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of \$123,000 (\$FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- **Prudency:**
This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY19 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.
- **Efficiency:**
The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

000004992 – Study: 20 Yr Dam Safety Review – Wuruma Dam

Project Overview

The Wuruma Dam supplies water for irrigation and is used for flood mitigation. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 June 2021) as well as a safety review report.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$328,560 FY21-24: \$0 FY25-53: \$345,400
			Standard	✓	Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
			Cost	✓	Total Accepted (\$FY19)	FY19-20: \$328,560 FY21-24: \$0 FY25-53: \$345,400

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20-year intervals, providing a copy to the Department of Natural Resources and Mines. The Dam Safety Condition Schedule – DS12 identifies the last review was completed in 2000. The next review is due 1 June 2021. The subsequent review would be due in FY41.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater’s Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from review of actual costs of historical safety reviews across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considers the following but not limited to:

- extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which may influence the scale of the study;
- existing risk profile specific to each site which may influence the type and number of tasks required for the study;

- updates and changes to dam safety standards and guidelines which may influence the scale of the study;
- other site-specific peculiarities which may influence the task requirements of the study
- locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For the reasons, the capital expenditure claim of \$328,560 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 June 2021. The project scope of works will align with the relevant Acts and Guideline.

- Efficiency:

This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

000006501 – Study: 20 Yr Dam Safety Review (including anchor pullout test and intrusive inspection) – Eungella Dam

Project Overview

The Eungella Dam requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 October 2020) as well as a safety review report. In addition to these works, an anchor pullout test and intrusive inspection is mentioned. The documentation quality of the aforementioned works is low.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$349,150 FY21-24: \$0 FY25-53: \$385,180
			Standard	✓		
			Cost	✓		
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$349,150 FY21-24: \$0 FY25-53: \$385,180

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines. Additional works have been included in the title of the project including an anchor pullout test and intrusive inspection however the justification and drivers behind these additional works are not specified in documents provided. T

he Dam Safety Condition Schedule – DS12 identifies the next review is due 1 October 2020. The subsequent review would be due in FY40.

Options Assessment

Options assessments are not relevant to safety reviews.

Implementation

As described in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from review of actual costs of historical safety reviews across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considers the following but not limited to:

- extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which may influence the scale of the study;
- existing risk profile specific to each site which may influence the type and number of tasks required for the study;
- updates and changes to dam safety standards and guidelines which may influence the scale of the study;

- other site-specific peculiarities which may influence the task requirements of the study
- locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For the reasons, the capital expenditure claim of \$349,150 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 October 2020. The project scope of works will align with the Acts and Guidelines it falls under. There is insufficient information to determine the prudency of the additional works (anchor pullout test and intrusive inspection) and the documentation quality of these works are low.

- Efficiency:

This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

000006888 – Study: 5 yr Dam Comprehensive Inspection – Teemburra Dam

Project Overview

The Teemburra Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2020) and report (due 3 months post completion of inspection). The level of documentation is of a low quality.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$0		
			Standard	✓		FY21-24: \$76,085	FY25-53: \$571,948	
			Cost	✓		Impact of findings on claim (\$FY19)	FY19-20: \$0	FY21-24: \$0
					Total Accepted (\$FY19)	FY19-20: \$0	FY21-24: \$76,085	FY25-53: \$571,948

Background

The Teemburra Dam is a part of the Pioneer River Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater’s *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;

- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of \$95,000 (\$FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed in FY20 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

000008908 – Meter Replacement – Upper Condamine (2015 UCO strategy)

Project Overview

The Meter Replacement Program at Upper Condamine involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$39,400 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim	FY19-20: \$77,690 (FY19 actuals: \$30,879) FY21-24: \$153,128 FY25-53: \$1,146,412
		Standard ✓		
		Cost ✓		
			Impact of findings on claim	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
			Total Accepted	FY19-20: \$77,690 FY21-24: \$153,128 FY25-53: \$1,146,412

Background

The Meter Replacement Program for the Upper Condamine Distribution scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Upper Condamine Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Upper Condamine Scheme is \$1,960,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$98,000.

The total average annual capital expenditure claim, in \$FY19, is \$39,400. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$77,690 was made up of FY19: \$39,855 and FY20: \$37,835. Actual FY19 spend was reported to be at \$30,879. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

000009475 – Study: 5 yr Dam Comprehensive Inspection – Coolmunda Dam

Project Overview

The Coolmunda Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2021) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$0
			Standard	✓		FY21-24: \$130,258
			Cost	✓		FY25-53: \$801,691
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$0 FY21-24: \$130,258 FY25-53: \$801,691

Background

The Coolmunda Dam is a part of the Macintyre Brook Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater’s *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document QCA Information Request *A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;

- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of \$133,000 (\$FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed by December 2021 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

000014241 – Replace Concrete Lining

Project Overview

This project allows for the replacement of concrete lining for an irrigation channel within the Burdekin Haughton Distribution Scheme. It is proposed that the lining is replaced in FY52 for a forecasted expenditure of \$1,320,700 (in \$FY19)

Summary of Findings

Review Summary	Prudent	✓	Scope	✗	Capital expenditure claim (\$FY19)	FY25-53: \$1,320,700
			Standard	✓	Impact of findings on claim (\$FY19)	FY25-53: \$768,369
			Cost	✗	Total Accepted (\$FY19)	FY25-53: \$552,331

Background

The Millaroo irrigation channel forms part of the Burdekin Haughton Distribution Scheme. It is proposed that the concrete lining of the channel is replaced in FY52 for an estimated cost of \$1,320,700 (in \$FY19). The asset's functionality and the quality of water supplied by the pipeline may be compromised due to its age and potential deterioration of the concrete lining. While it has been assumed this project is for the replacement of the lining, the object code CTWK refers to non-structural concrete emplacements.

The Sunwater *Overall Strategy Common to all Irrigation Schemes by Object Type* applies an asset strategy for non-structural concrete emplacements of replacement at 100 years or earlier if condition and risk warrants. For concrete lined channels, the asset strategy is to refurbish/replace bays in 5 year intervals starting in the 40th year, up to asset life of 100 years.

The *QCA Information Request A40_Remaining projects supporting information* spreadsheet states that the Asset Management Strategy only applies to a 30-year outlook and planning items outside this timeframe would default to the Whole of Life Maintenance Strategy. The 30-year outlook from FY20 is FY50. Since the replacement is proposed in FY53, the Whole of Life Maintenance Strategy applies.

The asset risk register rated the concrete lining as moderate risk asset in 2018. The Whole of Life Maintenance Strategy for a moderate risk concrete lined channel is 18-year refurbishment intervals and replacement at 70 years. The maintenance strategy for moderate risk concrete works (object code CTWK) is refurbishment at 53 years.

The asset was constructed in 1952. At the time of proposed replacement in FY52, the concrete lining will be 100 years old which is consistent with the asset strategy from the *Overall Strategy Common to all Irrigation Schemes by Object Type* but is not consistent with the Whole of Life Maintenance Strategy for either concrete lined channels or concrete works.

Although outside the 30-year planning outlook for the asset strategy, its application would still be reasonable. The asset's life indicates the proposed replacement timing would be prudent and could even be brought forward if it were to be planned using the Whole of life Maintenance Strategy. A high-level condition assessment of the concrete lining in 2012 gives an overall rating of 3, which indicates it is in fair condition. Future condition assessments will assist in forecasting the timing of replacement.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

According to the document *QCA Information Request A40_Attachment 1 Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value for the concrete lining is estimated to be \$516,429 in 2015. In \$FY19, this is \$552,331. The proposed capital expenditure claim is \$1,320,700, which is more than double the asset register's replacement value.

For this reason, the cost has not been considered efficient. It is likely that the capital expenditure claim has been scoped to include earthworks and/or the synthetic lining of the channel but there is no information to confirm this. An adjustment of \$768,369 is recommended to align the capital expenditure claim with the asset register replacement value.

Findings

- Prudence:

Replacement of the system is justified based on the age of the asset at its proposed replacement year being consistent with the asset strategy. If applying replacement timings from the Whole of Life Maintenance Strategy, it could theoretically be brought forward. Either way, the project is deemed prudent.

- Efficiency:

For the proposed concrete lining replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. From a high level, it appears that the scope and/or cost of the lining replacement has not been done appropriately since it is significantly higher than the asset register's 2016 valuation. An adjustment of \$768,369 (in \$FY19) is recommended.

000000645 – Replace HV Switchboards

Project Overview

The high voltage switchboards at Tom Fenwick pump station are proposed to be replaced in FY27 for an estimated cost of \$538,420 (in \$FY19).

Summary of Findings

Review Summary	Prudent	✘	Scope	✓	Capital expenditure claim (\$FY19)	FY25-53: \$538,420
			Standard	✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
			Cost	✓	Total Accepted (\$FY19)	FY25-53: \$538,420

Background

Tom Fenwick Pump Station forms part of the Burdekin Haughton Distribution. It is proposed that the switchboard be replaced in FY27 for an estimated cost of \$538,420 in \$FY19.

A risk rating was completed in 2009 for the switchboard. The outcome was the switchboard has an extreme risk rating in terms of WH&S related to access to live parts, thermal overload risk, and short-circuiting risks. Sunwater must ensure the switchboard is compliant with safety requirements.

A high-level condition assessment was completed in 2009 which rated the switchboard at level 3, being in overall fair condition. The assessment noted the age of the switchboard and potential that components may not be readily available should they be required. These parts should be refurbished.

The Sunwater asset strategy for electrical switchboards it to replace on 35 year intervals or based on risk or condition. The switchboards at Tom Fenwick Pump Station 1 were installed in 1989. At the time of proposed replacement in 2027, the switchboards will be 38 years old; therefore, replacement could be considered prudent and potentially brought forward considering the assessed risk. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process. Given the age of the switchboard it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

The asset register shows a valuation completed in 2015 with a replacement cost of \$524,908. In \$FY19, this is \$561,399. The proposed capital expenditure claim of \$538,420 is close to but less than the asset register replacement cost and therefore considered reasonable.

Findings

- Prudency:
Replacement of the switchboards is justified based on the age of the asset and the 25-year asset strategy for switchboard replacement. In this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.
- Efficiency:
For the proposed switchboard replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any

alternatives identified. The proposed capital expenditure claim of \$538,420 is close to but less than the asset register replacement cost and therefore considered reasonable.

0000015210 – Replace Pump No. 2 at Tom Fenwick Pump Station

Project Overview

Pump No. 2 within the Tom Fenwick pump station is proposed to be replaced in FY53 for an estimated cost of \$1,902,580 in \$FY19.

Summary of Findings

Review Summary	Prudent	✘	Scope	✓	Capital expenditure claim (\$FY19)	FY25-53: \$1,902,580
			Standard	✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
			Cost	✓	Total Accepted (\$FY19)	FY25-53: \$1,902,580

Background

Tom Fenwick Pump Station forms part of the Burdekin Haughton Distribution. Pump No. 2 within the pump station is proposed to be replaced in FY53 for an estimated cost of \$1,902,580 (\$FY19).

A high-level condition assessment was completed in 2015 for Pump No. 2 and it was rated as having an overall condition of 3, which is fair. The mechanical seal was in the worst condition and was rated to be in poor condition, 4.

The Pump No. 2 was rated as a low risk in 2005. In 2016, it was re-rated as moderate. It appears that the 2005 assessment was incorrectly concluded. The Whole of Life Maintenance Strategy for moderate risk centrifugal pumps is to replace at 53 years and refurbish at 13-year intervals.

Pump No. 2 of Tom Fenwick Pump Station was installed in 1992. At the time of the proposed replacement, the pump will be 61 years old, which is more in line with the replacement interval of a low risk centrifugal asset; therefore, the project has been considered prudent but with the potential need to bring the project forward. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

An evaluation of the full replacement cost for the existing Thompson Kelly & Lewis pump at Tom Fenwick Pump Station was last completed in 2015. This value was \$2,410,321 (or \$2,577,883 in \$FY19). The proposed capital expenditure claim of \$1,902,580 is less and although considered efficient, it highlights the uncertainty in the Sunwater’s methodology for calculating forward renewal costs.

Findings

- Prudency:

More information is required from Sunwater regarding Tom Fenwick Pump Station and the role it plays within the Burdekin Haughton Distribution. Replacement of the pump is justified based on the age of the asset and Sunwater’s Whole of Life Maintenance Strategy for centrifugal pumps. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

For the proposed pump replacement, there is insufficient information provided to full comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim is less than the asset register replacement value and has thus been considered efficient.

0000015276 – Replace Reduction Gearbox

Project Overview

The reduction gearbox on Pump 5 at Tom Fenwick Pump Station 4/5 is proposed to be replaced under this project.

Summary of Findings

Review Summary	Prudent	✘	Scope	✓	Capital expenditure claim (\$FY19)	FY25-53: \$1,067,910
			Standard	✓		
			Cost	✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
					Total Accepted (\$FY19)	FY25-53: \$1,067,910

Background

The Tom Fenwick Pump Station forms part of the Burdekin Haughton Distribution. The reduction gearbox on Pump 5 is proposed to be replaced in FY27 and FY52 for an estimated cost of \$539,000 and \$529,000 respectively (in \$FY19).

The gearbox was installed in January 1998. At the time of the proposed works in FY27, the asset will be 29 years old. The typical serviceable life of mechanical equipment including pumps and their constituent parts is 20 years (according to WSA 03-2011-3.1 Section 1.2.6).

The gearbox is listed as a low risk asset in the asset risk register. Sunwater’s Whole of Life Maintenance Strategy for low risk gearboxes is to replace at 25 years and refurbish halfway through the life at 13 years.

A high-level condition assessment was completed for the gearbox in 2016 with the overall rating being 3 which is fair condition. Depending on the condition of the gearbox in the coming years, and based on the proposed replacement at 29 years instead of 25 years, it may be justified to bring the expenditure forward. The FY52 is scheduled at a 25 year interval from FY27, matching the planned maintenance interval.

That said, the annuities assessment has recommended an increase in useful life for this project. It has recommended a delay of 3 years, which pushes the second renewal from FY52 to outside the review period.

Options Assessment

There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided. There is no evidence that a scoping process was undertaken, although given the age of the gearbox it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

Based on a 2015 valuation of the reduction gearbox at Tom Fenwick Pump Station, the replacement value is documented as \$1,570,600. In \$FY19, this is \$1,679,786. The proposed capital expenditure claim is \$539,000 which is a third of the full replacement cost. It is not clear based on the information provided whether the claim will be sufficient to properly replace the reduction gearbox.

Findings

- Prudency:

More information is required from Sunwater regarding both the gearbox and the Tom Fenwick Pump Station and the role they play within the Burdekin Haughton Distribution. Replacement of the gearbox is justified based on the age of the asset having exceeded the typical serviceable life for mechanical equipment (by 9 years) and the Sunwater Whole of Life Maintenance Strategy replacement interval (by 4 years). In this regard, the prudency is demonstrated; however, the modelling completed for the annuities assessment has recommended an increase in useful life of 3 years. For this reason, the project timing has not been considered prudent.

- Efficiency:

For the proposed gearbox replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim is a third of the value of the asset register replacement cost, which signifies the scope may not have been defined appropriately; however, there is insufficient information to confirm this, therefore it is assumed as efficient.

0000015726 – Replace Pipeline 1352.0 to 4307.0

Project Overview

The section of 710mm diameter HDPE pipeline between chainage 1352 m and 4307 m is proposed to be replaced in FY53 for \$1,428,795 (\$FY19).

Summary of Findings

Review Summary	Prudent ✘	Scope ✓	Capital expenditure claim (\$FY19)	FY25-53: \$1,428,795
		Standard ✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
		Cost ✓	Total Accepted (\$FY19)	FY25-53: \$1,428,795

Background

A section of pipeline from chainage 1352 m to 4307 m, which forms part of Clare Irrigation Distribution scheme, is proposed to be replaced in FY53 for an estimated cost of \$1,428,795 (\$FY19).

The pipeline was constructed in 2001 and would be 52 years old at the time of replacement. Per Sunwater’s *Overall Strategy Common to all Irrigation Schemes by Object Type*, the strategy for HDPE pipe is to adopt an asset life of 80 years subject to condition and risk assessment and NPV of pipe leaks on a case by case basis.

In the asset risk register, the pipeline was classified as a low risk asset in 2018. The Whole of Life Maintenance Strategy for low risk HDPE pipe is to replace at 50 years.

The *QCA Information Request A40_Remaining projects supporting information* spreadsheet states that the Asset Management Strategy only applies to a 30-year outlook and planning items outside this timeframe would default to the Whole of Life Maintenance Strategy. The 30-year outlook from FY20 is FY50. Since the replacement is proposed in FY53, the 50-year life would apply, which indicates the proposed replacement timing would be prudent and could even be brought forward several years; however, it is likely that this replacement will be pushed out once the planning item enters the outlook of the Asset Management Strategy. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

The asset register 2016 valuation of the pipe estimates the full replacement cost for the pipeline section to be \$1,985,427 in \$FY15. In \$FY19, this is \$2,123,451. The proposed capital expenditure claim is \$1,428,795, which indicates that only partial replacement of the pipeline is planned. Otherwise, the budget may be underestimated.

Findings

- Prudency:

More information is required from Sunwater regarding the section of pipeline between 1352 and 4307 m and the role it plays within the Burdekin Haughton Distribution. Replacement of the pipe is justified based on the current Whole of Life Maintenance Strategy and the age of the asset; although in future planning forecasts, it will likely be pushed out. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

For the proposed pipeline replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The proposed capital expenditure claim is \$1,428,795, which is less than the asset register replacement value which although deemed efficient, may indicate that only partial replacement of the pipeline is planned or that the costs may be underestimated.

000025738 – Replace Pump at Monduran Pump Station

Project Overview

It is proposed that the existing Pump No 3 at Monduran Pump Station be replaced in FY38 for an estimated cost of \$885,770 (in \$FY19).

Summary of Findings

Review Summary	Prudent ✘	Scope ✓	Capital expenditure claim (\$FY19)	FY25-53: \$885,770
		Standard ✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
		Cost ✓	Total Accepted (\$FY19)	FY25-53: \$885,770

Background

Monduran Pump Station forms part of the Bundaberg Distribution. It is proposed that the existing 900mm Kelly & Lewis pump is replaced in 2038 for an estimated cost of \$885,770.

A high-level condition assessment was completed in 2018 for Pump No. 3 and it was rated as having an overall condition of 3, which is fair. The foundation and baseplate were listed as being the worst condition and was rated to be in poor condition, 4.

The asset risk register lists the pump, in 2005, as a low risk asset. The Whole of Life Maintenance Strategy for low risk centrifugal pumps is 60-year replacement intervals and 15 year refurbishment intervals.

The pump at Monduran Pump Station was installed in 1978. At the time of its proposed replacement, the pump will be 60 years old. Replacement of the pump could be justified based on its age in line with the maintenance strategy. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

The asset register shows valuation of the pump replacement was completed in 2015. It was determined to have a full replacement cost of \$1,335,187. The proposed capital expenditure claim is \$885,770, which although is deemed efficient, could also indicate that the scope or costs have been underestimated.

Findings

- Prudency:

More information is required from Sunwater regarding Monduran Pump Station and the role it plays within the Bundaberg Distribution to confirm its criticality. Replacement of the pump is justified based on the age of the asset having exceeded the typical serviceable life under the Sunwater Whole of Life Maintenance Strategy. In this regard, the project's prudency could be demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.
- Efficiency:

For the proposed pump replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was very high level and the basis for its estimation could not be

determined. The proposed capital expenditure claim is deemed efficient, but as it is much less than the listed asset replacement value, it could also indicate that the scope and/or costs have been underestimated.

000030670 – Replace Pipe From 1535.00 to 5250.74M

Project Overview

The section of pipe between chainage 1535 m to 5250 m in the Isis distribution scheme is proposed to be replaced as part of this project. The pipe is reinforced concrete, 525mm diameter, and built in 1989. It is proposed for replacement in FY50 for a cost of \$1,398,550 in \$FY19.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY25-53: \$1,398,550
			Standard	✓		
			Cost	✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
					Total Accepted (\$FY19)	FY25-53: \$1,398,550

Background

The reinforced concrete (RC) pipeline forms part of the Isis Distribution system within the Bundaberg Irrigation Scheme. The section under consideration is between chainage 1535 to 5250 m.

As stated in the Overall Strategy Common to all Irrigation Schemes by Object Type, the former strategy for RC pipes was to replace at full replacement cost at standard asset life of 80 years. Given that RC pipes are typically long lived, and that issues are likely due to rubber risks, a new strategy has been developed. Leaks are proposed to be repaired as required and the asset would adopt a new asset life of 100 years. The replacement is subject to regular condition and risk assessment or NPV on number of pipe leaks verses capital replacement. Higher risk assets such as pipelines subject to pressure and vehicle loadings require more regular condition and risk assessments. NPV will be assessed on a case by case basis for sections of pipelines.

The pipeline has also been considered a low risk asset. The Whole of Life Maintenance strategy for low risk RC pipeline is to replace at 80 years.

The pipeline was installed in 1989, making it 61 years in the proposed replacement year. This is not in line with the asset strategy or the Whole of Life Maintenance Strategy. The replacement should be closer to 2089, therefore the full cost of the project has not been considered prudent.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

The full replacement cost for the section of RC pipeline per the document *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx* is \$1,396,823, valued in 2008. In \$FY19, this is \$1,761,441. The proposed capital expenditure claim of \$1,398,550 appears to be reasonable.

Findings

- Prudency:

More information is required from Sunwater regarding the section of pipe between 1535 and 5250 m and the role it plays within the Bundaberg Distribution to demonstrate its impact on service levels. Replacement of the pipeline is not justified based on the age of the asset being within the typical serviceable life for reinforced concrete pipeline and prior to the asset strategy's replacement interval. The age in FY50 is 61 years. Replacement will be pushed out past the assessment period (FY25-53). In this regard, the project's prudency is not demonstrated, and an adjustment of the full amount is recommended.

- Efficiency:

For the proposed pipeline replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim is less than the asset register replacement value; therefore, it has been considered efficient. That said, the timing of the replacement has not been deemed prudent.

0000030689 – Replace Common Control System STG I

Project Overview

The common controls system is proposed to be replaced in FY26 and every 15 years thereafter at Don Beattie Pump Station for an estimated cost of \$385,960 in FY26 and \$398,120 in FY41 (both in \$FY19).

Summary of Findings

Review Summary	Prudent ✘	Scope ✓	Capital expenditure claim (\$FY19)	FY25-53: \$784,080
		Standard ✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
		Cost ✓	Total Accepted (\$FY19)	FY25-53: \$784,080

Background

Don Beattie Pump Station forms part of the Bundaberg Distribution. There are three stages of the control system replacement project, which is proposed to occur in FY26-FY28, then again in FY41-FY43. This review relates to Stage 1 of the works, occurring in FY26 for an estimated cost of \$386,960, then again in FY41 for \$398,120 (both in \$FY19).

The control system is responsible for the operation of the pumps at Don Beattie Pump Station. Sunwater have a regulatory obligation under the Bundaberg Distribution Scheme to provide a consistent water supply.

Per Sunwater’s *Overall Strategy Common to all Irrigation Schemes by Object Type*, the strategy for control systems (including SCADA and related equipment) is to replace the equipment of 15-year intervals or based on condition or risk. The standard serviceable life of SCADA equipment is defined in WSA 03 as also being 15 years, mostly due to rapid technological advancements rendering old equipment obsolete.

The controls system was installed in 1989. At the time of the proposed replacement, the system will be 37 years old. Therefore, the controls system will have exceeded the typical run-to-failure asset life.

The asset risk register rated the common controls as a low risk asset. Its condition was rated at a 1 in 2012. Other components of the communications and control system were rated at varying scores from 1 to 4 in 2016 and 2017.

Replacement of the control system is justified based on its obsolescence as a function of age and technological advancements. Depending on the requirements of Sunwater and the capability of the existing control system to achieve the intended operation of Don Beattie Pump Station, it may be justified to bring forward the proposed expenditure to eliminate possible risk of the system malfunctioning due to its age. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped as part of the forward planning process

Implementation

The asset register replacement cost was valued in 2017 and records the common controls as having a full replacement cost of \$1,205,033 (\$1,247,447 in \$FY19). The proposed capital expenditure (\$1,179,500 in \$FY19 for the three stages of work for the first replacement occurring over FY26-FY28) is approximately aligned with the listed replacement value.

Findings

- Prudency:

Replacement of the system is justified based on the age of the asset having exceeded the typical serviceable life for controls equipment. In this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

For the proposed common controls system replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was high level and appears based on the asset replacement value, which is reasonable on the basis that this will be reviewed as the project draws nearer.

000042132 – Replace Scour Valve 1275.59M

Project Overview

This project comprises the replacement of the scour valve at chainage 1275.59 m along the pipeline within the West Barron Distribution. The proposed replacement year is FY36 for an estimated cost of \$119,200 (in \$FY19).

Summary of Findings

Review Summary	Prudent	x	Scope	✓	Capital expenditure claim (\$FY19)	FY25-53: \$119,200
			Standard	✓	Impact of findings on claim (\$FY19)	FY25-53: \$119,200
			Cost	✓	Total Accepted (\$FY19)	FY25-53: \$119,200

Background

It is proposed the DN225 scour valve at chainage 1275.59m is replaced in FY36 for an estimated cost of \$119,200 in \$FY19. This project addresses compliance obligations due to potential failure resulting from aged infrastructure.

The asset risk register, in 2018, classified the asset as low risk. It also lists the scour valve as a sluice valve type. The Whole of Life Maintenance Strategy for low risk sluice gate valves is to refurbish on 13-year intervals and replace at 40 years. In 2013, Sunwater prepared a *Scour & Isolation Valve Replacement Strategy*. The document presents an option study for the replacement of scour valves scheduled to be completed during the pricing period of 2014-2017 across three Sunwater service contracts, but stated it would form the basis for dealing with Sunwater’s broader portfolio of scour and isolation valves across all service contracts beyond 2017. The study recommended changing the asset strategy for low risk valves to a run-to-failure strategy.

The valve was installed in 1956. At the time of proposed replacement, the valve will be 80 years old; therefore, the valve will have exceeded the expected run-to-failure asset life of 40 years and would likely have failed.

The latest condition assessment completed for the valve was performed in 2002. At the time, the valve was determined to be in fair condition with an overall rating of 2. Comments from the inspection include that the valve was full of sand, the metal work was rusting, leaking was observed at the top gland, and that rock pitching was good. The valve was noted as being refurbished in 2003, however more details could not be located. Future condition inspections will refine the expected failure year of the valve. For now, the proposed timing could be considered prudent; however, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Options Assessment

There were no options scoped specific for this valve as part of the forward planning process; although the *Scour & Isolation Valve Replacement Strategy* completed in 2013 assesses the scheduled refurb/replace strategy vs the run to failure strategy, and recommended run-to-failure for low risk valves based on whole of life costs.

Implementation

According to the document *QCA Information Request A40 Attachment 1 Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement cost of the scour valve is \$102,343 in

2008. In \$FY19, this is \$129,058. The capital expenditure claim of \$119,200 is close to and less than the asset register replacement value and has therefore been considered reasonable.

Findings

- Prudency:

The asset strategy is run-to-failure. Failure, and thus replacement, has been estimated at the age of 80 years. Replacement of the valve is therefore justified based on the age of the asset having exceeded the typical serviceable life of 40 years. In this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

- Efficiency:

For the proposed valve replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The capital expenditure claim of \$119,200 is close to and less than the asset register replacement value and has therefore been considered reasonable.

000042159 – Replace Pipe Cherry Ck Siphon

Project Overview

The Cherry Creek Siphon, constructed of reinforced concrete pipe, is proposed to be replaced in 2049 for an estimated cost of \$6.7M in \$FY19.

Summary of Findings

Review Summary	Prudent	✘	Scope	✘	Capital expenditure claim (\$FY19)	FY25-53: \$6,721,690
			Standard	✓	Impact of findings on claim (\$FY19)	FY25-53: \$6,721,690
			Cost	✓		
Total Accepted (\$FY19)					FY25-53: \$0	

Background

The pipe at Cherry Creek forms part of the Mareeba-Dimbulah Distribution. Replacement of this pipe is forecasted to require replacement in 2049 for a cost of \$6,721,690 in \$FY19.

According to the document *QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019*, the pipe has a documented start-up date of 30/06/1956. Based on this information, the asset age will be 92 years. As per the *Overall Strategy Common to all Irrigation Schemes by Object Type*, Sunwater’s previous asset strategy for reinforced concrete pipes was to replace at 80 years. They have revised the strategy to adopt a 100 year life subject to regular condition and risk assessments. The cost of repairing pipe leaks vs capital replacement would be regularly assessed.

The most recent high-level condition assessment of the pipeline, in 2002, suggests it is level 2, which is equivalent to good condition. Based on this and the Sunwater decay curve, the replacement should be postponed beyond FY53. Pending future condition assessments, this project has not been deemed prudent to occur in FY49.

Options Assessment

There were no options scoped as part of the forward planning process. Options assessment would occur closer to the implementation year.

Implementation

The pipeline was assessed in 2008 to have a replacement cost of \$6,624,567. In \$FY19, this is \$8.35M. The proposed capital expenditure claim for this project is \$6.72M, which is less than the assessed replacement value. No further cost estimate information was provided, so it is reasonably implied that the entire pipeline is not being replaced, but rather a portion equivalent to the capital claim amount. The claim appears to be reasonable, however it may be an underestimation of the replacement value should the entire pipeline need replacing.

Findings

- Prudence:

Based on the Sunwater asset strategy, the project's timing has not been considered prudent. Based on age along, the project is proposed 8 years too early. Based on the latest condition assessment and the Sunwater decay curve, its replacement year should be beyond FY54. It is recommended to adjust the capital expenditure claim of this project in the FY25-53 period to \$0.

- Efficiency:

For the proposed replacement of Cherry Creek Pipeline, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives documented. The capital expenditure claim amount was less than the asset register's replacement value; therefore, the scope of the project may not have considered full replacement at the same time, which may not be efficient.

000042409 – Replace Syn/Lin Chnl 38142.67-40917.1M

Project Overview

A section of channel synthetic lining is proposed to be replaced between chainages 38,142 m and 40,917 m on the Mareeba-Dimbulah Distribution Scheme with investments in FY28 and FY48.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (FY19\$)	FY25-53: \$1,402,000
			Standard	✓	Impact of findings on claim (FY19\$)	FY25-53: \$0
			Cost	✓	Total Accepted (FY19\$)	FY25-53: \$1,402,000

Background

The asset in question forms part of the Mareeba-Dimbulah Distribution Scheme. It was installed in 1998 and will be 30 years old at the time of the proposed project delivery in FY28. Synthetic liner materials may deteriorate when exposed to harsh environmental conditions, which is likely the situation for a distribution channel. The proposed works include replacing the channel lining between chainage 38,142.67 and 40,917.1 m.

Per the Overall Strategy Common to all Irrigation Schemes by Object Type, the existing strategy for synthetic lined channels is to replace at full replacement cost at standard life of 20 years. The new strategy is to extend asset life to 30 years and continue condition-based repairs.

A high-level condition assessment was completed in 2010 for the channel lining. The asset was assessed as being in very poor condition, with a rating of 5. Comments from the inspection note that major sections of the liner are torn and non-functional, partial replacement of liner between distance 400 to 1000 m.

While the proposed replacement year in FY28 is consistent with the asset age at 30 years, but the condition of the asset indicates it should be brought forward. If the FY28 asset replacement is brought forward, then the FY48 replacement year could remain. Otherwise, it should be pushed out to reflect a 30 year replacement interval.

Options Assessment

No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the condition of the liner it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

In *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the channel was valued in 2008 as having a replacement value of \$629,823.04 (\$794,200 in \$FY19). Per the Overall Irrigation Strategy, the full replacement cost of the synthetic lining is justified. The capital expenditure claim of \$924,000 (FY19\$747,300) in 2028 and \$1,327,000 (FY19\$654,900) in 2048 appear reasonable.

Findings

- Prudency:

Sections of the channel lining need to be replaced, as supported by the condition assessment undertaken in 2010. Based on the asset strategy per Sunwater's Overall Strategy Common to all Irrigation Schemes by Object Type, the proposed replacements are justified based on the asset's age and condition; although the FY28 replacement could be brought forward.

- Efficiency:

For the proposed channel relining, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates or bill of materials were included in the documentation from Sunwater; however, the cost appears reasonable based on the asset register full replacement cost.

000045622 – Replace Earth Drain 1845.00-3765.00M

Project Overview

This project comprises the replacement of a section of earth drain within the Mareeba-Dimbulah Distribution between chainage 1845 m and 3765 m. The proposed replacement year is in FY52 for an estimated cost of \$340,360 (in \$FY19)

Summary of Findings

Review Summary	Prudent	x	Scope	✓	Capital expenditure claim (\$FY19)	FY25-53: \$340,360
			Standard	✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
			Cost	x	Total Accepted (\$FY19)	FY25-53: \$340,360

Background

The Mareeba-Dimbulah Distribution contains an earth drain which facilitates drainage for Arriga. It is proposed that this drain is replaced in FY52 for an estimated cost of \$340,360 (in \$FY19).

The drain is critical earthworks that are critical to Sunwater's flood management protocol. These works address compliance obligations.

Sunwater's strategy according to *Overall Strategy Common to all Irrigation Schemes by Object Type* for desilting of drains or channels is to remove all minor desilting from program and perform under routine maintenance and only include major re-profiling based on condition and risk.

The asset risk register classified the earth drain as low risk asset in 2018. According to the Whole of Life Maintenance Strategy, low risk earth drains are refurbished at 50-year intervals and replaced at 150 years. Sunwater has stated the Whole of Life Maintenance Strategy is applied when the project falls outside the 30-year outlook of the asset management strategy.

The earth drain was installed in 1979. In FY52, it will be 73 years old. This is 77 years earlier than the Whole of Life Maintenance Strategy for replacement. As such, the project has not been deemed prudent and an adjustment of the full amount is recommended.

A high-level condition assessment was completed in 2010. The earth drain was given a rating of 1, which indicates that it is in good condition. The aspects of the drain which were assessed include the drain waterway batter, operational performance, access road surface, and other berm & drain batter.

Options Assessment

There were no options scoped as part of the forward planning process.

Implementation

According to *QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx*, the full replacement value of the earth drain is \$189,292, valued in 2016. In \$FY19, this is \$199,465. The proposed capital expenditure claim is \$340,360, which is significantly higher than the replacement cost. A major re-profiling of the drain should be less than the full replacement value. Had the project been deemed prudent in timing, an adjustment would have been made based on cost, but the full amount is being adjusted as a result of prudence.

Findings

- Prudency:

More information is required from Sunwater regarding the section of earth drain between 1845 m and 3765 m and the role it plays within the Mareeba-Dimbulah Distribution. Replacement of the pipeline is not justified based on the age of the asset being within the typical serviceable life for earth drains. In this regard, the project's prudency is not demonstrated, and the full amount is recommended for adjustment.

- Efficiency:

For the proposed earth drain replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The basis for its estimation could not be determined and was higher than the asset register replacement value. It has not been deemed efficient, but the full amount is already recommended for adjustment by lack of prudency.

000048336 – Study: 20Yr Dam Safety Review – Peter Faust Dam

Project Overview

The Peter Faust Dam supplies water for irrigation, urban use and also provides flood mitigation. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 Dec 2023) as well as a safety review report.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$0		
			Standard	✓		FY21-24: \$349,860	FY25-53: \$387,050	
			Cost	✓		Impact of findings on claim (\$FY19)	FY19-20: \$0	FY21-24: \$0
					Total Accepted (\$FY19)	FY19-20: \$0	FY21-24: \$349,860	FY25-53: \$387,050

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater’s Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from review of actual costs of historical safety reviews across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considers the following but not limited to:

- Extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which may influence the scale of the study;
- Existing risk profile specific to each site which may influence the type and number of tasks required for the study;
- Updates and changes to dam safety standards and guidelines which may influence the scale of the study;

- Other site-specific peculiarities which may influence the task requirements of the study
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For these reasons, the capital expenditure claim of \$349,860 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- **Prudency:**
This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 Dec 2023. The project scope of works will align with the relevant Acts and Guidelines.
- **Efficiency:**
This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

0000057410 – Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervios fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)

Project Overview

Undermining of Allan Tannock Weir was observed in February 2013. Works to repair the damages observed are proposed to be completed in 2021.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY21-24: \$50,592
			Standard	✓	Impact of findings on claim (\$FY19)	FY21-24: \$992
			Cost	✗	Total Accepted (\$FY19)	FY21-24: \$49,600

Background

The Cunnamulla township receives water supply from the storage at Allan Tannock Weir. An emerging issue at Allan Tannock Weir was raised at the Toowoomba Office during the annual budget meeting. During an inspection when the water levels were lower, it appears that the protection concrete on the upstream side of the sheet piling has been undermined. This project was initiated to repair the weir to its original design, but its scoping was delayed until after the October 2016 5-Yr Dam Safety inspection. After the inspection, the original proposed works were confirmed, and additional works were recommended to unblock the weep holes and reinstate the broken rock mattresses.

Undermining of the weir may worsen to the point of structural failure. Without intervention, it may result in a risk to the long-term water security of Cunnamulla. Immediate works are required to repair the weir to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme.

The weir was constructed in 1992. At the time of proposed repair, the weir will be 29 years old. Typically, unreinforced concrete has a design life of 50-100 years, however it was noted that wave action has caused the condition to worsen progressively with time. With the loss of supporting soil, the concrete condition has deteriorated considerably in the time since it was poured.

Site inspection photos adequately represent undermining of the weir and resulting damaged concrete protection.

Options Assessment

There were no options scoped as part of the forward planning process. Based on the information provided and given the project is not proposed to be implemented until 2021, the appropriateness cannot be commented on at this stage.

Implementation

As per the initial planning for this project, provided in the document *Undermining Issues 2013 January*, the cost breakdown for this project is shown in Table 1:

Table 1 Initial Cost Estimate Breakdown (\$ Nominal)

Description	Plan Costs
Contractors	\$12,000
Internal Labour Transfer	\$640
Internal O/head Transfer	\$2,288
Materials	\$11,680
Plant Equipment & Vehicles	\$6,000
Service Charges	\$398
Travel & Accommodation	\$2,640
TOTAL	\$35,646

The draft estimate from the draft scope dated January 2013 detailed the following:

From annual report, Crest Length is 55m long. Therefore $2m \times 0.5m \times 55 = 55m^3$ of rock.

55 cube of rock @ 2650kg/m³ = 146 tonne. Assume [REDACTED] tonne delivered to site = [REDACTED]

Hire Rock breaker; break Rock	\$1500	
Place dumped Rock (3 Days)	\$4500	
Our Operators (2*4 days)	\$8000	(Can do the other works at the same time)
Travel costs	\$3000	
Accommodation/ TA	\$2200	
Total	\$30,880	
Add 20% as it's a brown estimate =	\$37,000.	Plugged figures into SAP Order 5135299 -
	\$40,003	

The \$40,003 cost will remain till scope and accurate costed estimate is obtained as we will want to add a concrete slurry over the top of the dumped rock

Additional works were identified for the rock mattress repairs:

Our operators (2 x 1 day)	\$ 1,000
Move Rocks back into position	\$ 1,500
Concrete 4 m ³	\$ 4,000
Other materials	\$ 2,000
Contingency	\$ 1,500
Total	\$ 10,000

The revised total combined cost estimate is \$47,000. This amount comprises \$37,000 (in \$FY13) and \$10,000 (in \$FY17). When converted to \$FY19 and planned in FY21, the total is \$49,600. The CAPEX claim of \$50,592 (in \$FY19) does not match. A slight adjustment of \$992 is recommended so that it matches the cost estimates available.

Findings

- Prudency:

The Allan Tannock weir provides storage of water and supply to the township of Cunnamulla. The rock protection at the weir was designed to protect the sheet piles. Immediate repairs are required to reinstate the rock protection to its original condition to prevent further damage to the sheet piles and overall dam structural integrity. The 5-Yearly Dam Inspection also recommended repairs to the rock mattresses and weep holes.

- Efficiency:

For the proposed rock protection replacement, unblocking of weep holes, and rock mattress reinstatement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. An adjustment of \$1,200 to the CAPEX claim has been made such that it matches the cost estimates provided.

000058091 – Study: 20 Yr Dam Safety Review – Cania Dam

Project Overview

The Cania Dam supplies water recharging alluvial aquifers around and downstream of the Township of Moodford as well as providing flood mitigation. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 Dec 2019) as well as a safety review report.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$220,310 FY21-24: \$0 FY25-53: \$265,510
			Standard	✓		
			Cost	✓		
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$220,310 FY21-24: \$0 FY25-53: \$265,510

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines.

The Dam Safety Condition Schedule – DS12 states the last safety review was undertaken in May 2001 and the next review is due 1 December 2019, and every 20 years thereafter.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater’s Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

As described in the Procurement Process and Recommendation document, an open tender process was adopted with eight contractors invited to provide quote for Dam Safety Reviews at Boondooma Dam, Cania Dam and Fred Haigh Dam.

A cost effectiveness ratio (CER) was determined based on Total Cost / Total of Weighted Score for the quotations provided. The offer with the lowest CER is an indication of the best value for money. The outcome of this assessment was that [REDACTED] was the preferred supplier. Their fee was estimated at \$209,265 and was within range of the other supplier fees. Sunwater proposed a \$30,000 contingency based on potential geotechnical investigations.

The Procurement Process and Recommendation document also referred to a project budget of \$348,728, which was stated to be split into \$228,889 in FY19 and \$119,839 in FY20. The [REDACTED] fee (inc contingency) of \$239,265 is within the allocated budget of \$348,728. The budget also allows for Sunwater labour and indirect cost allowances.

The original capital expenditure claim was \$231,124 in FY19 only. The actual FY19 expenditure was less at \$220,310. It is assumed that the FY20 budgeted costs are under a separate work order that was not provided for review.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 Dec 2023. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

While the scope and standard appear to be reasonable, there was insufficient information to provide a strong determination of cost efficiency. The consultant proposal was \$209,265 and was within the same range as the other suppliers but the second least cost offer. There was no budget breakdown for the overall budget, but with a total of \$239,265 (inc. contingency) allocated to [REDACTED] and assuming the remainder of the \$348,728 budget is for indirects and Sunwater labour, the costs appear reasonable. The actual expenditure in FY19 was lower at \$220,310. It is noted that the budget had a budget allocation in FY20 but the CAPEX claim did not include FY20 costs. It is assumed these are under a separate maintenance key, similar to the Burdekin Falls Dam Safety Review project.

000064409 – 20 Dam Safety Review – Kroombit Dam

Project Overview

The Kroombit Dam supplies water as part of the Callide Valley Supply Scheme. It requires a safety review to be carried out every 20 years as part of condition DS12 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule which includes the safety review (due 1 June 2020) as well as a safety review report.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$253,628
			Standard	✓		FY21-24: \$0
			Cost	✓		FY25-53: \$0
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$253,628 FY21-24: \$0 FY25-53: \$0

Background

The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a Safety Review as well as the preparation of a Safety Review Report at 20 year intervals, providing a copy to the Department of Natural Resources and Mines. As per the Dam Safety Condition Schedule – DS12, the next report is due 1 June 2020.

Options Assessment

Options assessments are not relevant to safety reviews. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS12.

Implementation

Per Sunwater's Overall Strategy Common to all Bulk Water Schemes for dams and structural components, these structures are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. Regular safety and condition assessments form a critical part of this strategy.

Based on information provided in the document *QCA Information Request A40_20 year dam safety reviews supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Extent of new investigations / assessment / data inputs requiring review and updating, specific to each site;
- Physical features such as size, construction material, construction method, gated / non-gated spillway, site geology, etc. specific to each site which may influence the scale of the study;
- Existing risk profile specific to each site which may influence the type and number of tasks required for the study;

- Updates and changes to dam safety standards and guidelines which may influence the scale of the study;
- Other site-specific peculiarities which may influence the task requirements of the study;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information used to scale the cost estimate was not provided, the methodology appears adequate, and the total costs are in line with other 20-Year Dam Safety Review projects. For these reasons, the capital expenditure claim of \$253,628 is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works. It is noted that the future 20-Year Dam Safety Review required in FY40 was not included in this project. It is assumed it has been accounted for under a separate work order.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 June 2020. The project scope of works will align with the relevant Acts and Guidelines. It is noted that the future 20-Year Dam Safety Review required in FY40 was not included in this project. It is assumed it has been accounted for under a separate work order.

- Efficiency:

This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.

000064557 – Study: 5 Yr Dam Comprehensive Inspection – Kinchant Dam

Project Overview

The Kinchant Dam requires a comprehensive inspection of the dam be carried out every 5 years as part of condition DS11 of QDSMG. The scope of works is detailed by the Dam Safety Condition Schedule including the comprehensive inspection (due 1 Dec 2023) and report (due 3 months post completion of inspection).

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$0
			Standard	✓		FY21-24: \$132,825
			Cost	✓		FY25-53: \$848,409
					Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
					Total Accepted (\$FY19)	FY19-20: \$0 FY21-24: \$132,825 FY25-53: \$848,409

Background

The Kinchant Dam is a part of the Eton Bulk Supply Scheme. The Queensland Dam Safety Management Guidelines states that the dam owner must carry out a comprehensive inspection of the dam every 5 years as per Condition DS11. A comprehensive inspection report must detail the findings of the inspection in accordance with the QDSMG and must be submitted to the Department of Natural Resources and Mines within 3 months of the inspection.

Options Assessment

Options assessments are not relevant to Compliance Inspections. The works as part of this project are necessary to meet the requirements of the Dam Safety Condition Schedule – DS11.

Implementation

Per Sunwater’s *Overall Strategy Common to all Bulk Water Schemes*, dams and structural components are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk.

Based on information provided in the document *QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx*, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater’s portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:

- Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks;
- Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks;
- Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks;

- Other site-specific peculiarities which may influence the task requirements;
- Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks.

While the specific information forming the cost estimate was not provided, the methodology appears appropriate. For this reason, the average capital expenditure claim of \$140,000 (\$FY19) per investigation/study is considered reasonable and is therefore accepted. This claim should be reviewed upon procurement of works.

Findings

- Prudency:

This project is deemed prudent as it is a regulatory requirement. The comprehensive inspection of the Dam will need to be completed by December 2023 and every 5 years thereafter. The project scope of works will align with the relevant Acts and Guidelines.

- Efficiency:

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

0000064960 – Replace Control Equipment

Project Overview

The crane control equipment at Leslie Dam has reached the end of its serviceable life and is scheduled to be replaced under this project.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY21-24: \$154,440 FY25-53: \$167,250
		Standard ✓	Impact of findings on claim (\$FY19)	FY21-24: \$0 FY25-53: \$0
		Cost ✓	Total Accepted (\$FY19)	FY21-24: \$154,440 FY25-53: \$167,250

Background

Leslie Dam forms part of the Upper Condamine Scheme. It is proposed that the crane control equipment at Leslie Dam is replaced in 2024 for an estimated cost of approximately \$160,000.

According to Sunwater's Overall Strategy Common to all Bulk Water Schemes by Object Type, cranes are considered under Sunwater's Existing Developed Strategies. The crane was acquired in 1985. The typical serviceable life for electrical and mechanical equipment as defined in WSA 03 (Section 1.2.6) is 15 and 20 years respectively. At the time of the proposed replacement, the crane will be 39 years old and will have exceeded the standard run-to-failure asset life expectancy. This is also in accordance with Sunwater's existing strategy. A high-level condition assessment completed in 2019 indicates the gantry crane switchboard internal components is in overall condition of 3, which is fair, with some components rated 4 indicating some aspects are in poor condition.

Options Assessment

An options assessment was not completed for this project. There is no evidence that a scoping process was undertaken, although given the age of the crane and control equipment it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

Implementation

Information provided in QCA Information Request A40_Attachment1_asset Register Including Condition and Risk as at 5 June 2019.xlsx does not identify a replacement cost for the control equipment at Leslie Dam. However, replacement costs for similar items in the register indicate figures between \$115,000 and \$200,000 are likely. Therefore, the proposed expenditure of \$161,000 appears reasonable.

Findings

- Prudency:
Sufficient information has been provided in regard to the proposed replacement of control equipment at Leslie Dam. Replacement of the equipment is justified based on the age of the asset having exceeded the typical serviceable life for mechanical/electrical equipment. Sunwater's Existing Strategy for Crane Equipment is supported by their Overall Strategy Common to all Bulk Water Schemes by Object Type. In this regard, the project's prudency is demonstrated.

- Efficiency:

For the proposed crane control equipment replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was very high level and the basis for its estimation could not be determined. That said, the \$160,000 replacement cost appears to be close to replacement costs for similar assets.

0000065102 – Meter Replacement – Three Moon Creek

Project Overview

The Meter Replacement Program at Three Moon Creek involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$44,200 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19-20: \$82,339 (FY19 actuals: \$41,951) FY21-24: \$161,371 FY25-53: \$1,178,780	
		Standard ✓		Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
		Cost ✓		Total Accepted (\$FY19)	FY19-20: \$82,339 FY21-24: \$161,371 FY25-53: \$1,178,780

Background

The Meter Replacement Program for the Three Moon Creek scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Three Moon Creek Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Three Moon Creek Scheme is \$1,046,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$53,000.

The total average annual capital expenditure claim, in \$FY19, is \$44,200. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$82,339 was made up of FY19: \$42,512 and FY20: \$39,827. Actual FY19 spend was reported to be at \$41,951. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

0000065103 – Meter Replacement – Dawsons Valley

Project Overview

The Meter Replacement Program at Dawsons Valley involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at an average annual cost of \$89,100 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$85,257 (FY19 actuals: \$0) FY21:24: \$327,074 FY25-53: \$2,449,500
			Standard	✓		
			Cost	✗		
					Impact of findings on claim (\$FY19)	FY19-20: \$33,257 FY21:24: \$119,074 FY25-53: \$941,500
					Total Accepted (\$FY19)	FY19-20: \$52,000 FY21:24: \$208,000 FY25-53: \$1,508,000

Background

The Meter Replacement Program for the Dawsons River scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Dawsons River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Dawsons River Scheme is \$1,040,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$52,000.

The total average annual capital expenditure claim, in \$FY19, is \$84,000. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has been overstated by approximately 38%. As such, the reasonable value is considered to be \$52,000.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$85,267 was made up of FY19: \$85,267 and FY20: \$0. Actual FY19 spend was reported to be at \$0. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method has overstated costs compared to the cost of summing the replacement costs for each meter in the scheme. As such, adjustments are proposed to lower the annual budget to \$52,000 (\$FY19).

0000065104 – Meter Replacement – Callide Valley

Project Overview

The Meter Replacement Program at Callide Valley involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$66,500 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19-20: \$124,207 (FY19 actuals: \$13,245) FY21-24: \$244,339 FY25-53: \$1,828,236	
		Standard ✓		Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0 FY25-53: \$0
		Cost ✓		Total Accepted (\$FY19)	FY19-20: \$124,207 FY21-24: \$244,339 FY25-53: \$1,828,236

Background

The Meter Replacement Program for the Callide Valley scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Callide Valley Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Callide Valley Scheme is \$ 1,560,837. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$79,000.

The total average annual capital expenditure claim, in \$FY19, is \$66,500. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$124,207 was made up of FY19: \$63,839 and FY20: \$60,368. Actual FY19 spend was reported to be at \$13,245. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

0000065145 – Meter Replacement – Proserpine River

Project Overview

The Meter Replacement Program at Proserpine River involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$35,940 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19-20: \$63,602 (FY19 actuals: \$46,405) FY21:24: \$125,205 FY25-53: \$941,532	
		Standard ✓		Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21:24: \$0 FY25-53: \$0
		Cost ✓		Total Accepted (\$FY19)	FY19-20: \$63,602 FY21:24: \$125,205 FY25-53: \$941,532

Background

The Meter Replacement Program for the Proserpine River scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program

based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Proserpine River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Proserpine River Scheme is \$1,190,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$60,000.

The total average annual capital expenditure claim, in \$FY19, is \$35,940. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$63,602 was made up of FY19: \$32,516 and FY20: \$31,086. Actual FY19 spend was reported to be at \$46,405. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

0000065147 – Meter Replacement – Macintyre Brook (strategy for IBT as developed in 2015)

Project Overview

The Meter Replacement Program at Macintyre Brook involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$22,600 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19-20: \$45,527 (FY19 actuals: \$18,567)
		Standard ✓		FY21:24: \$89,730
		Cost ✓		FY25-53: \$655,387
			Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21:24: \$0 FY25-53: \$0
			Total Accepted (\$FY19)	FY19-20: \$45,527 FY21:24: \$89,730 FY25-53: \$655,387

Background

The Meter Replacement Program for the Macintyre Brook scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program

based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Macintyre Brook Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Macintyre Brook Scheme is \$931,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$47,000.

The total average annual capital expenditure claim, in \$FY19, is \$22,600. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$45,527 was made up of FY19: \$23,000 and FY20: \$22,000. Actual FY19 spend was reported to be at \$18,567. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

0000065148 – Meter Replacement – Chinchilla Meter Outlets (2015 IBH strategy)

Project Overview

The Meter Replacement Program at Chinchilla involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$11,400 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19-20: \$22,914 (FY19 actuals: \$1,360) FY21:24: \$45,148 FY25-53: \$329,751
		Standard ✓		
		Cost ✓		
			Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21:24: \$0 FY25-53: \$0
			Total Accepted (\$FY19)	FY19-20: \$22,914 FY21:24: \$45,148 FY25-53: \$329,751

Background

The Meter Replacement Program for the Chinchilla scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that

shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Chinchilla Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Chinchilla Scheme is \$523,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$27,000.

The total average annual capital expenditure claim, in \$FY19, is \$11,400. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$22,914 was made up of FY19: \$11,764 and FY20: \$11,150. Actual FY19 spend was reported to be at \$1,360. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

000072774 – Stabilise bed and banks of the spillway discharge channel subject to dam safety review

Project Overview

This project proposes to stabilise the bed and banks of the spillway discharge channel at Teemburra Dam.

Summary of Findings

Review Summary	Prudent	x	Scope	x	Capital expenditure claim (\$FY19)	FY21-24: \$350,900 FY25:53: \$292,708
			Standard	x	Impact of findings on claim (\$FY19)	FY21-24: \$350,900 FY25:53: \$292,708
			Cost	x	Total Accepted (\$FY19)	FY21-24: \$350,900 FY25:53: \$292,708

Background

Teemburra Dam supplies water to the Pioneer Valley irrigation system and for urban and industrial purposes in the region. The Teemburra Dam is assessed as having an Incremental Flood Consequence Category (IFCC) rating of extreme based on major damage. It is proposed that the bed and banks of the spillway discharge channel are stabilised in 2024 for an estimated cost of \$350,000 (\$FY19) and in 2049 for a cost of \$272,000 (\$FY19).

The January 2018 20-Yr Dam Safety Review report does not make any conclusions or recommendations regarding the stabilisation of the spillway discharge channel. Furthermore, the dam was installed in 1997. With an asset life of 80 years for a concrete channel, the replacement would not be due until 2077. The project has, therefore, not been considered prudent.

Options Assessment

No alternatives were identified.

Implementation

Sunwater’s existing strategy for dam and structural components including the bed and banks of the spillway discharge was to replace on an 80 to 200-year interval based on condition, risk and object type. Under Sunwater’s new strategy, the assets are to be maintained into perpetuity by undertaking periodical refurbishments based on condition and risk. The most recent dam safety inspection did not appear to support the need for this project.

Findings

- **Prudency:**
The January 2018 20-Yr Dam Safety Review report does not make any conclusions or recommendations regarding the stabilisation of the spillway discharge channel. Furthermore, the dam was installed in 1997. With an asset life of 80 years for a concrete channel, the replacement would not be due until 2077. The project has, therefore, not been considered prudent.
- **Efficiency:**
There is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified, nor cost estimates provided.

0000073006 – Kinchant Dam - Refurbish - Inlet Tower Upgrade - Stage III - Fabrication, Installation of Modifications (Tier 2)

Project Overview

Major refurbishment works to strengthen the tall slender tower against earthquake damage at Kinchant Dam have been identified for completion in 2022 for an estimated cost of \$305,120.

Summary of Findings

Review Summary	Prudent ✘	Scope	✓	Capital expenditure claim (\$FY19)	FY21-24: \$285,450
		Standard	✓		
		Cost	✓	Impact of findings on claim (\$FY19)	FY21-24: \$285,450
				Total Accepted (\$FY19)	FY21-24: \$0

Background

It is proposed that refurbishment works to the Kinchant Dam inlet tower be done in 2022 for an estimated cost of \$285,450 (\$FY19). The works involve a major refurbishment to strengthen (post tensioning) the structure against damage from an earthquake. An Options Study is planned for FY20 so no other documentation will be created until the outcome of the Options Study is complete. The project was recommended from the 2000 Dam Safety Review, but the document was not provided to allow confirmation of prudence and scope.

Options Assessment

There were no options scoped as part of the forward planning process but was stated to be planned FY20. The appropriateness cannot be commented on at this stage, based on the information provided.

Implementation

The proposed CAPEX claim is for a single year at a cost of \$285,450 (\$FY19). The basis for this estimate was not provided but is assumed to be sourced from the Kinchant Dam 2000 Dam Safety Review. There is no replacement value for the tower in the asset register to assess a relative cost for the refurbishment.

The tower was built in 1986 and the asset register condition rating for the tower was good (minor defects only) as assessed in 2012. It is therefore assumed that the project is related to a change in design standard for seismic requirements since the year it was built. At the time of design, AS2121-1979 (Australian Standard for the Design of Earthquake Resistant Buildings) was the main seismic design requirement and the first of kind in Australia. It only applied to various areas of Australia, which Kinchant Dam doesn't appear to have been affected. It is possible that no seismic considerations would have been applied to the 1986 design. After earthworks in 1988 and 1989, a new standard was introduced called AS1170.4-1993, which applied to all regions of Australia. This standard may have been the basis of the recommendation in the 2000 Dam Safety Review report. Revisions to the standard were made in 2002 and 2007, but in 2018 a major change to seismic design requirements was introduced. Australia updated the magnitude of historical earthquakes to more accurately represent their true size based on modern measurement techniques. As a result, hazard design factors have been reduced; therefore, what may have driven the seismic review in 2000 may no longer apply. Before the project can be considered prudent, an appropriate review of seismic requirements should be done.

While a portion of the funds have been stated to be spent in FY20 for an options study, the full CAPEX claim is in FY22. The need for the project was identified in FY00 but the project was scheduled 22 years later. The long delay indicates that the project was not of high priority.

Findings

- Prudency:

While the tower appears to be in good condition, it appears that the 2000 Dam Safety Review identified unacceptable structural integrity for seismic resistance of the structure. It is assumed that this in response to the updated seismic codes in 1993. The delay in project implementation of 22 years suggest the project was of low priority and did not affect overall risk of the dam. Furthermore, the seismic standards have been updated in 2018 and what may have been prudent in 2000 could have changed. The project has not been considered prudent until an appropriate review of current standards is done.

- Efficiency:

For the proposed tower refurbishment/strengthening, there is insufficient information provided to commentary on project efficiency as no supporting documentation was provided and no data from the asset register is applicable. It is noted that options study (Stage 1) and design and procurement (Stage 2) are expected to occur in FY20 and FY21 respectively.

0000076150 – Meter Replacement – Burnett River

Project Overview

The Meter Replacement Program at Burnett River involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$51,700 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19-20: \$102,830 (FY19 actuals: \$48,863) FY21:24: \$201,268 FY25-53: \$1,469,049	
		Standard ✓		Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21:24: \$0 FY25-53: \$0
		Cost ✓		Total Accepted (\$FY19)	FY19-20: \$102,830 FY21:24: \$201,268 FY25-53: \$1,469,049

Background

The Meter Replacement Program for the Burnett River scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program

based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Burnett River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Burnett River Scheme is \$1,353,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$68,000.

The total average annual capital expenditure claim, in \$FY19, is \$51,700. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20 estimate of \$102,830 was made up of FY19: \$53,000 and FY20: \$50,000. Actual FY19 spend was reported to be at \$48,863. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

0000076154 – Meter Replacement – Upper Burnett River

Project Overview

The Meter Replacement Program at Upper Burnett involves the refurbishment or replacement of water meters every year as they fail, or are near failure if opportunistically identified, at a cost of \$56,800 (in \$FY19) per year. Working and accurate meters are required as part of the Resource Operations Plan for each of the systems to accurately record and invoice Sunwater customers. The scope of works involves the ad-hoc replacement of failed meters. The new meters are required to meet AS4747 and the National Measurement Institute (NMI) requirements.

Summary of Findings

Review Summary	Prudent ✓	Scope ✓	Capital expenditure claim (\$FY19)	FY19-20: \$113,280 (FY19 actuals: \$90,402) FY21:24: \$221,808 FY25-53: \$1,619,532	
		Standard ✓		Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21:24: \$0 FY25-53: \$0
		Cost ✓		Total Accepted (\$FY19)	FY19-20: \$113,280 FY21:24: \$221,808 FY25-53: \$1,619,532

Background

The Meter Replacement Program for the Upper Burnett scheme identifies failed meters that require replacement on an as-needed basis. The water meters are considered low risk, run-to-failure assets. Failure is currently identified either during daily operational surveillance, quarterly meter readings, meter servicing activities, or as advised by customers per their obligations within their supply contract. As such, Sunwater did not consider it prudent or efficient to undertake additional field condition assessment activities.

Upon failure, one of the following renewal actions are done (in order of priority):

1. Meter is repaired using OEM parts;
2. Meter is repaired using remanufactured replacement components;
3. Meter is replaced 'like-for-like' with existing serviceable stock without altering the offtake arrangement;
4. Meter is replaced with modern equivalent.

The meter replacements must comply with Sunwater's AM14 -Non-Urban Water Meter Standard and will meet AS4747 and the requirements specified by NMI. Any new non-urban metered arrangements shall be designed in accordance with AS4747, signed-off by an RPEQ, and a safety design review completed. The meter must be installed by a certified meter installer in accordance with AS 4747 and the meter manufacturer's specification.

Options Assessment

Sunwater has stated that a run-to-fail and adhoc refurbishment/replacement approach to the water meter asset class is the most prudent and efficient approach. No documentation was provided that shows an appropriate options assessment for other asset strategies was completed. A rolling program based on age, condition, and risk may bring added benefits and more accuracy in forecasting capital expenditure.

Implementation

The water meter replacement program is budgeted by allocating a rolling program with annual budgets, but only implementing the refurbishments/replacements if meters fail. It appears that if there is insufficient funding in a particular year, prioritisation of meter replacements within the available budget are based on age and usage profiles.

The annual capital expenditure program budget for water meters are allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be “representative of the type and size of water meter in the service contract”.

The *QCA Information Request A40_meter replacement supporting information.xlsx* included two spreadsheets relevant for estimating costs. The *Upper Burnett River Customer Offtake Assets* spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The *Meter Replacement Cost Estimate Summary* spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a “representative meter” approach as used by Sunwater.

The approximate value of all water meters within the Upper Burnett Scheme is \$1,609,000. Across a nominal asset life of 20 years, the rolling program annual replacement budget allocation would be approximately \$81,000.

The total average annual capital expenditure claim, in \$FY19, is \$57,000. While the specific cost basis (i.e., selecting a representative meter) was not provided, it appears that the cost has not been overstated. As such, it is considered reasonable.

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Initial FY19-20: \$113,280 estimate was made up of FY19: \$59,000 and FY20: \$54,000. Actual FY19 spend was reported to be at \$90,402. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.

Findings

- Prudency:

Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a ‘run-to-fail’ approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.

- Efficiency:

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a ‘representative meter’ is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

0000076200 & 0000076201 – Refurbish Silverleaf Weir – Stage 1

Project Overview

Silverleaf Weir is part of the Barker Barambah Bulk Supply Scheme and its condition has been deteriorating over time. The latest condition assessment has identified that the elements of the weir are at the failure stage with an estimated remaining life of 2-4 years (from 2018). The outcome of a 2018 Options Study will determine the scope of works for its long term maintenance strategy. This is a single project that is to be delivered across two years.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY19-20: \$939,980 FY21-24: \$1,861,760
			Standard	✓		
			Cost	✓	Impact of findings on claim (\$FY19)	FY19-20: \$0 FY21-24: \$0
					Total Accepted (\$FY19)	FY19-20: \$939,980 FY21-24: \$1,861,760

Background

The Silverleaf weir was constructed in 1949 and will be 71 years old at the time of proposed renewal. The asset strategy for weirs is to maintain into perpetuity by undertaking periodical refurbishments based on condition and risk. The most recent condition assessment report (Wood and Research Development, 2018) has stated the structure is in poor condition based on severely degraded piles through the structure. The timber elements have reached the failure stage and restoration is needed urgently to prevent weir failure. The report recommended work be undertaken within 6 months (i.e., by January 2019) including posting of the deteriorated piles, diffusing of all timber members, replacement of the backwall boards, replacement of the bracing, treatment of all timber with copper naphthenate or similar, and replacement of vertical fasteners. Overall, the weir was deemed to have an expected remaining life of 2-4 years.

Options Assessment

An options analysis was undertaken in 2010 but was considered to be out of date and was not used for this project. The Non Routine Work Initiation Justification Document (2017) specifies that the following options are to be considered as a minimum for the 2018 options analysis.

1. Do nothing;
2. Upgrade the weir;
3. Rebuild the weir;
4. Refurbish / replace certain components of the weir; and
5. Decommission the weir.

The 2018 options analysis was not provided and the proposed option has not been provided.

Implementation

The condition of the weir has been deteriorating with time. Condition assessments were completed in 2015, as report in the asset register, with the majority of components being rated as 4 (poor). Some concrete components and select other components were scored as 2 (minor defects only). The Non Routine Work Initiation Justification Document (2017) recommended a two stage approach to planning. First, a 5 yearly comprehensive assessment (i.e. condition inspection) should be carried out. Second, an options analysis be done to determine an appropriate whole-of-life strategy for the weir.

The condition inspection was carried out in 2018 by Wood and Research Development. The report recommended urgent restoration to prevent a weir failure. It estimated a remaining life of 2-4 years (i.e., by 2020-2022).

The options analysis was supposedly completed in FY18, but no documentation was provided.

The design and construction phase has been scheduled over three stages in FY20, FY21 and FY22 with costs of \$939,980 and \$1,862,000 and \$468,950 respectively (this review relates to Stage 1 and Stage 2 works only). The total combined cost of all three stages is \$3,270,930. The QCA Information Request A40_refurbish Silverleaf Weir supporting information document states that the cost estimate was based on a similar restoration to Whetstone Weir in FY10 and was scaled up in consideration of size, level of decay, locality, and inflation/escalation.

The asset register replacement value for the weir and all its components is \$2,523,227 using a 2015 valuation. In \$FY19, this is \$2,698,692. However, it is noted that not all of the weir components were populated with replacement values.

Findings

- Prudency:

The project is deemed prudent as it can be reasonably implied there is a safety risk attached to the failure of the Silverleaf Weir and a business need for the safe functioning of the weir. The option has not been chosen yet and the scope of works is to be defined by the 2018 Options Study. It is reasonably implied the scope of works will fulfil regulatory obligations.

- Efficiency:

Based on the early phase of the project, and prior to options being assessed, there is insufficient information to comment fully on the efficiency of the project. However, the proposed project process indicates the project should result in overall efficiency being delivered on the project. The cost estimate was established by scaling costs from a previous similar weir restoration project. The costs appear to be reasonable in comparison to available replacement values in the asset register.

24BIA20 – Isis System – Irrigation Common Strategy

Project Overview

The assets forming the Isis Irrigation System are maintained in accordance with the Overall Strategy Common to all Irrigation Schemes by Object Type. This project relates to the refurbishment of concrete lined channels.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY25-53: \$2,578,670
			Standard	✓	Impact of findings on claim (\$FY19)	FY25-53: \$0
			Cost	✓	Total Accepted (\$FY19)	FY25-53: \$2,578,670

Background

The Isis irrigation system forms part of the Bundaberg Distribution Scheme. The description of the proposed project appears to be the refurbishment of the Isis system concrete lined channels as part of the Irrigation Common Strategy. The asset register shows six concrete channel sections running from a chainage of 9,682 to 17,923m (i.e. 8.2km). The Isis system also has a portion of unlined earth channel, but based on the title of the project, they are not intended to be included in this refurbishment program.

Options Assessment

There were no options scoped as part of the forward planning process, but this would not be expected until close to the first year of refurbishment in FY29.

Implementation

The refurbishment program is planned on a 5-year cycle starting in FY29. The channel was constructed in 1989. In FY29, the channel will be 40 years old. This timing is consistent with the asset strategy, which states the refurbishment program to start at 40 years and replace and repair bays on a 5-year frequency. The cost of each 5-yearly refurbishment is to be the total replacement cost divided by 60 multiplied by 5, which relates to the time from start of the refurbishment program to the end of life at 100 years.

The asset register replacement value for the concrete channel linings is \$9.38M valued in 2008 (excluding the concrete bench flume). In \$FY19, this is \$11.8M. Following the asset strategy budgeting process, the 5-yearly allocation should be \$985,982.

The CAPEX claim is for an average refurbishment cost in \$FY19 of \$437,620. This converts to a total valuation of \$5.25M. Sunwater later clarified that the project has a second stage under a separate project number (0000073055), which has an average refurbishment cost in \$FY19 of \$407,500. This second stage converts to a total valuation of \$4.89M. The combined valuation of the two stages is \$10.1M, which is \$0.76M greater than the asset register value. The difference may be as a result of varying (and potentially lower) 5-yearly allocations beyond FY53. The varying levels of costs in each year are due to the application of Sunwater’s cost allocation methodology for non-direct costs.

Findings

- Prudence:

The start and frequency of the proposed Isis system concrete channel refurbishment program is in line with the asset strategy and is therefore considered prudent.

- Efficiency:

The asset strategy divides the replacement cost by 60 years to spread the refurbishments and replace and repair bays on a 5-year frequency. Sunwater has divided this refurbishment program into two stages with stage two occurring the year after stage one. The combined average cost of each refurbishment appears to be in line with the asset register replacement value.

000076580 – Study: Bathymetric survey of Fairbairn Dam

Project Overview

A bathymetric survey (or similar) is proposed at Fairbairn Dam to identify underwater hazards and increase safe use of the dam for recreational activities.

Summary of Findings

Review Summary	Prudent	x	Scope	x	Capital expenditure claim (\$FY19)	FY19-20: \$286,547
			Standard	x	Impact of findings on claim (\$FY19)	FY19-20: \$286,547
			Cost	x	Total Accepted (\$FY19)	FY19-20: \$0

Background

The Sunwater Executive Leadership Team (ELT) has identified Fairbairn Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to survey (not necessarily limited to bathymetric) the lake to determine accurate depths, features and hazards in the lake that pose a safety risk for the various recreational users. The hazards may change depending on the varying water levels. Identified features within the pondage storage area will subsequently be required to be addressed accordingly in the interest of public safety on the lake. This will presumably be under a separate project.

The expected survey area to be approximately 2000 ha.

As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.

Options Assessment

No alternatives were identified. Considering this is a study, there is little to no options scoping possible. A do-nothing option should still be considered as a non-capex consideration.

Implementation

The cost estimate for the survey study per the Non-Routine Work Initiation Justification document as being \$317,500 and was costed in 2019. The basis for this estimate is Internal Project Management with an estimate confidence of +/-15%. The CAPEX claim amount for this study was originally \$292,280 (in nominal \$).

Findings

- Prudency: As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.
- Efficiency: For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency.

0000076581 – Study: Bathymetric Survey of Bjelke-Petersen Dam

Project Overview

A bathymetric survey (or similar) is proposed at Bjelke-Petersen Dam to increase safe use of the dam for recreational activities.

Summary of Findings

Review Summary	Prudent	✘	Scope	✘	Capital expenditure claim	FY21-24: \$46,840
			Standard	✘	Impact of findings on claim	FY21-24: \$46,840
			Cost	✘	Total Accepted	FY21-24: \$0

Background

The ELT has identified Bjelke-Petersen Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to survey (not necessarily limited to bathymetric) a portion of the lake to determine accurate depths, features and hazards in the lake posing safety risks to the various recreational users. Hazards may change depending on varying water levels. Any identified features within the pondage storage area subsequently would be required to be addressed in the interest of public safety on the lake. It is presumed this would be part of a separate project.

As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.

Options Assessment

No alternatives were identified. Considering this is a study, there is little to no options scoping possible. A do-nothing option should still be considered as a non-capex consideration.

Implementation

A basis for the cost estimation was not provided for this project. Given the cost estimation for a similar project at Fairbairn Dam, the capital expenditure claim appears to be reasonable for the survey study. The Fairbairn Dam survey proposed to survey approximately 2000 ha of the roughly 15,000 ha reservoir for a cost of \$286,549 (\$FY19). Considering the Bjelke-Petersen Dam reservoir covers roughly 2,500 ha (i.e. roughly 6x less than Fairbairn), a scaled version of the survey cost would be \$48,000 which could be in the range of the proposed CAPEX claim cost, but this cannot be confirmed.

Findings

- Prudency: As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.
- Efficiency: For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency.

000077561 – Testing of post tensioning permanent strand anchors

Project Overview

This project involves the testing of post tensioning permanent strand anchors, which is required in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD 2003). The inspection is scheduled for 2027 and every 5 years thereafter.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (\$FY19)	FY24-53: \$673,000
			Standard	✓		
			Cost	✓	Impact of findings on claim (\$FY19)	FY24-53: \$0
					Total Accepted (\$FY19)	FY24-53: \$673,000

Background

Tinaroo Dam forms part of the Mareeba-Dimbulah Bulk Scheme. Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003).

Five yearly testing is appropriate. However, more frequent tests should be undertaken if the permanent strand anchors show signs of deterioration.

Tinaroo Dam was constructed in 1959. At the time of the testing, it will be 68 years old.

A condition assessment of the spillway anchor prestress system was completed in 2015 in accordance with the five yearly inspection requirements (ANCOLD Guidelines, 2013). The system was rated as being in good to fair condition which supports the continuation of testing at its current schedule.

Options Assessment

Testing is required to meet Dam Safety Requirements. An options analysis is not applicable to this project.

Implementation

The testing of post tensioning permanent strand anchors has been estimated at approximately \$105,000 to \$120,000 (in \$FY19) every five years. It is unclear why each year has a different projected cost, but the costs appear reasonable.

Findings

- Prudency:
Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003). The previous condition assessment of the asset indicates that the existing inspection schedule is suitable. This project is considered prudent to meet Dam Safety Requirements.
- Efficiency:
For the proposed testing of post tensioning strand anchors, there is insufficient information provided to comment on project efficiency, but the costs appear reasonable.

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Appendix C

Impact on Annuity by Scheme

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Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Appendix C Annuity Adjustment by Scheme

1.0 Total

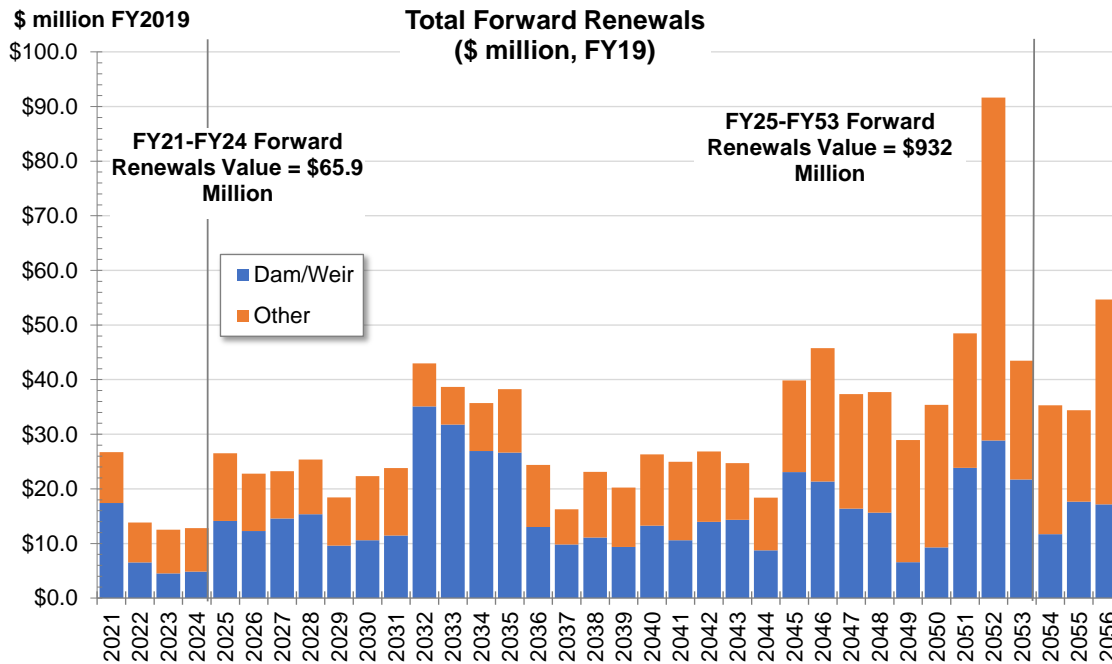


Figure 1

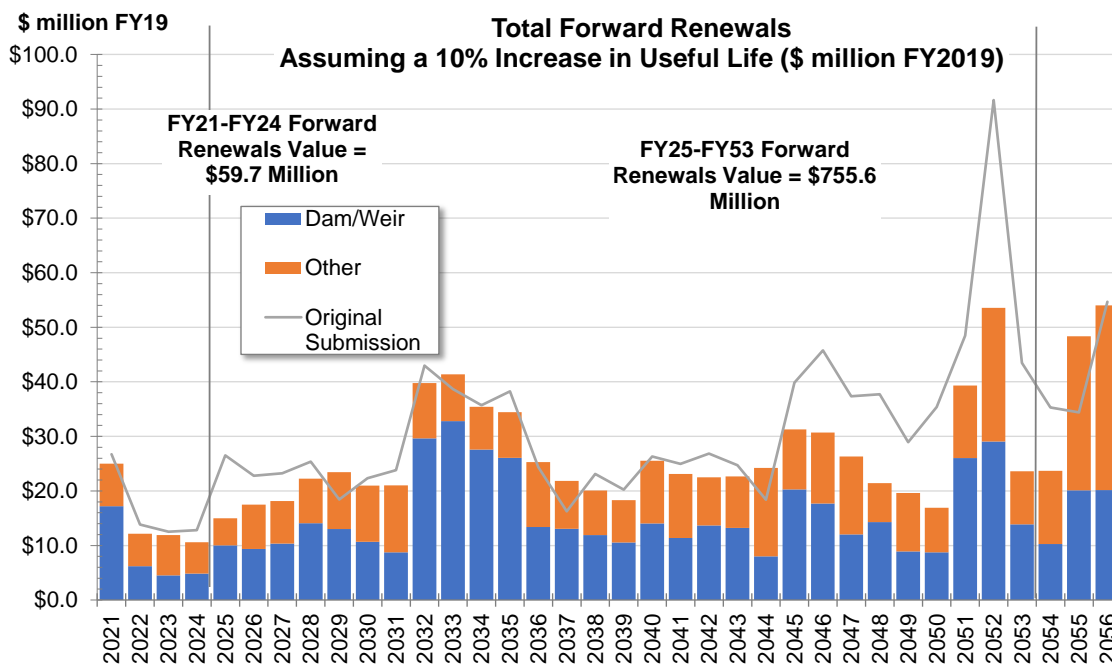


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$26.72	\$24.99
2022	\$13.84	\$12.17
2023	\$12.51	\$11.92
2024	\$12.83	\$10.61
2025	\$26.51	\$14.98
2026	\$22.78	\$17.49
2027	\$23.23	\$18.13
2028	\$25.39	\$22.24
2029	\$18.44	\$23.45
2030	\$22.32	\$20.98
2031	\$23.80	\$21.00
2032	\$42.98	\$39.79
2033	\$38.68	\$41.38
2034	\$35.73	\$35.42
2035	\$38.24	\$34.43
2036	\$24.40	\$25.27
2037	\$16.27	\$21.82
2038	\$23.10	\$20.05
2039	\$20.23	\$18.32
2040	\$26.29	\$25.53
2041	\$24.97	\$23.13
2042	\$26.84	\$22.51
2043	\$24.73	\$22.67
2044	\$18.39	\$24.22
2045	\$39.86	\$31.29
2046	\$45.78	\$30.72
2047	\$37.34	\$26.31
2048	\$37.73	\$21.42
2049	\$28.95	\$19.63
2050	\$35.40	\$16.93
2051	\$48.48	\$39.32
2052	\$91.63	\$53.56
2053	\$43.49	\$23.60

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

2.0 Barker Barambah bulk

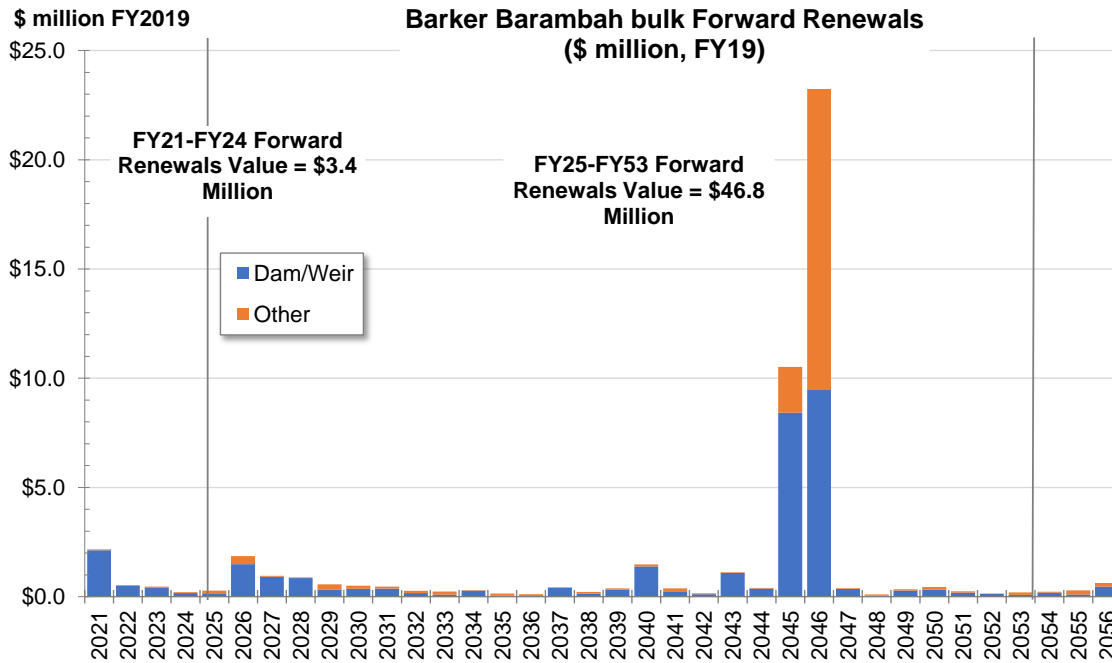


Figure 1

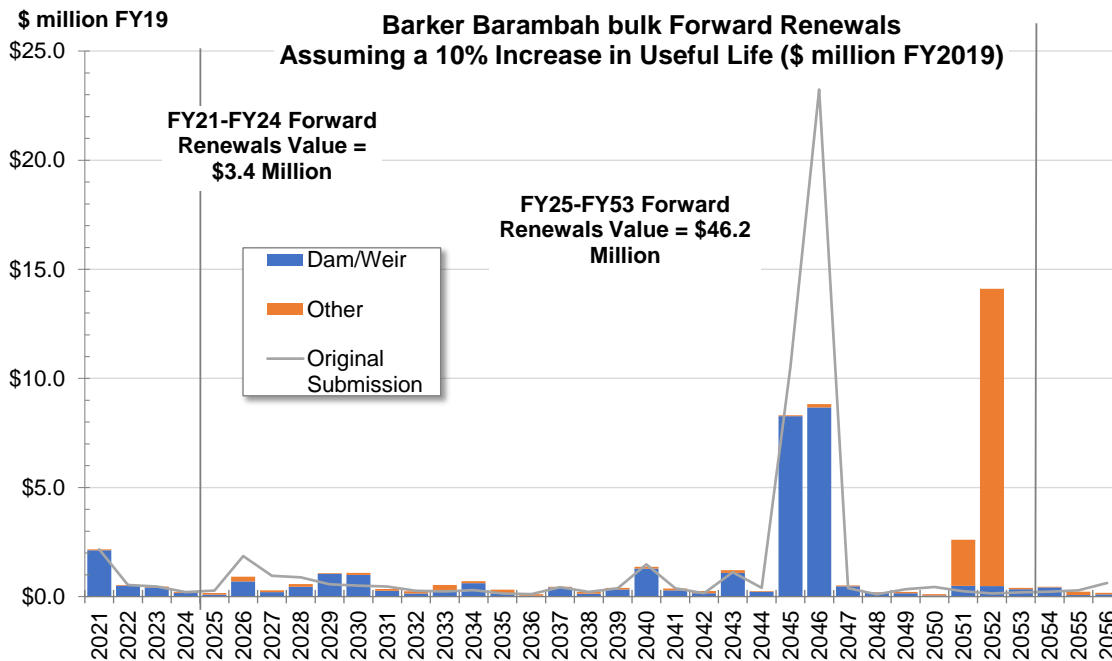


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

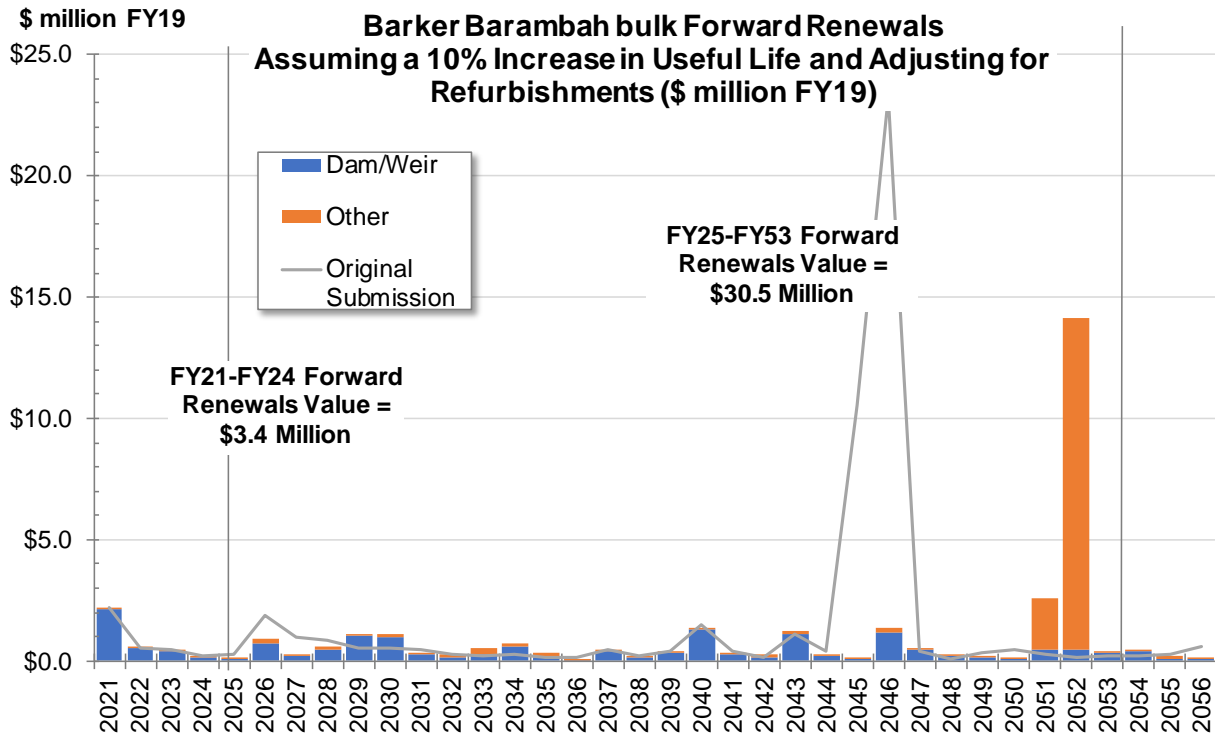


Figure 3

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)		
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension	Additional Refurbishment Adjustment
2021	\$2.17	\$2.17	\$2.17
2022	\$0.53	\$0.53	\$0.53
2023	\$0.46	\$0.46	\$0.46
2024	\$0.20	\$0.20	\$0.20
2025	\$0.28	\$0.17	\$0.17
2026	\$1.86	\$0.91	\$0.91
2027	\$0.96	\$0.28	\$0.28
2028	\$0.88	\$0.58	\$0.58
2029	\$0.56	\$1.07	\$1.07
2030	\$0.51	\$1.08	\$1.08
2031	\$0.47	\$0.36	\$0.36
2032	\$0.27	\$0.25	\$0.25
2033	\$0.24	\$0.54	\$0.54
2034	\$0.30	\$0.71	\$0.71
2035	\$0.14	\$0.32	\$0.32
2036	\$0.12	\$0.11	\$0.11
2037	\$0.44	\$0.45	\$0.45
2038	\$0.22	\$0.22	\$0.22
2039	\$0.38	\$0.40	\$0.40
2040	\$1.48	\$1.37	\$1.37
2041	\$0.39	\$0.37	\$0.37
2042	\$0.16	\$0.26	\$0.26
2043	\$1.12	\$1.21	\$1.21
2044	\$0.40	\$0.26	\$0.26
2045	\$10.52	\$8.31	\$0.10
2046	\$23.24	\$8.82	\$1.34
2047	\$0.39	\$0.51	\$0.51
2048	\$0.11	\$0.21	\$0.21
2049	\$0.34	\$0.22	\$0.22
2050	\$0.45	\$0.12	\$0.12
2051	\$0.25	\$2.61	\$2.61
2052	\$0.15	\$14.11	\$14.11
2053	\$0.20	\$0.40	\$0.40

Figure 1 presents Sunwater's revised forward renewals submission. **Figure 2** presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. **Figure 3** (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. **Table 1** presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

3.0 Bowen Broken Rivers

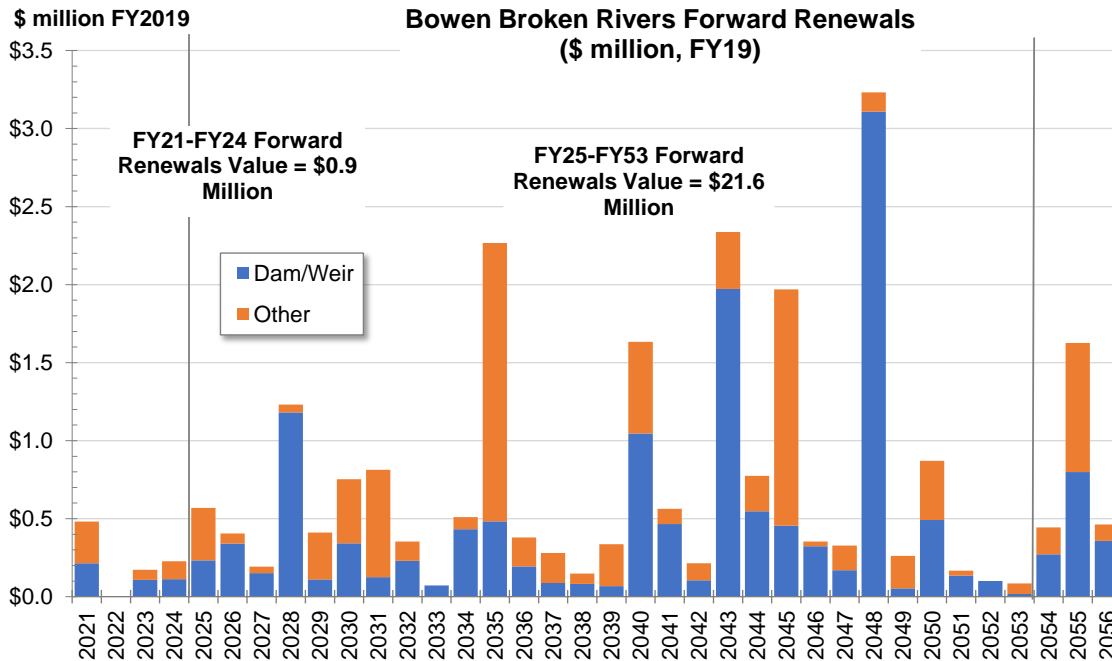


Figure 1

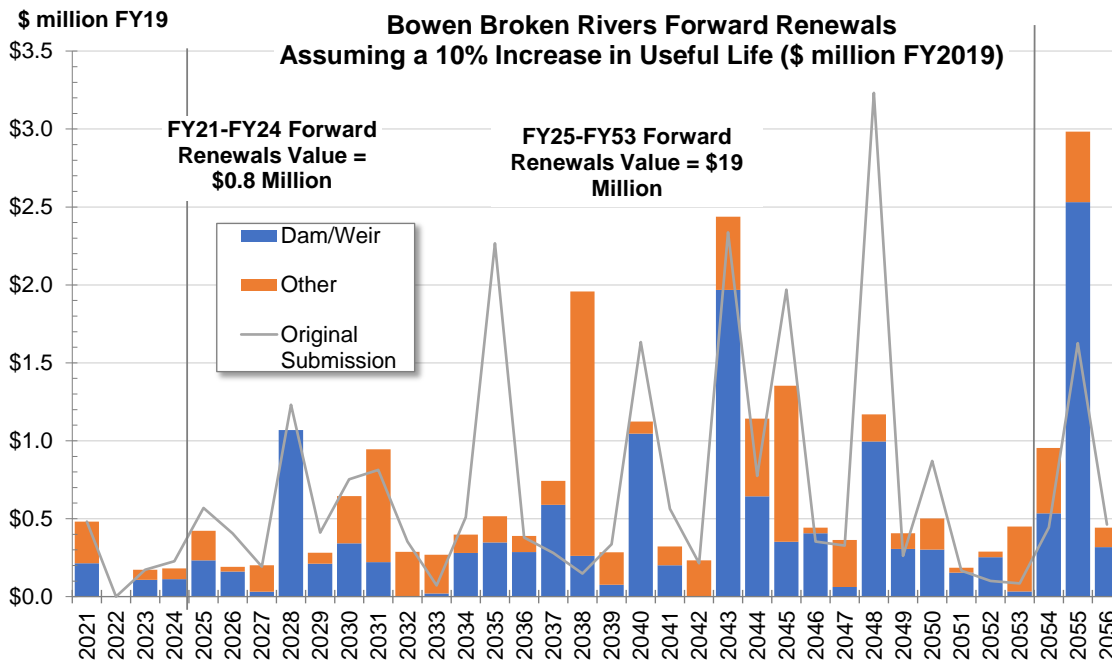


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.48	\$0.48
2022		
2023	\$0.17	\$0.17
2024	\$0.23	\$0.18
2025	\$0.57	\$0.42
2026	\$0.40	\$0.19
2027	\$0.19	\$0.20
2028	\$1.23	\$1.07
2029	\$0.41	\$0.28
2030	\$0.75	\$0.65
2031	\$0.81	\$0.95
2032	\$0.35	\$0.29
2033	\$0.07	\$0.27
2034	\$0.51	\$0.40
2035	\$2.27	\$0.52
2036	\$0.38	\$0.39
2037	\$0.28	\$0.74
2038	\$0.15	\$1.96
2039	\$0.34	\$0.28
2040	\$1.63	\$1.12
2041	\$0.56	\$0.32
2042	\$0.21	\$0.23
2043	\$2.34	\$2.44
2044	\$0.77	\$1.14
2045	\$1.97	\$1.35
2046	\$0.35	\$0.44
2047	\$0.33	\$0.36
2048	\$3.23	\$1.17
2049	\$0.26	\$0.41
2050	\$0.87	\$0.50
2051	\$0.17	\$0.18
2052	\$0.10	\$0.29
2053	\$0.08	\$0.45

Figure 1 presents Sunwater's revised forward renewals submission. **Figure 2** presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. **Figure 3** (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. **Table 1** presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

4.0 Boyne River & Tarong

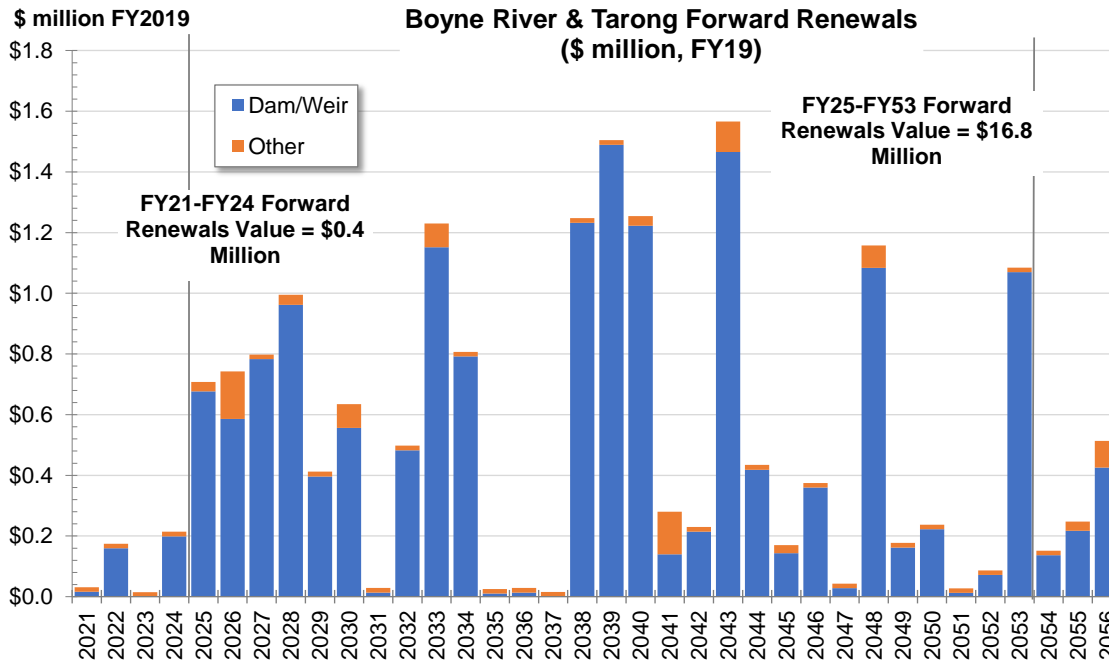


Figure 1

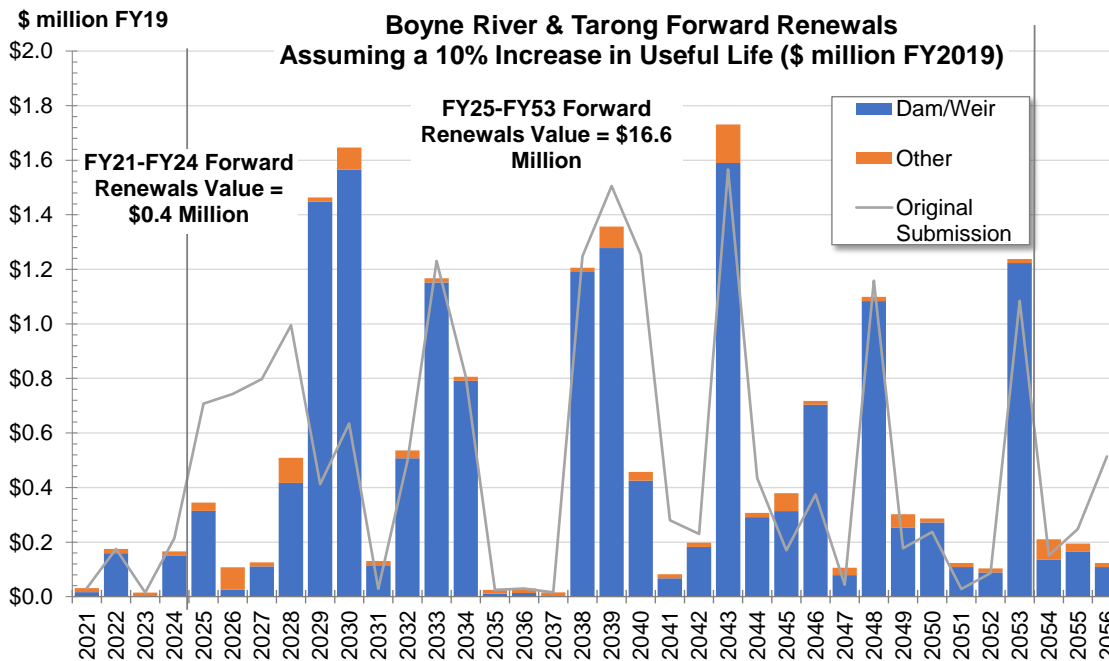


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.03	\$0.03
2022	\$0.17	\$0.17
2023	\$0.02	\$0.02
2024	\$0.21	\$0.17
2025	\$0.71	\$0.34
2026	\$0.74	\$0.11
2027	\$0.80	\$0.13
2028	\$1.00	\$0.51
2029	\$0.41	\$1.46
2030	\$0.63	\$1.65
2031	\$0.03	\$0.13
2032	\$0.50	\$0.54
2033	\$1.23	\$1.17
2034	\$0.81	\$0.81
2035	\$0.03	\$0.03
2036	\$0.03	\$0.03
2037	\$0.02	\$0.02
2038	\$1.25	\$1.21
2039	\$1.51	\$1.36
2040	\$1.25	\$0.46
2041	\$0.28	\$0.08
2042	\$0.23	\$0.20
2043	\$1.57	\$1.73
2044	\$0.43	\$0.31
2045	\$0.17	\$0.38
2046	\$0.37	\$0.72
2047	\$0.04	\$0.11
2048	\$1.16	\$1.10
2049	\$0.18	\$0.30
2050	\$0.24	\$0.29
2051	\$0.03	\$0.12
2052	\$0.09	\$0.10
2053	\$1.08	\$1.24

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

5.0 Bundaberg bulk

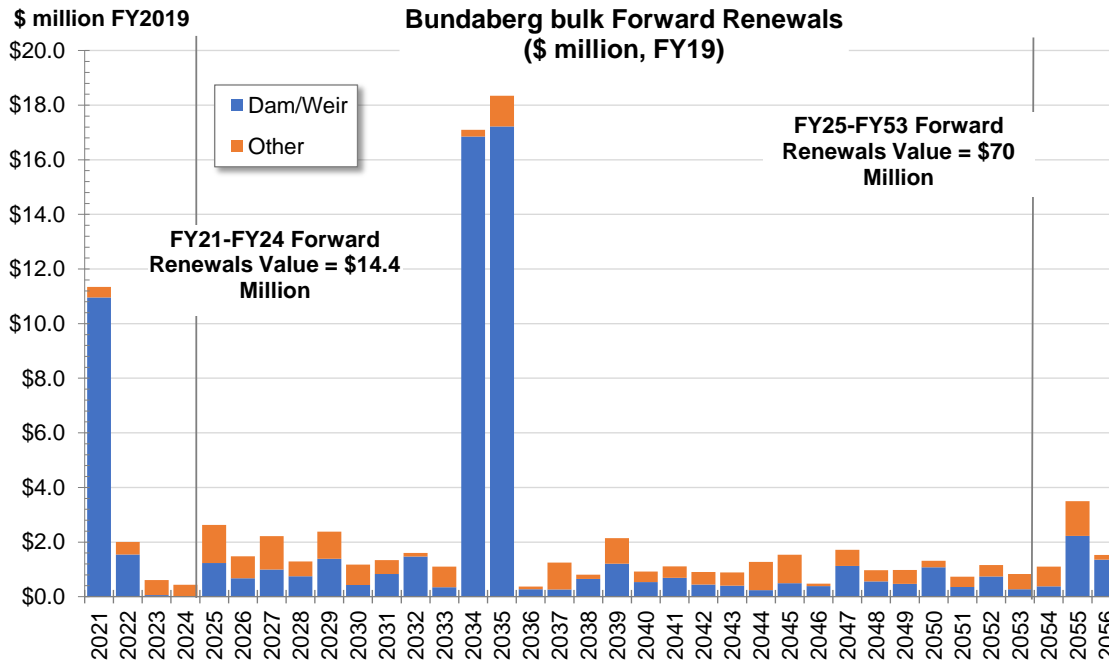


Figure 1

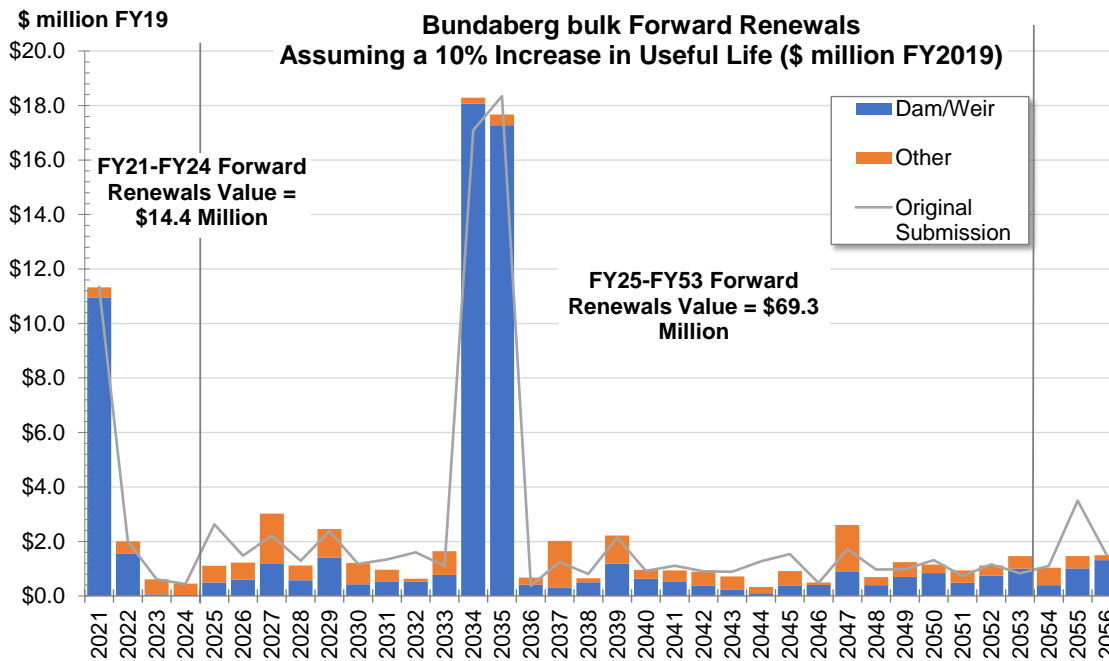


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
 Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
 Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
 Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

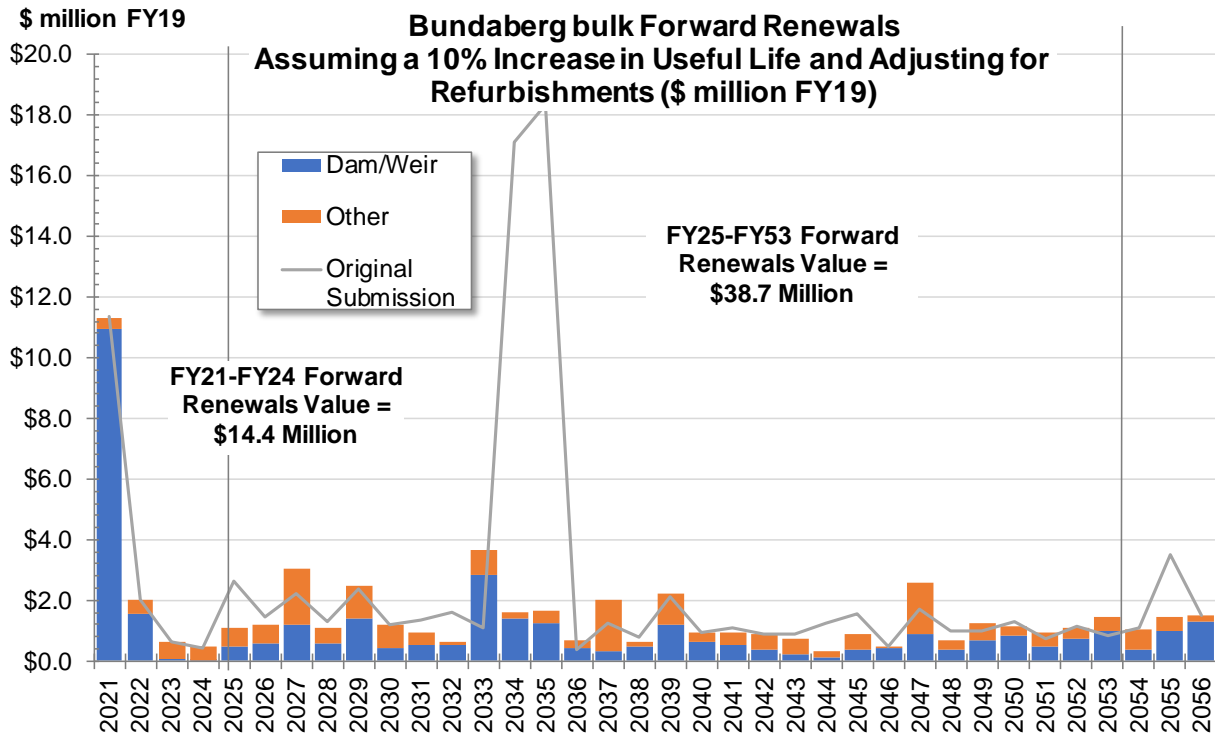


Figure 3

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)		
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension	Additional Refurbishment Adjustment
2021	\$11.34	\$11.32	\$11.32
2022	\$2.01	\$2.01	\$2.01
2023	\$0.61	\$0.61	\$0.61
2024	\$0.44	\$0.45	\$0.45
2025	\$2.63	\$1.11	\$1.11
2026	\$1.48	\$1.22	\$1.22
2027	\$2.22	\$3.02	\$3.02
2028	\$1.29	\$1.12	\$1.12
2029	\$2.38	\$2.46	\$2.46
2030	\$1.18	\$1.21	\$1.21
2031	\$1.34	\$0.96	\$0.96
2032	\$1.60	\$0.63	\$0.63
2033	\$1.10	\$1.64	\$3.68
2034	\$17.10	\$18.29	\$1.63
2035	\$18.35	\$17.67	\$1.65
2036	\$0.37	\$0.67	\$0.67
2037	\$1.25	\$2.02	\$2.02
2038	\$0.80	\$0.65	\$0.65
2039	\$2.14	\$2.21	\$2.21
2040	\$0.92	\$0.96	\$0.96
2041	\$1.11	\$0.94	\$0.94
2042	\$0.90	\$0.89	\$0.89
2043	\$0.89	\$0.72	\$0.72
2044	\$1.27	\$0.33	\$0.33
2045	\$1.54	\$0.91	\$0.91
2046	\$0.48	\$0.49	\$0.49
2047	\$1.72	\$2.61	\$2.61
2048	\$0.97	\$0.69	\$0.69
2049	\$0.98	\$1.24	\$1.24
2050	\$1.32	\$1.15	\$1.15
2051	\$0.73	\$0.94	\$0.94
2052	\$1.16	\$1.12	\$1.12
2053	\$0.83	\$1.47	\$1.47

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

6.0 Burdekin Houghton bulk

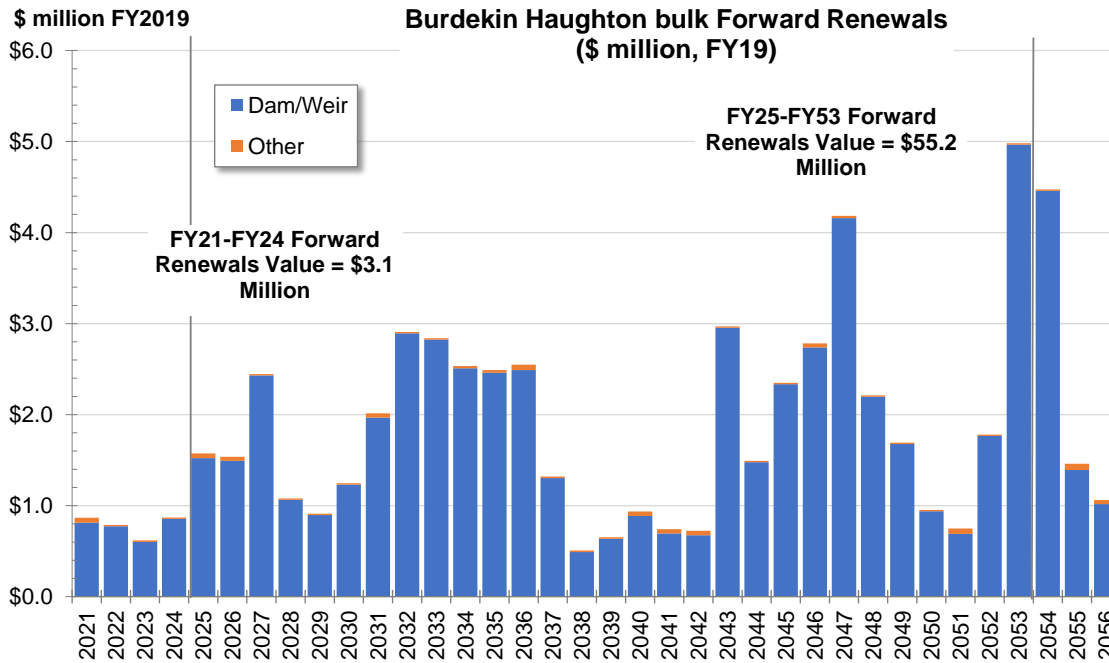


Figure 1

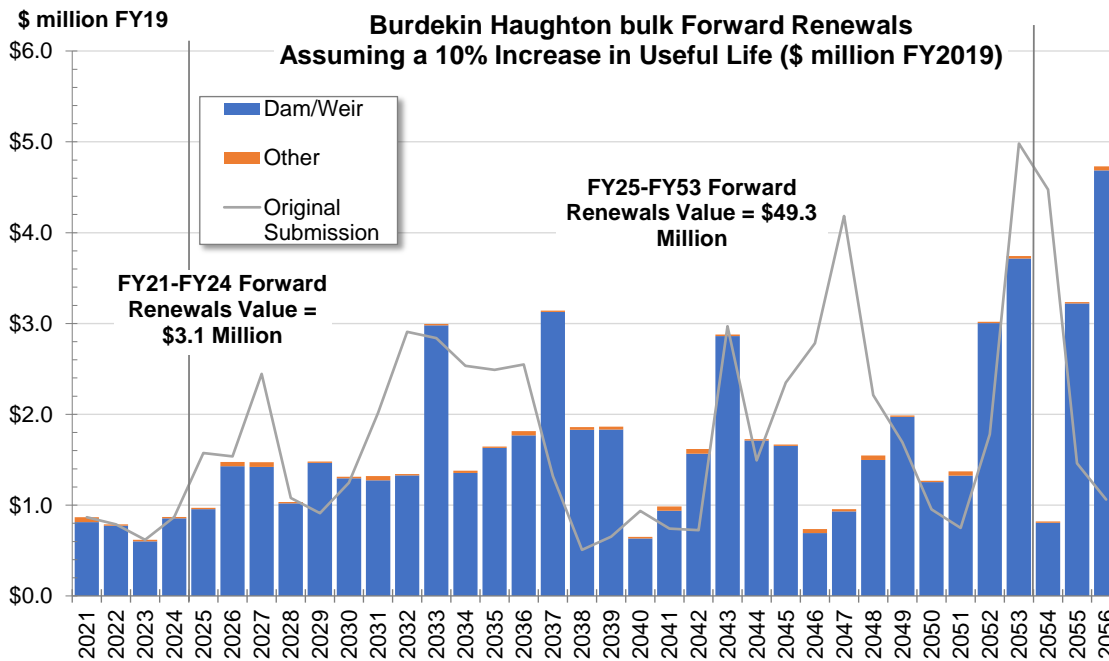


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.87	\$0.87
2022	\$0.79	\$0.79
2023	\$0.62	\$0.62
2024	\$0.87	\$0.87
2025	\$1.57	\$0.97
2026	\$1.54	\$1.48
2027	\$2.45	\$1.47
2028	\$1.08	\$1.04
2029	\$0.91	\$1.48
2030	\$1.25	\$1.31
2031	\$2.01	\$1.32
2032	\$2.91	\$1.34
2033	\$2.84	\$3.00
2034	\$2.53	\$1.38
2035	\$2.49	\$1.65
2036	\$2.55	\$1.81
2037	\$1.32	\$3.14
2038	\$0.51	\$1.86
2039	\$0.65	\$1.86
2040	\$0.94	\$0.65
2041	\$0.74	\$0.99
2042	\$0.73	\$1.62
2043	\$2.97	\$2.88
2044	\$1.49	\$1.73
2045	\$2.35	\$1.67
2046	\$2.78	\$0.74
2047	\$4.18	\$0.96
2048	\$2.21	\$1.55
2049	\$1.69	\$1.99
2050	\$0.95	\$1.27
2051	\$0.75	\$1.37
2052	\$1.78	\$3.02
2053	\$4.98	\$3.74

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

7.0 Callide Valley

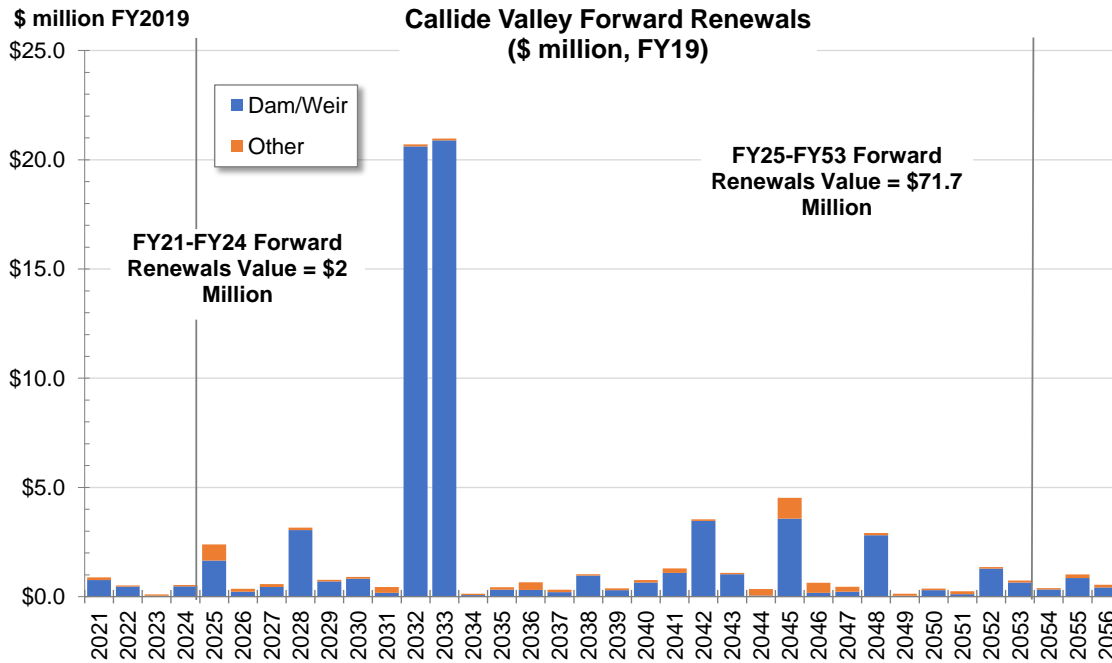


Figure 1

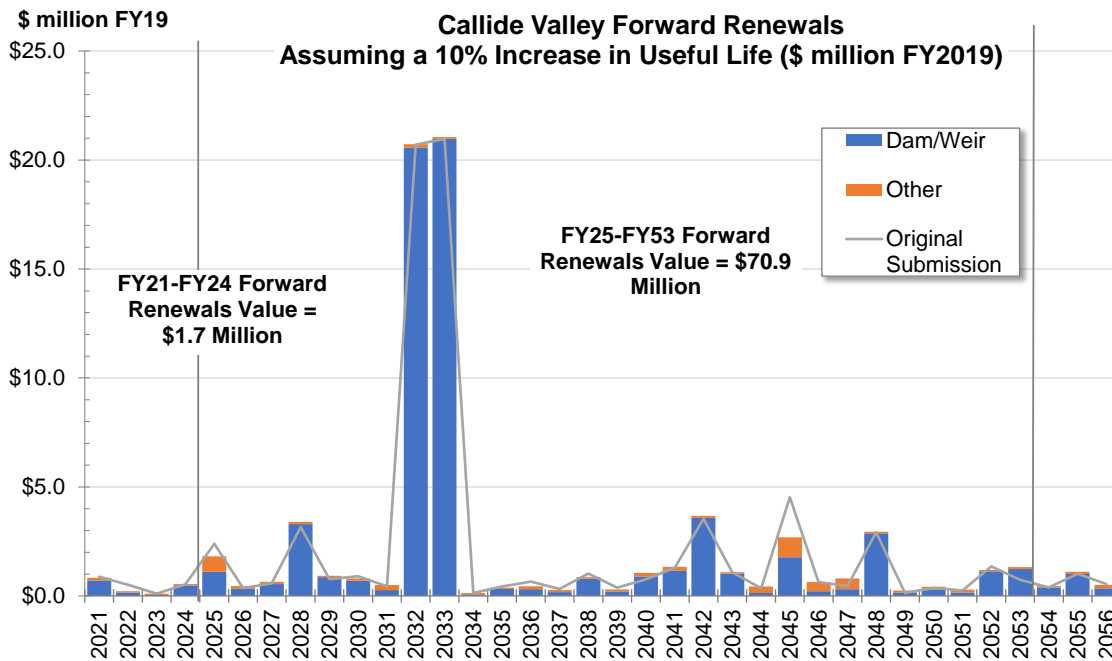


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

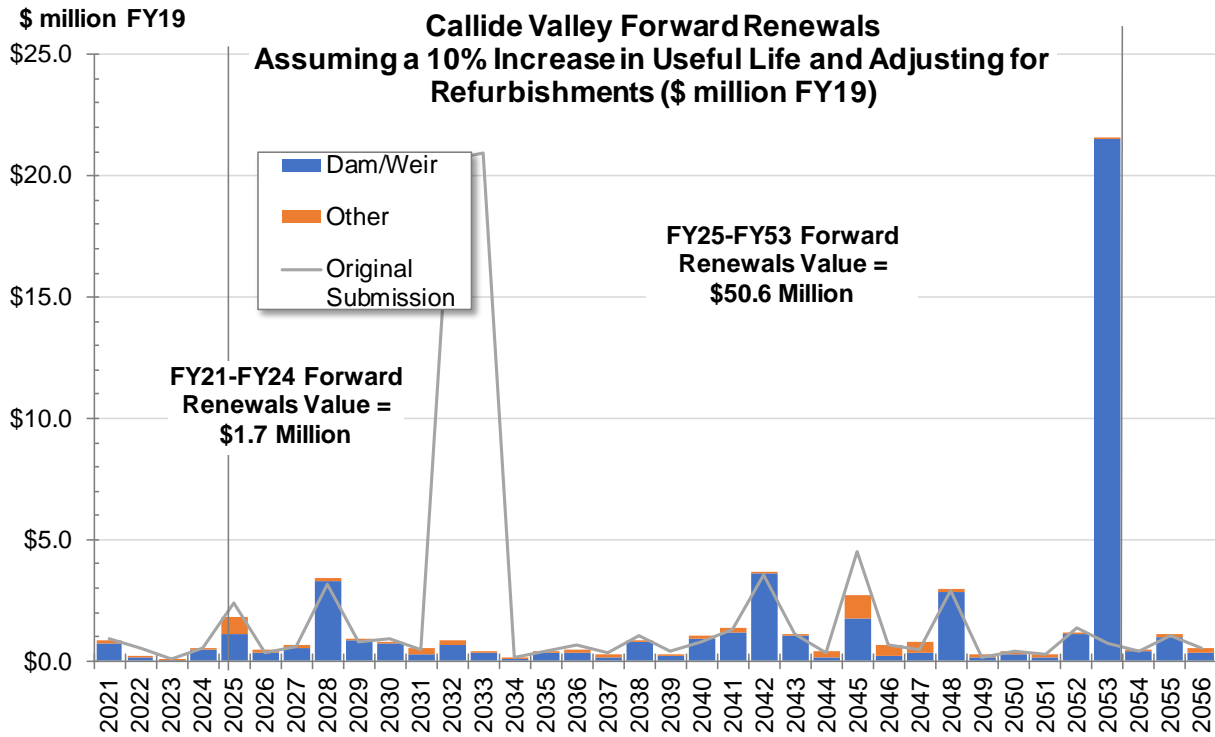


Figure 3

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)		
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension	Additional Refurbishment Adjustment
2021	\$0.89	\$0.84	\$0.84
2022	\$0.52	\$0.22	\$0.22
2023	\$0.10	\$0.10	\$0.10
2024	\$0.54	\$0.55	\$0.55
2025	\$2.39	\$1.82	\$1.82
2026	\$0.36	\$0.46	\$0.46
2027	\$0.58	\$0.65	\$0.65
2028	\$3.16	\$3.39	\$3.39
2029	\$0.77	\$0.93	\$0.93
2030	\$0.91	\$0.80	\$0.80
2031	\$0.44	\$0.50	\$0.50
2032	\$20.70	\$20.73	\$0.82
2033	\$20.97	\$21.06	\$0.42
2034	\$0.13	\$0.14	\$0.14
2035	\$0.43	\$0.38	\$0.38
2036	\$0.66	\$0.45	\$0.45
2037	\$0.32	\$0.27	\$0.27
2038	\$1.03	\$0.86	\$0.86
2039	\$0.39	\$0.30	\$0.30
2040	\$0.76	\$1.05	\$1.05
2041	\$1.29	\$1.33	\$1.33
2042	\$3.54	\$3.68	\$3.68
2043	\$1.09	\$1.09	\$1.09
2044	\$0.35	\$0.43	\$0.43
2045	\$4.53	\$2.69	\$2.69
2046	\$0.64	\$0.64	\$0.64
2047	\$0.46	\$0.81	\$0.81
2048	\$2.92	\$2.94	\$2.94
2049	\$0.13	\$0.25	\$0.25
2050	\$0.37	\$0.42	\$0.42
2051	\$0.25	\$0.29	\$0.29
2052	\$1.35	\$1.19	\$1.19
2053	\$0.74	\$1.33	\$21.60

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

8.0 Chinchilla Weir

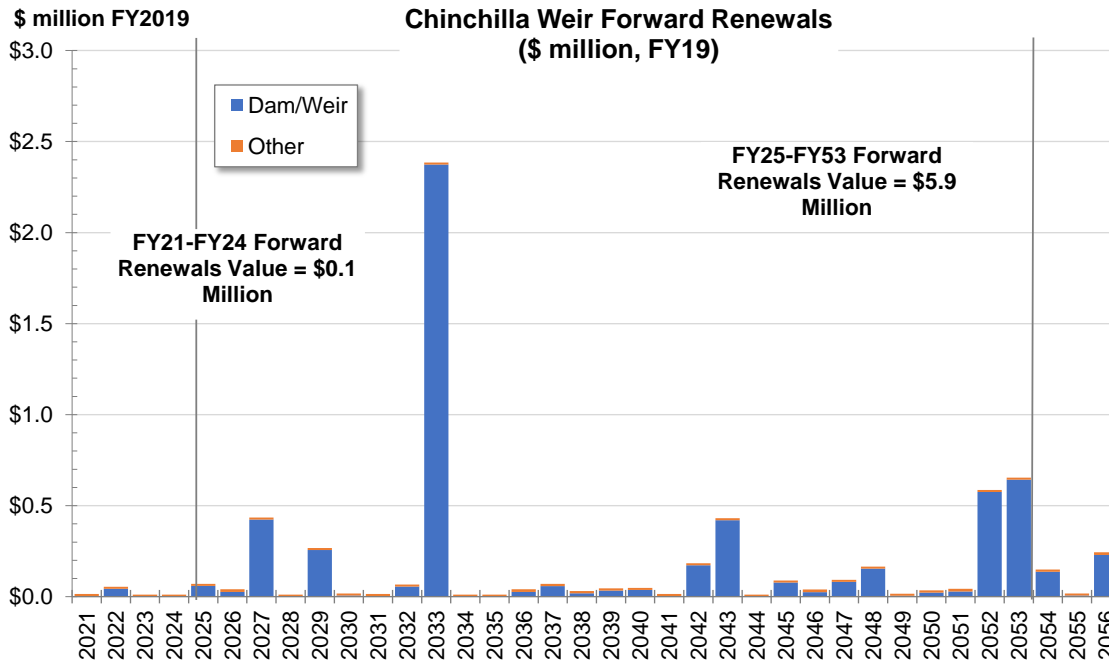


Figure 1

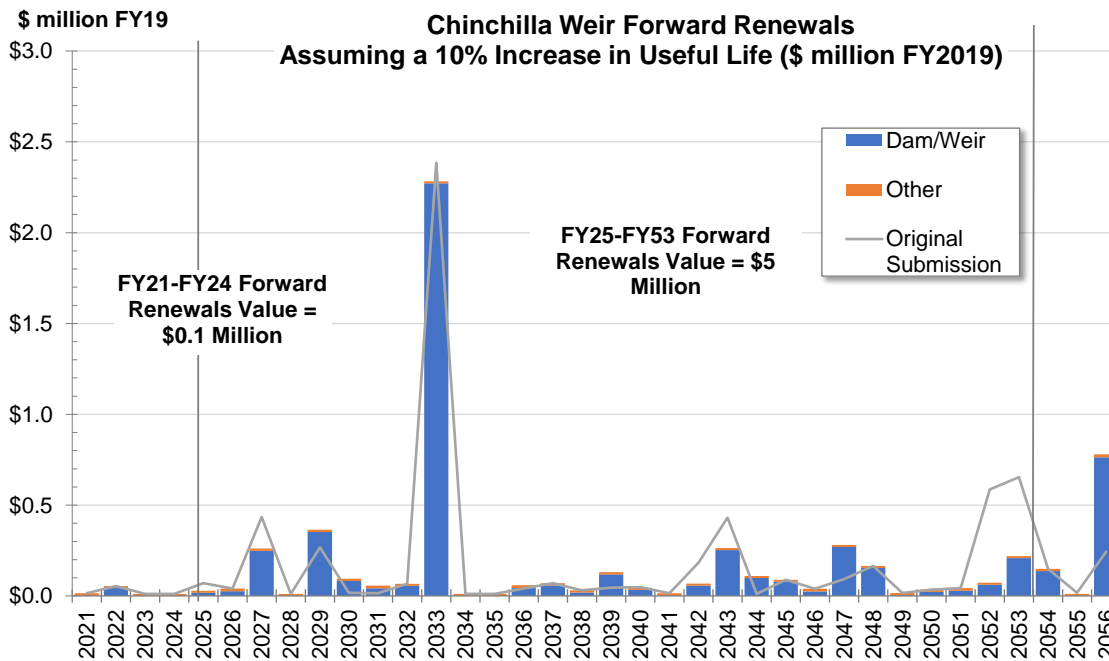


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.01	\$0.01
2022	\$0.05	\$0.05
2023	\$0.01	\$0.01
2024	\$0.01	\$0.01
2025	\$0.07	\$0.03
2026	\$0.04	\$0.04
2027	\$0.43	\$0.26
2028	\$0.01	\$0.01
2029	\$0.27	\$0.36
2030	\$0.02	\$0.09
2031	\$0.02	\$0.06
2032	\$0.07	\$0.07
2033	\$2.38	\$2.28
2034	\$0.01	\$0.01
2035	\$0.01	\$0.01
2036	\$0.04	\$0.06
2037	\$0.07	\$0.07
2038	\$0.03	\$0.03
2039	\$0.05	\$0.13
2040	\$0.05	\$0.04
2041	\$0.02	\$0.02
2042	\$0.18	\$0.07
2043	\$0.43	\$0.26
2044	\$0.01	\$0.11
2045	\$0.09	\$0.09
2046	\$0.04	\$0.04
2047	\$0.09	\$0.28
2048	\$0.17	\$0.17
2049	\$0.02	\$0.02
2050	\$0.03	\$0.03
2051	\$0.04	\$0.04
2052	\$0.59	\$0.07
2053	\$0.65	\$0.22

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

9.0 Cunnamulla

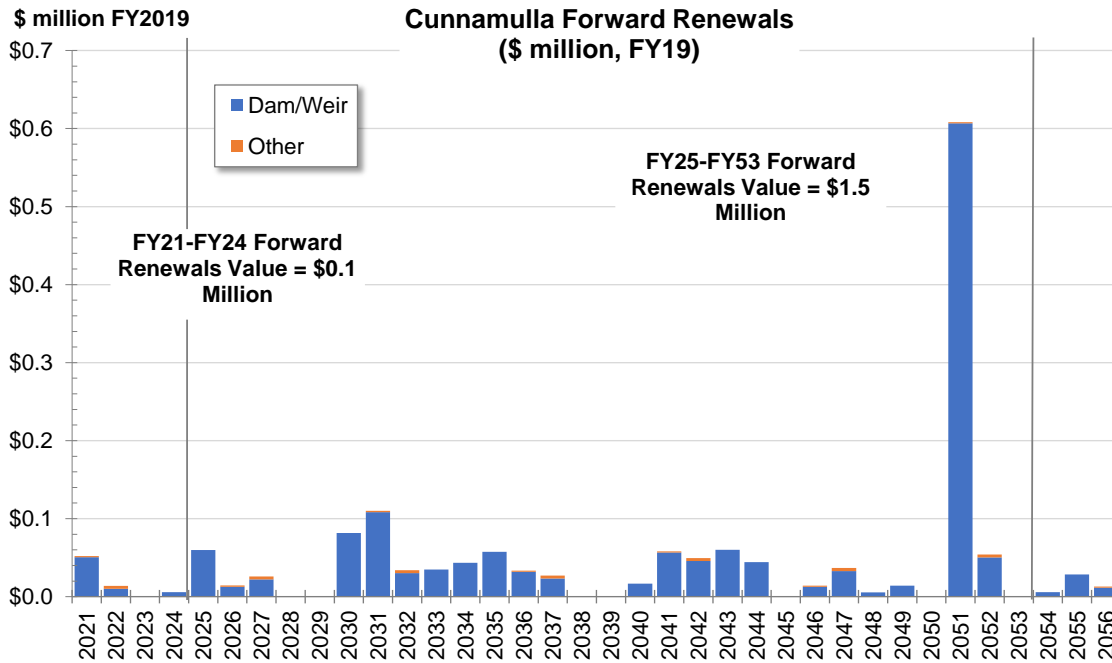


Figure 1

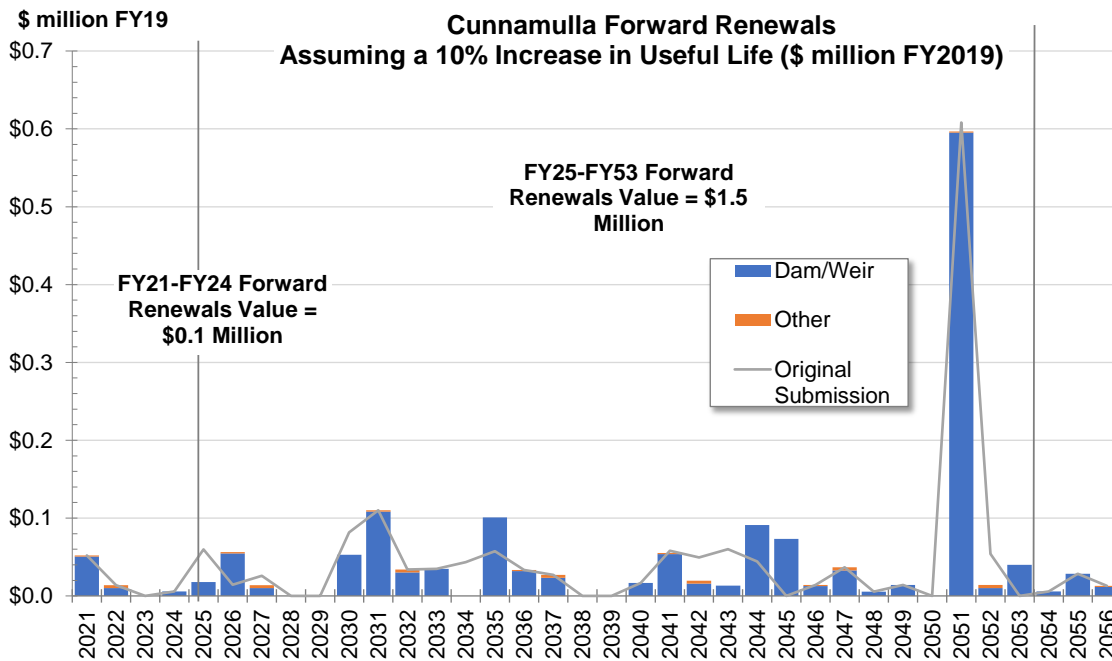


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.05	\$0.05
2022	\$0.01	\$0.01
2023		
2024	\$0.01	\$0.01
2025	\$0.06	\$0.02
2026	\$0.01	\$0.06
2027	\$0.03	\$0.01
2028		
2029		
2030	\$0.08	\$0.05
2031	\$0.11	\$0.11
2032	\$0.03	\$0.03
2033	\$0.03	\$0.03
2034	\$0.04	
2035	\$0.06	\$0.10
2036	\$0.03	\$0.03
2037	\$0.03	\$0.03
2038		
2039		
2040	\$0.02	\$0.02
2041	\$0.06	\$0.06
2042	\$0.05	\$0.02
2043	\$0.06	\$0.01
2044	\$0.04	\$0.09
2045		\$0.07
2046	\$0.01	\$0.01
2047	\$0.04	\$0.04
2048	\$0.01	\$0.01
2049	\$0.01	\$0.01
2050		
2051	\$0.61	\$0.60
2052	\$0.05	\$0.01
2053		\$0.04

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

10.0 Dawson Valley bulk

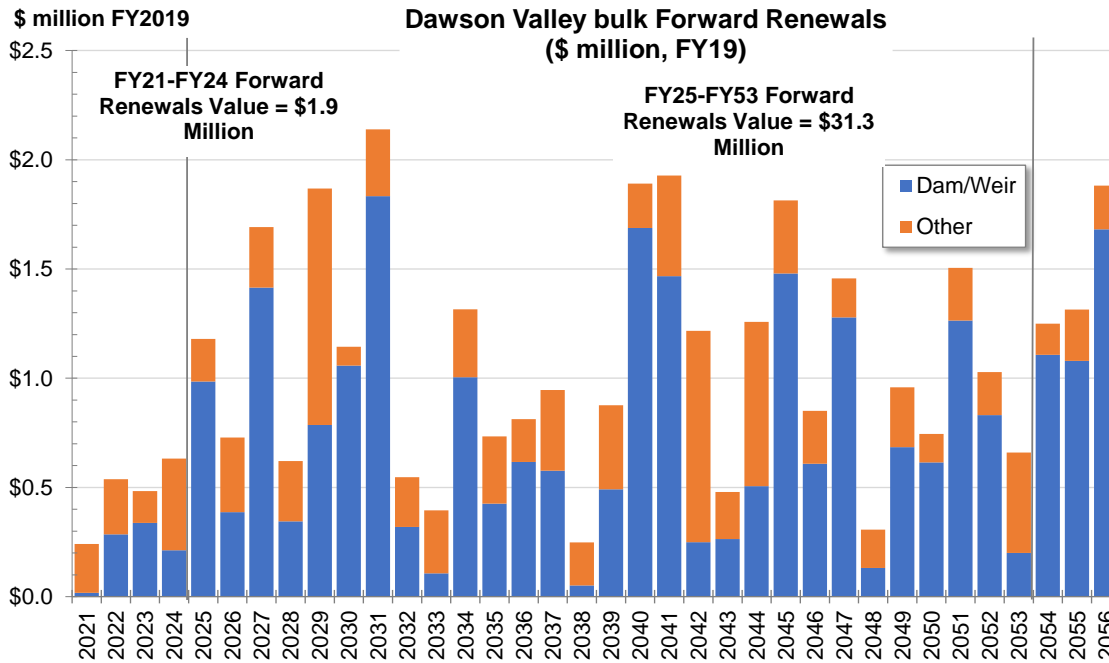


Figure 1

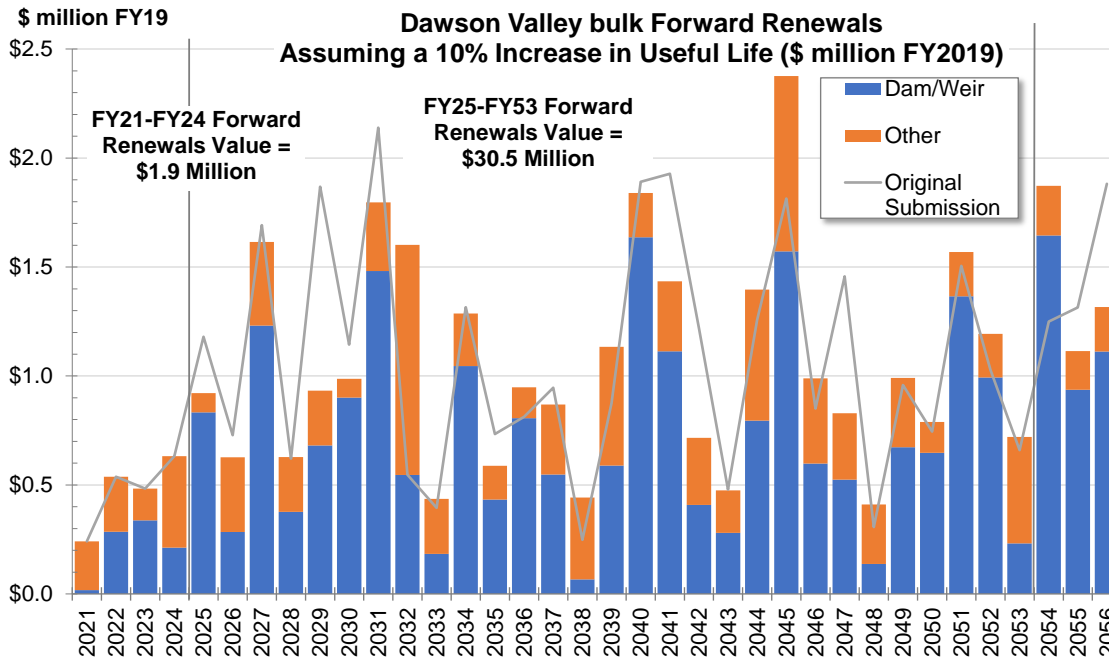


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.24	\$0.24
2022	\$0.54	\$0.54
2023	\$0.48	\$0.48
2024	\$0.63	\$0.63
2025	\$1.18	\$0.92
2026	\$0.73	\$0.63
2027	\$1.69	\$1.62
2028	\$0.62	\$0.63
2029	\$1.87	\$0.93
2030	\$1.14	\$0.99
2031	\$2.14	\$1.80
2032	\$0.55	\$1.60
2033	\$0.40	\$0.44
2034	\$1.32	\$1.29
2035	\$0.73	\$0.59
2036	\$0.81	\$0.95
2037	\$0.95	\$0.87
2038	\$0.25	\$0.44
2039	\$0.88	\$1.13
2040	\$1.89	\$1.84
2041	\$1.93	\$1.43
2042	\$1.22	\$0.72
2043	\$0.48	\$0.48
2044	\$1.26	\$1.40
2045	\$1.81	\$2.38
2046	\$0.85	\$0.99
2047	\$1.46	\$0.83
2048	\$0.31	\$0.41
2049	\$0.96	\$0.99
2050	\$0.74	\$0.79
2051	\$1.51	\$1.57
2052	\$1.03	\$1.19
2053	\$0.66	\$0.72

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

11.0 Eton bulk

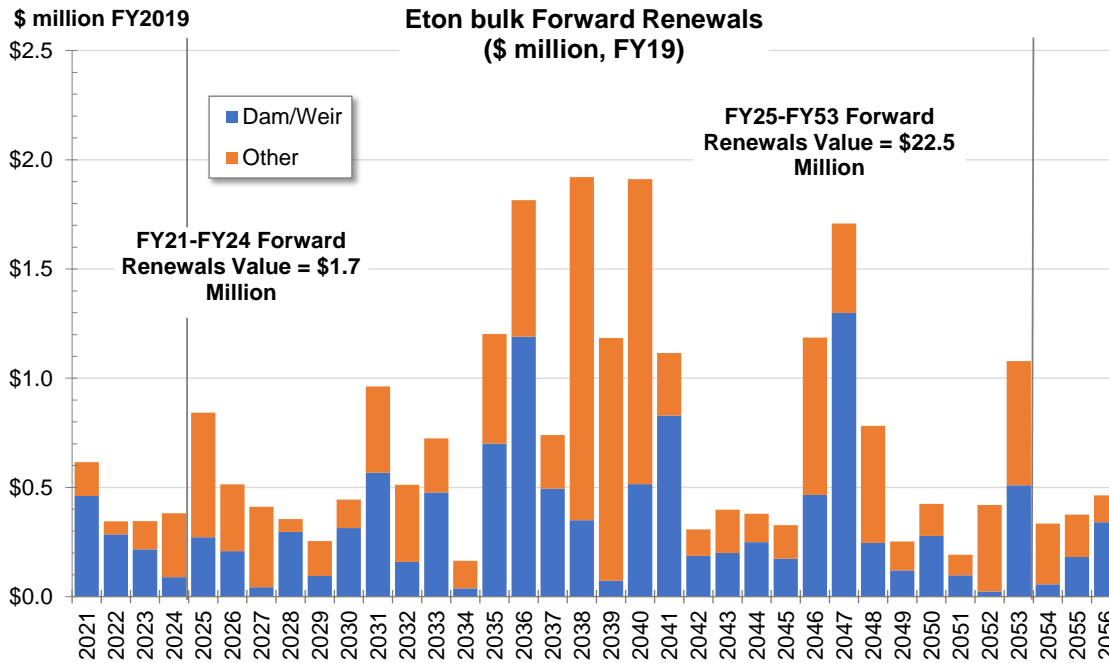


Figure 1

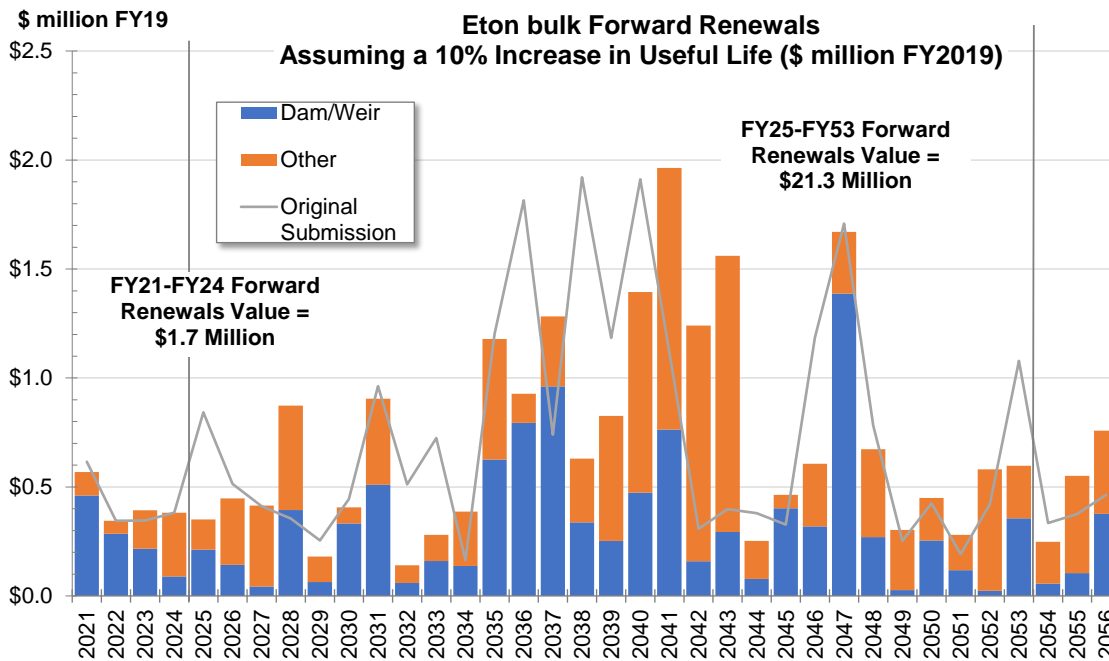


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.62	\$0.57
2022	\$0.34	\$0.34
2023	\$0.35	\$0.39
2024	\$0.38	\$0.38
2025	\$0.84	\$0.35
2026	\$0.51	\$0.45
2027	\$0.41	\$0.41
2028	\$0.35	\$0.87
2029	\$0.25	\$0.18
2030	\$0.44	\$0.41
2031	\$0.96	\$0.90
2032	\$0.51	\$0.14
2033	\$0.72	\$0.28
2034	\$0.16	\$0.39
2035	\$1.20	\$1.18
2036	\$1.82	\$0.93
2037	\$0.74	\$1.28
2038	\$1.92	\$0.63
2039	\$1.18	\$0.83
2040	\$1.91	\$1.39
2041	\$1.12	\$1.96
2042	\$0.31	\$1.24
2043	\$0.40	\$1.56
2044	\$0.38	\$0.25
2045	\$0.33	\$0.46
2046	\$1.19	\$0.61
2047	\$1.71	\$1.67
2048	\$0.78	\$0.67
2049	\$0.25	\$0.30
2050	\$0.43	\$0.45
2051	\$0.19	\$0.28
2052	\$0.42	\$0.58
2053	\$1.08	\$0.60

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

12.0 Lower Fitzroy

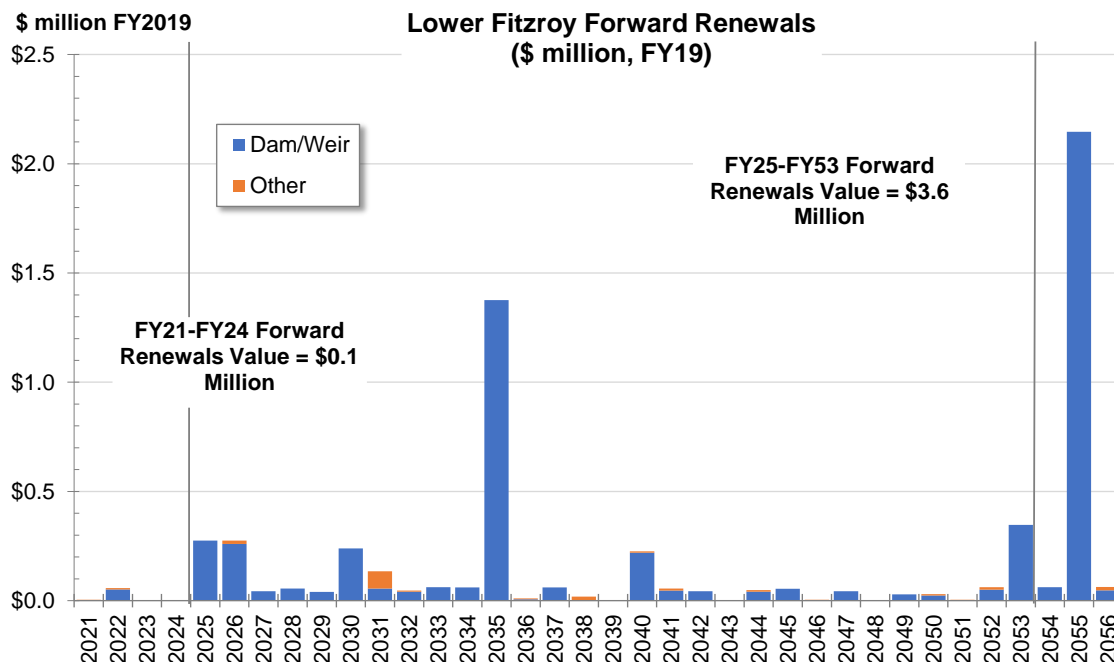


Figure 1

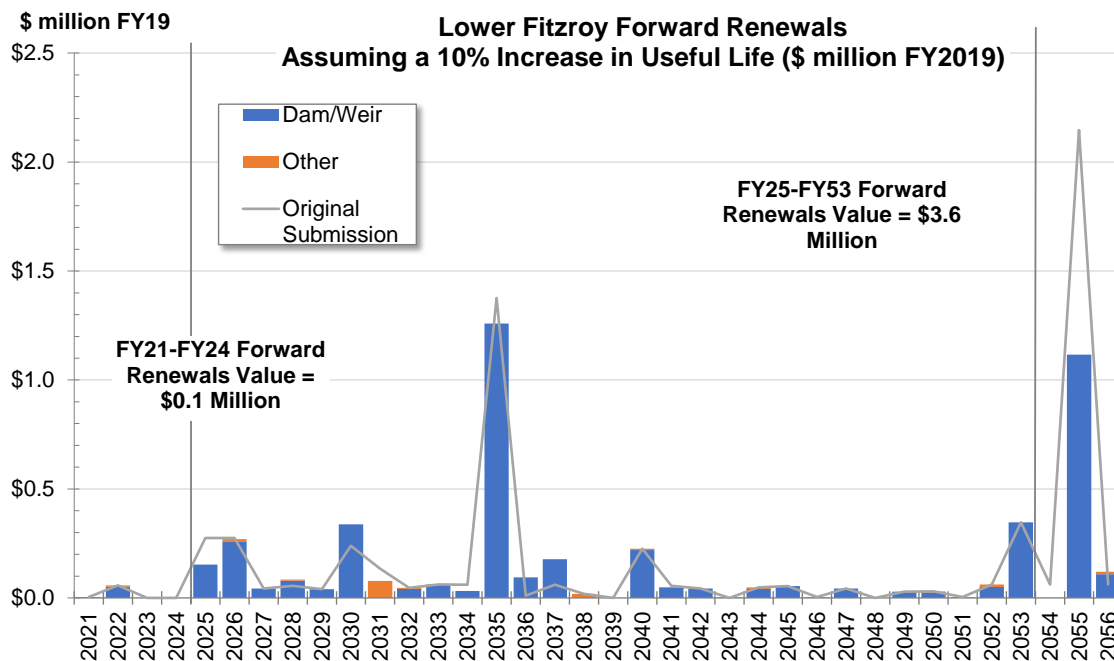


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.00	\$0.00
2022	\$0.06	\$0.06
2023		
2024		
2025	\$0.28	\$0.15
2026	\$0.28	\$0.27
2027	\$0.04	\$0.04
2028	\$0.06	\$0.08
2029	\$0.04	\$0.04
2030	\$0.24	\$0.34
2031	\$0.13	\$0.08
2032	\$0.05	\$0.05
2033	\$0.06	\$0.06
2034	\$0.06	\$0.03
2035	\$1.38	\$1.26
2036	\$0.01	\$0.10
2037	\$0.06	\$0.18
2038	\$0.02	\$0.02
2039		
2040	\$0.23	\$0.23
2041	\$0.06	\$0.05
2042	\$0.04	\$0.04
2043		\$0.00
2044	\$0.05	\$0.05
2045	\$0.05	\$0.05
2046	\$0.00	\$0.00
2047	\$0.04	\$0.04
2048		
2049	\$0.03	\$0.03
2050	\$0.03	\$0.03
2051	\$0.00	\$0.00
2052	\$0.06	\$0.06
2053	\$0.35	\$0.35

Figure 1 presents Sunwater's revised forward renewals submission. **Figure 2** presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. **Figure 3** (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. **Table 1** presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

13.0 Lower Mary River bulk

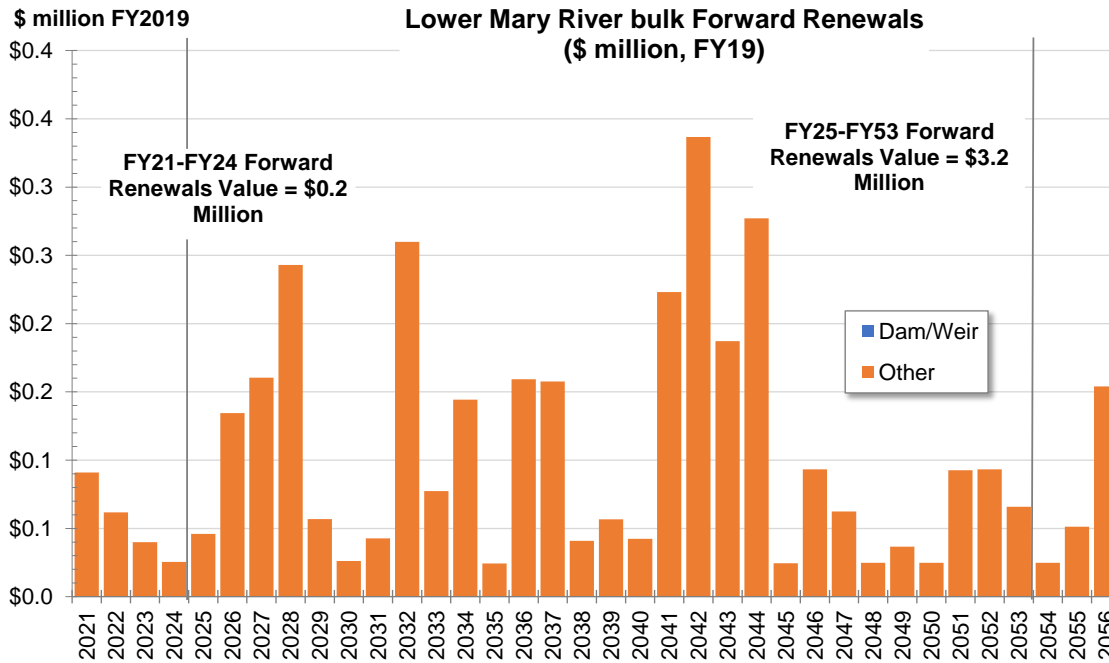


Figure 1

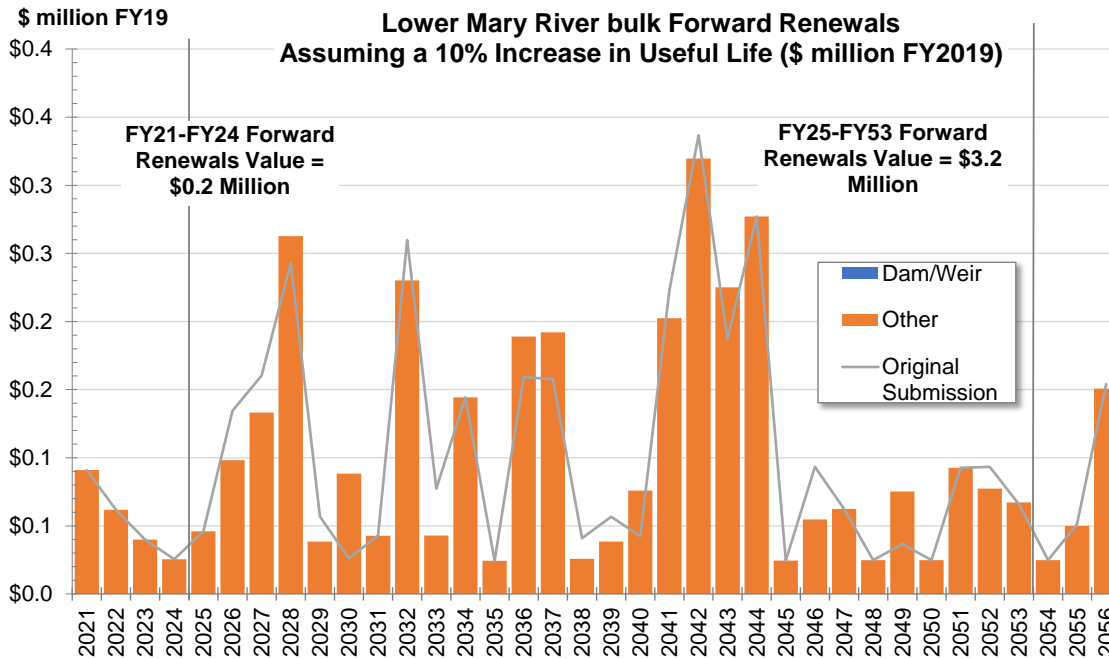


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.09	\$0.09
2022	\$0.06	\$0.06
2023	\$0.04	\$0.04
2024	\$0.03	\$0.03
2025	\$0.05	\$0.05
2026	\$0.13	\$0.10
2027	\$0.16	\$0.13
2028	\$0.24	\$0.26
2029	\$0.06	\$0.04
2030	\$0.03	\$0.09
2031	\$0.04	\$0.04
2032	\$0.26	\$0.23
2033	\$0.08	\$0.04
2034	\$0.14	\$0.14
2035	\$0.02	\$0.02
2036	\$0.16	\$0.19
2037	\$0.16	\$0.19
2038	\$0.04	\$0.03
2039	\$0.06	\$0.04
2040	\$0.04	\$0.08
2041	\$0.22	\$0.20
2042	\$0.34	\$0.32
2043	\$0.19	\$0.22
2044	\$0.28	\$0.28
2045	\$0.02	\$0.02
2046	\$0.09	\$0.05
2047	\$0.06	\$0.06
2048	\$0.02	\$0.02
2049	\$0.04	\$0.08
2050	\$0.02	\$0.02
2051	\$0.09	\$0.09
2052	\$0.09	\$0.08
2053	\$0.07	\$0.07

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

14.0 Macintyre Brook

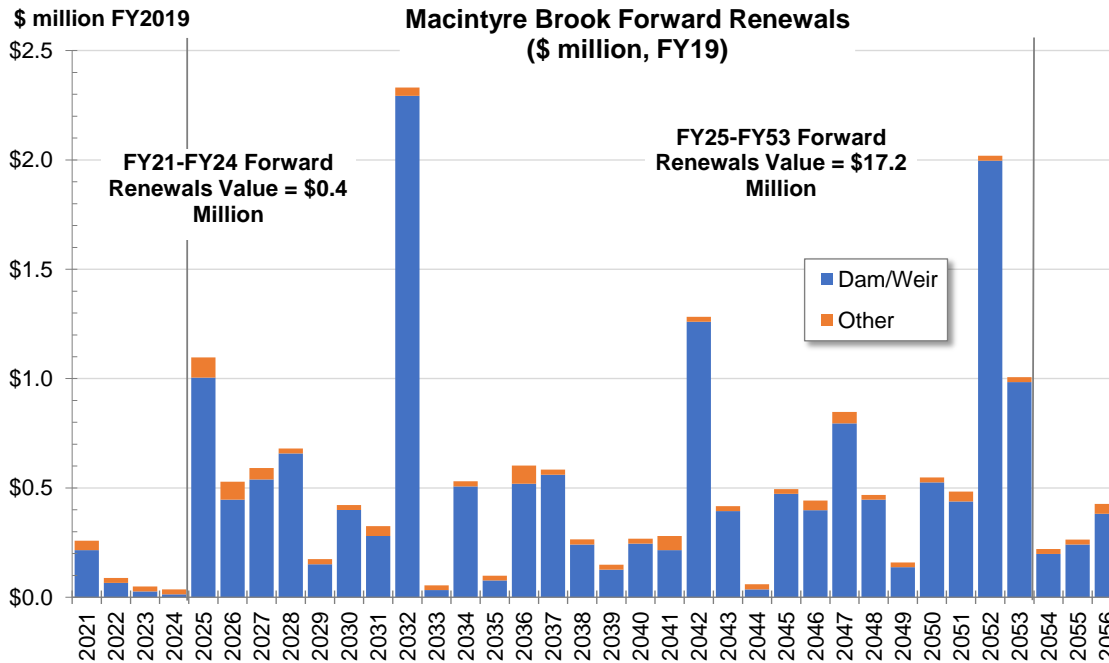


Figure 1

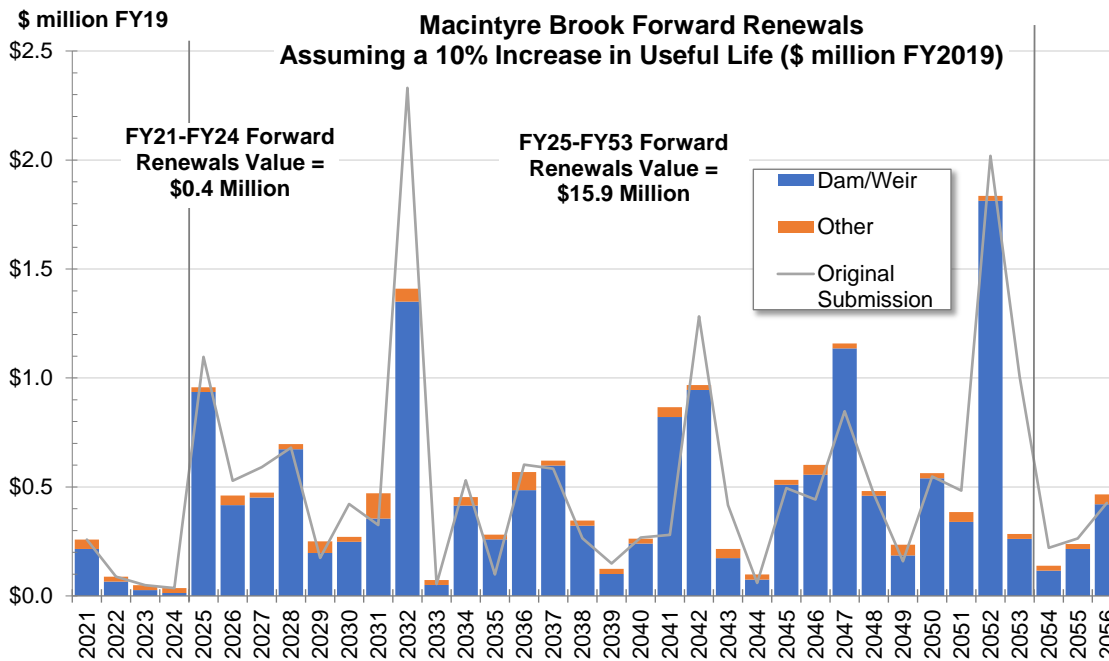


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.26	\$0.26
2022	\$0.09	\$0.09
2023	\$0.05	\$0.05
2024	\$0.04	\$0.04
2025	\$1.10	\$0.96
2026	\$0.53	\$0.46
2027	\$0.59	\$0.47
2028	\$0.68	\$0.70
2029	\$0.17	\$0.25
2030	\$0.42	\$0.27
2031	\$0.33	\$0.47
2032	\$2.33	\$1.41
2033	\$0.05	\$0.07
2034	\$0.53	\$0.45
2035	\$0.10	\$0.28
2036	\$0.60	\$0.57
2037	\$0.58	\$0.62
2038	\$0.26	\$0.35
2039	\$0.15	\$0.12
2040	\$0.27	\$0.26
2041	\$0.28	\$0.87
2042	\$1.28	\$0.97
2043	\$0.42	\$0.22
2044	\$0.06	\$0.10
2045	\$0.49	\$0.53
2046	\$0.44	\$0.60
2047	\$0.85	\$1.16
2048	\$0.47	\$0.48
2049	\$0.16	\$0.24
2050	\$0.55	\$0.56
2051	\$0.48	\$0.38
2052	\$2.02	\$1.84
2053	\$1.01	\$0.28

Figure 1 presents Sunwater's revised forward renewals submission. **Figure 2** presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. **Figure 3** (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. **Table 1** presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

15.0 Maranoa River

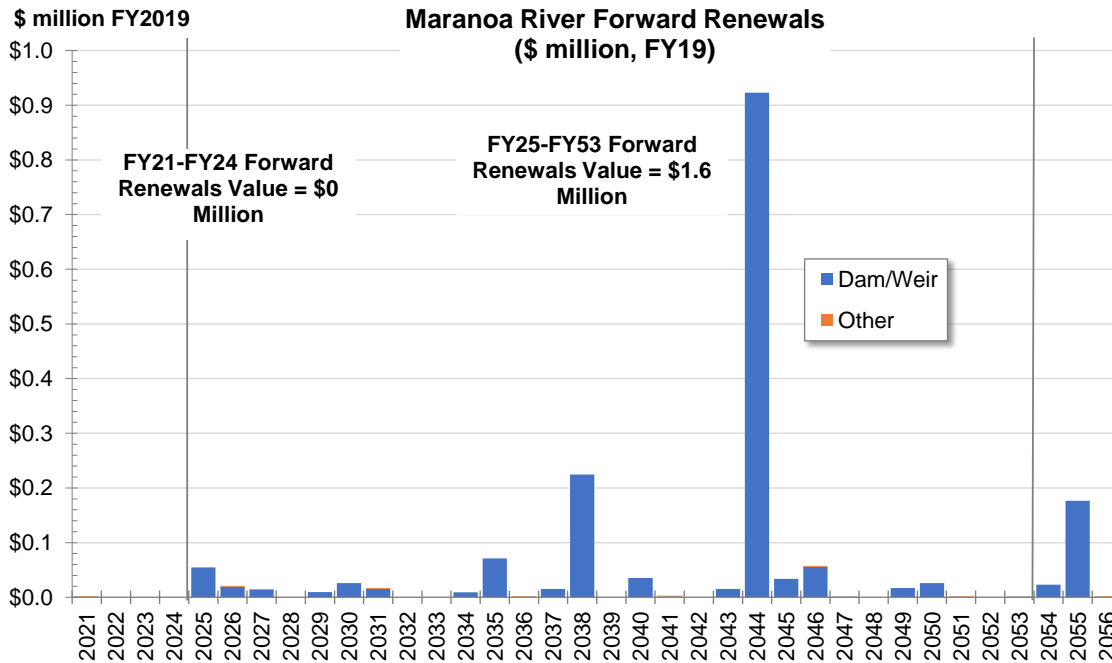


Figure 1

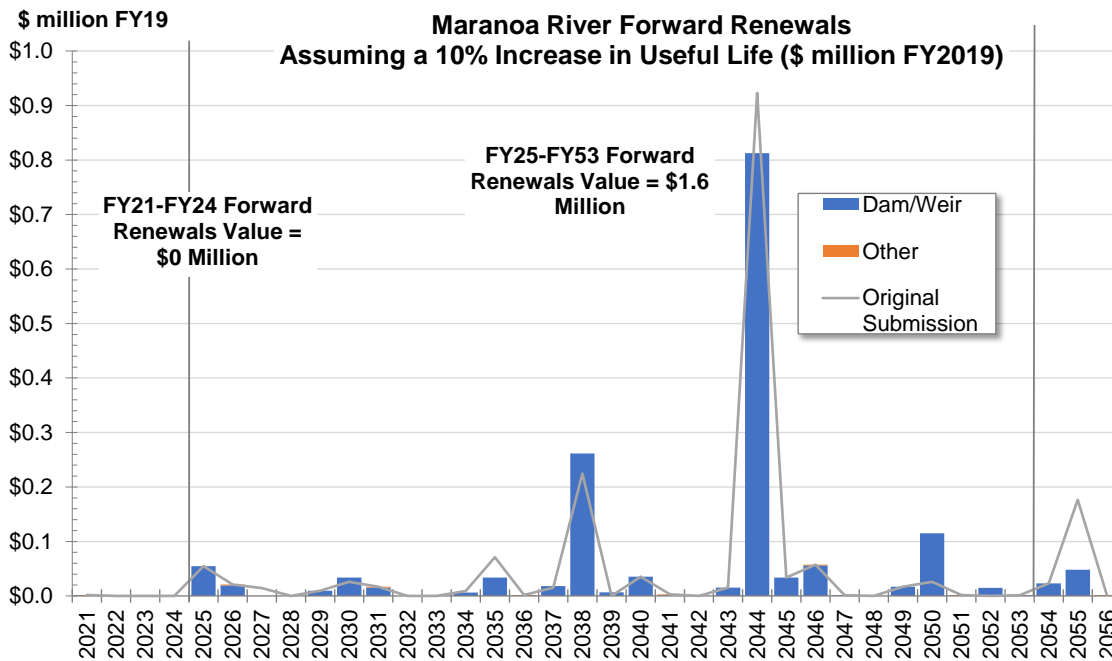


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.00	\$0.00
2022		
2023		
2024		
2025	\$0.05	\$0.05
2026	\$0.02	\$0.02
2027	\$0.01	
2028		
2029	\$0.01	\$0.01
2030	\$0.03	\$0.03
2031	\$0.02	\$0.02
2032		
2033		
2034	\$0.01	\$0.01
2035	\$0.07	\$0.03
2036	\$0.00	\$0.00
2037	\$0.02	\$0.02
2038	\$0.22	\$0.26
2039		\$0.01
2040	\$0.04	\$0.04
2041	\$0.00	\$0.00
2042		
2043	\$0.02	\$0.02
2044	\$0.92	\$0.81
2045	\$0.03	\$0.03
2046	\$0.06	\$0.06
2047	\$0.00	\$0.00
2048		
2049	\$0.02	\$0.02
2050	\$0.03	\$0.12
2051	\$0.00	\$0.00
2052		\$0.01
2053	\$0.00	\$0.00

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

16.0 Mareeba-Dimbulah bulk

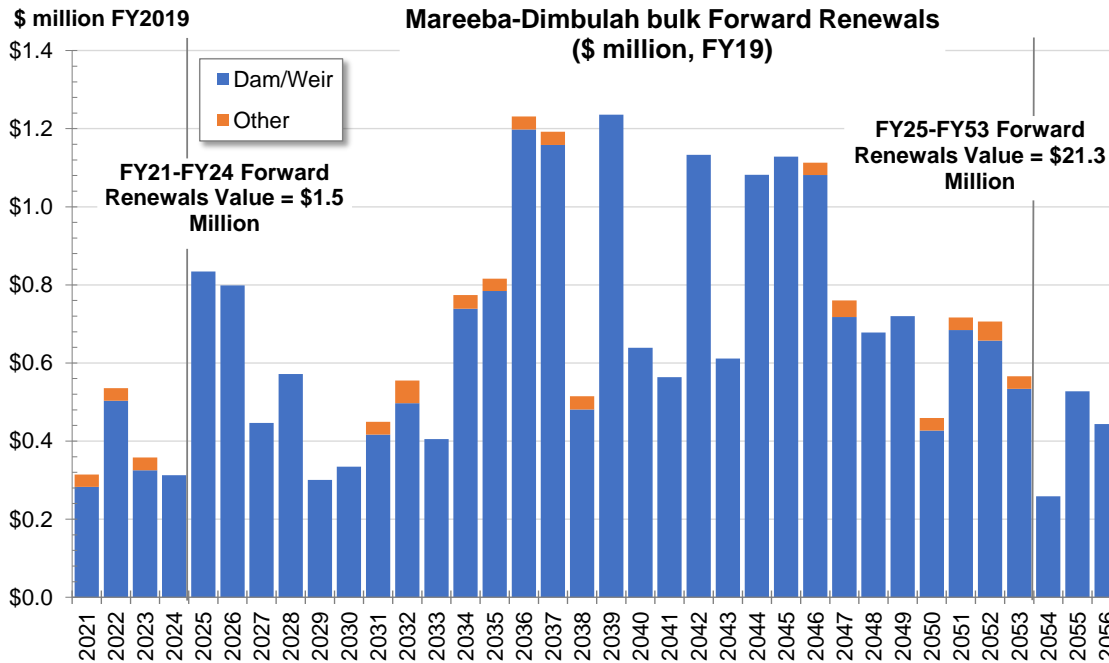


Figure 1

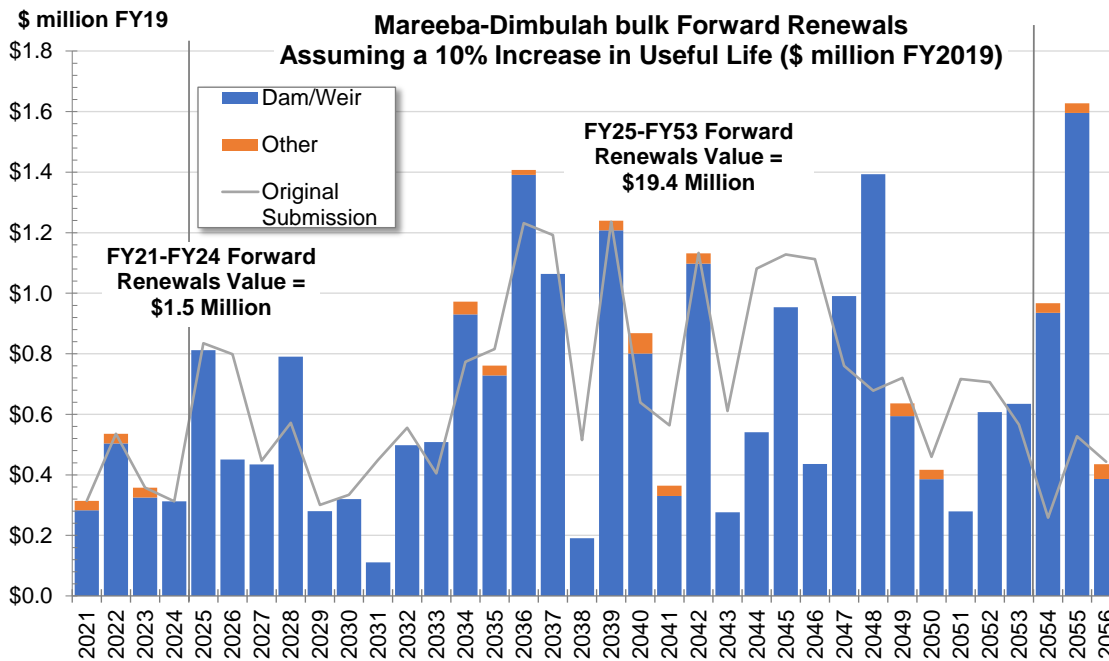


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.31	\$0.31
2022	\$0.54	\$0.54
2023	\$0.36	\$0.36
2024	\$0.31	\$0.31
2025	\$0.83	\$0.81
2026	\$0.80	\$0.45
2027	\$0.45	\$0.43
2028	\$0.57	\$0.79
2029	\$0.30	\$0.28
2030	\$0.33	\$0.32
2031	\$0.45	\$0.11
2032	\$0.56	\$0.50
2033	\$0.41	\$0.51
2034	\$0.77	\$0.97
2035	\$0.82	\$0.76
2036	\$1.23	\$1.41
2037	\$1.19	\$1.06
2038	\$0.52	\$0.19
2039	\$1.24	\$1.24
2040	\$0.64	\$0.87
2041	\$0.56	\$0.36
2042	\$1.13	\$1.13
2043	\$0.61	\$0.28
2044	\$1.08	\$0.54
2045	\$1.13	\$0.95
2046	\$1.11	\$0.44
2047	\$0.76	\$0.99
2048	\$0.68	\$1.39
2049	\$0.72	\$0.64
2050	\$0.46	\$0.42
2051	\$0.72	\$0.28
2052	\$0.71	\$0.61
2053	\$0.57	\$0.63

Figure 1 presents Sunwater's revised forward renewals submission.
 Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
 Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
 Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

17.0 Nogoia Mackenzie (bulk)

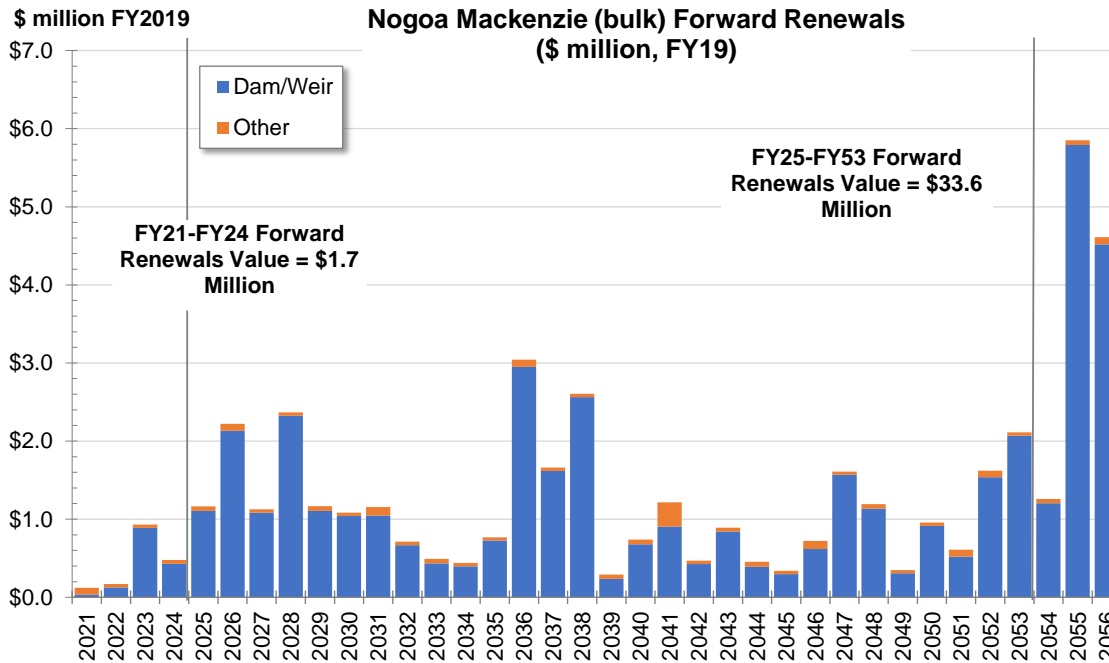


Figure 1

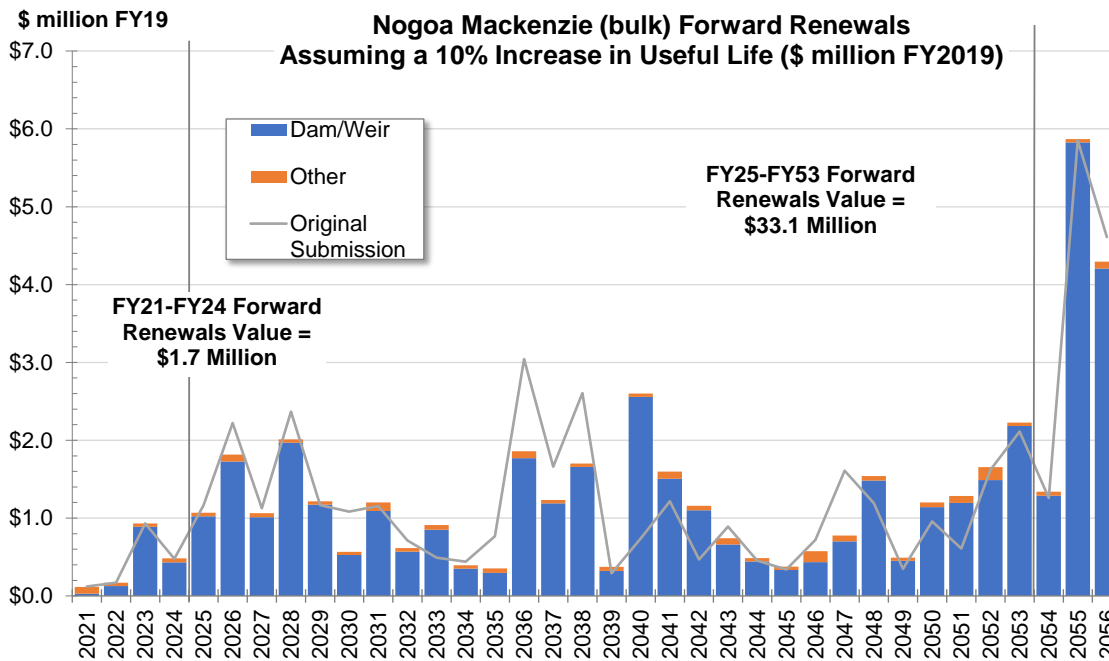


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.12	\$0.11
2022	\$0.17	\$0.17
2023	\$0.93	\$0.93
2024	\$0.48	\$0.48
2025	\$1.16	\$1.07
2026	\$2.22	\$1.82
2027	\$1.13	\$1.06
2028	\$2.37	\$2.01
2029	\$1.17	\$1.22
2030	\$1.08	\$0.57
2031	\$1.15	\$1.20
2032	\$0.71	\$0.62
2033	\$0.49	\$0.91
2034	\$0.44	\$0.39
2035	\$0.77	\$0.36
2036	\$3.04	\$1.86
2037	\$1.66	\$1.23
2038	\$2.61	\$1.70
2039	\$0.29	\$0.37
2040	\$0.74	\$2.60
2041	\$1.22	\$1.60
2042	\$0.47	\$1.16
2043	\$0.89	\$0.74
2044	\$0.46	\$0.49
2045	\$0.34	\$0.38
2046	\$0.72	\$0.58
2047	\$1.61	\$0.78
2048	\$1.19	\$1.54
2049	\$0.35	\$0.49
2050	\$0.96	\$1.20
2051	\$0.61	\$1.28
2052	\$1.62	\$1.66
2053	\$2.11	\$2.23

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

18.0 Pioneer River

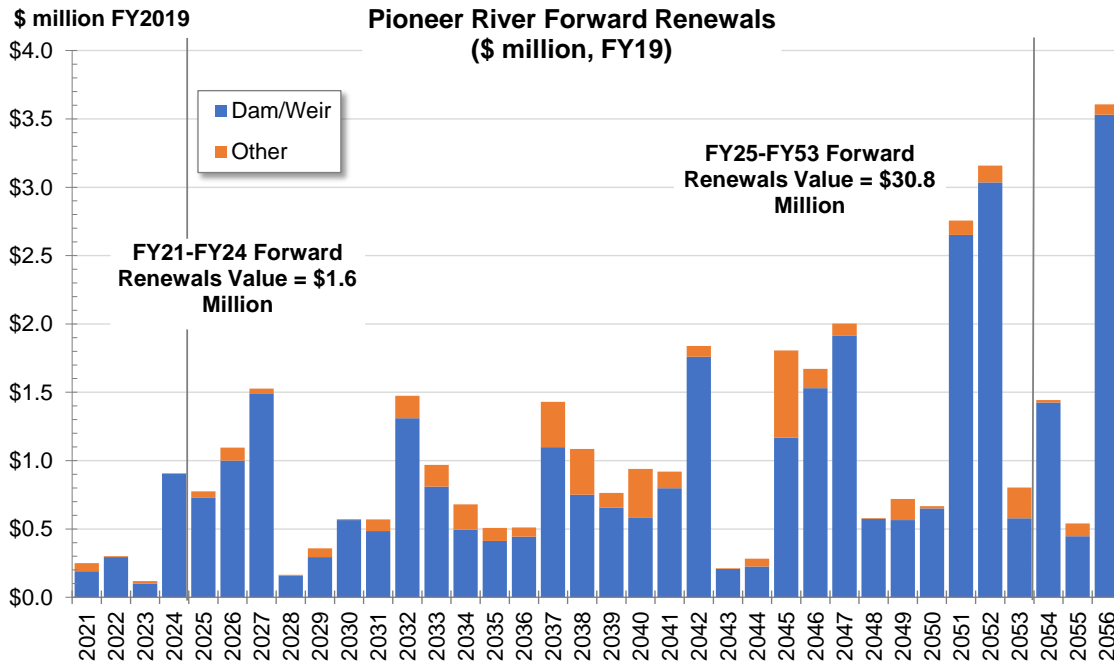


Figure 1

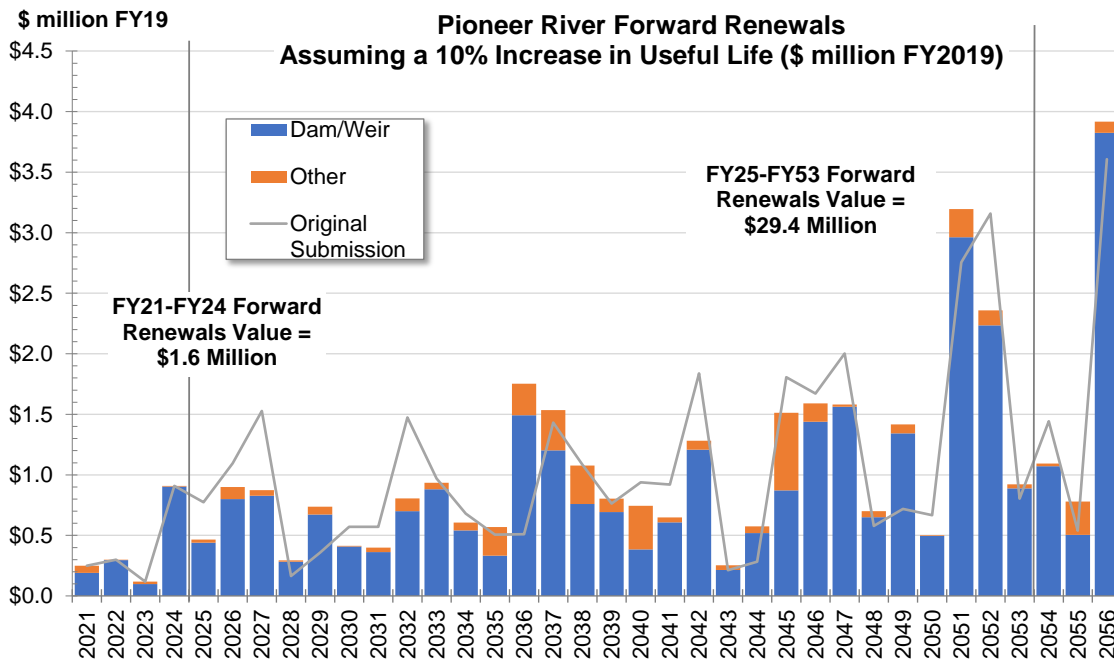


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.25	\$0.25
2022	\$0.30	\$0.30
2023	\$0.12	\$0.12
2024	\$0.91	\$0.91
2025	\$0.77	\$0.47
2026	\$1.09	\$0.90
2027	\$1.53	\$0.87
2028	\$0.16	\$0.29
2029	\$0.36	\$0.74
2030	\$0.57	\$0.41
2031	\$0.57	\$0.40
2032	\$1.47	\$0.80
2033	\$0.97	\$0.93
2034	\$0.68	\$0.61
2035	\$0.51	\$0.57
2036	\$0.51	\$1.75
2037	\$1.43	\$1.53
2038	\$1.08	\$1.08
2039	\$0.76	\$0.80
2040	\$0.94	\$0.75
2041	\$0.92	\$0.65
2042	\$1.84	\$1.28
2043	\$0.21	\$0.25
2044	\$0.28	\$0.58
2045	\$1.81	\$1.51
2046	\$1.67	\$1.59
2047	\$2.00	\$1.58
2048	\$0.58	\$0.70
2049	\$0.72	\$1.42
2050	\$0.67	\$0.50
2051	\$2.76	\$3.19
2052	\$3.16	\$2.36
2053	\$0.80	\$0.92

Figure 1 presents Sunwater's revised forward renewals submission.
 Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
 Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
 Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

19.0 Proserpine

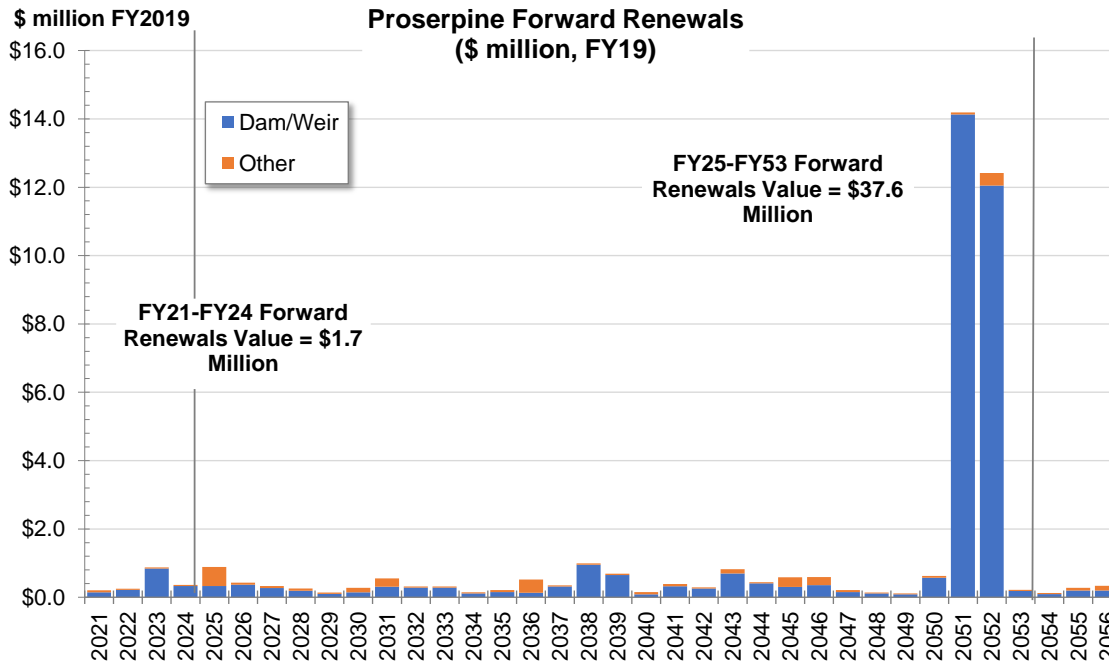


Figure 1

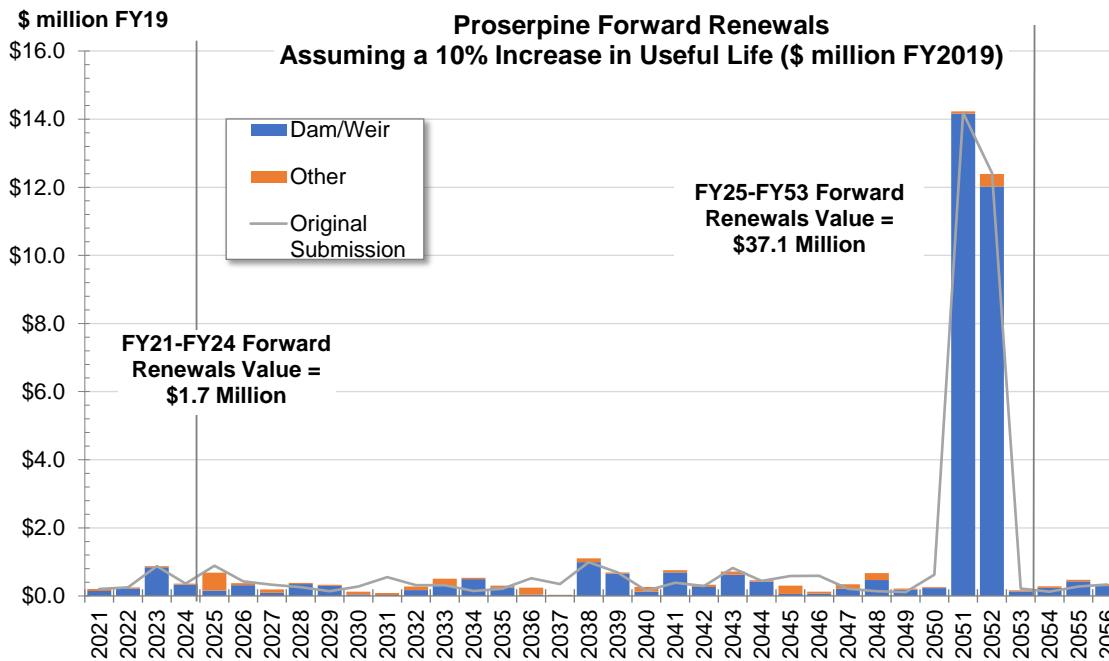


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

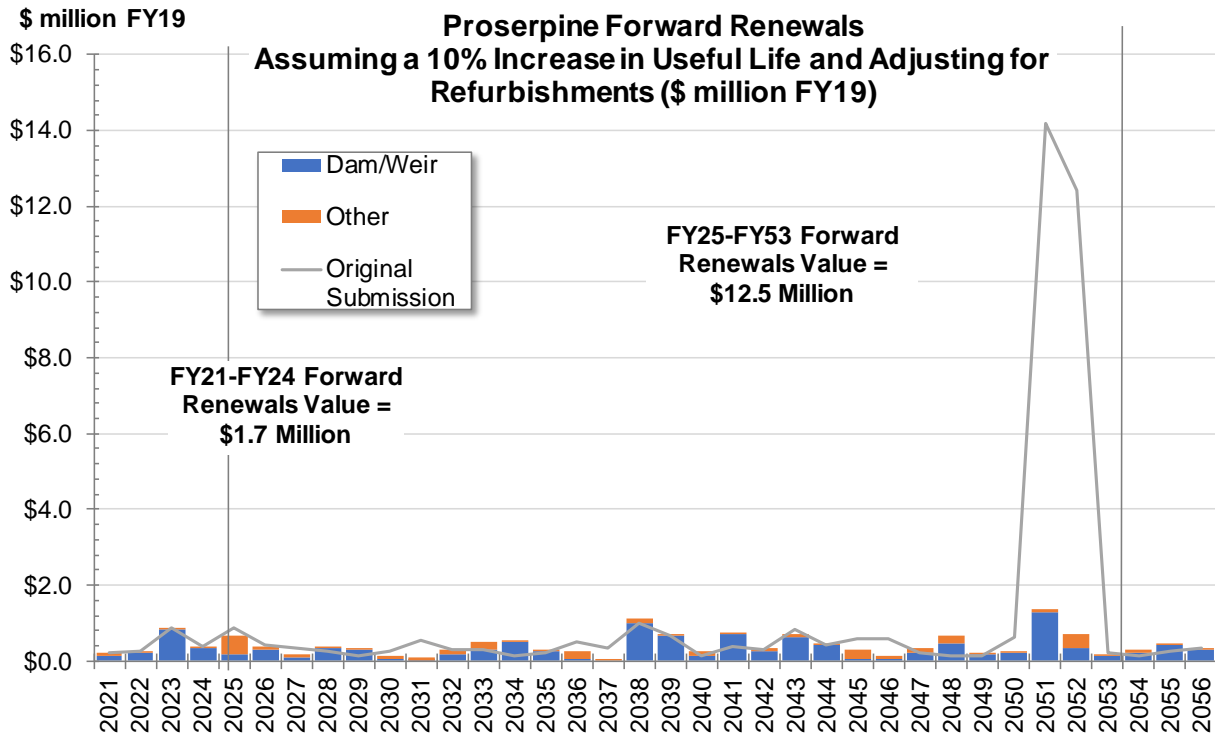


Figure 3

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Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)		
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension	Additional Refurbishment Adjustment
2021	\$0.20	\$0.20	\$0.20
2022	\$0.25	\$0.25	\$0.25
2023	\$0.87	\$0.87	\$0.87
2024	\$0.36	\$0.36	\$0.36
2025	\$0.89	\$0.68	\$0.68
2026	\$0.43	\$0.38	\$0.38
2027	\$0.33	\$0.19	\$0.19
2028	\$0.25	\$0.38	\$0.38
2029	\$0.14	\$0.33	\$0.33
2030	\$0.28	\$0.12	\$0.12
2031	\$0.55	\$0.09	\$0.09
2032	\$0.32	\$0.28	\$0.28
2033	\$0.32	\$0.51	\$0.51
2034	\$0.15	\$0.53	\$0.53
2035	\$0.21	\$0.31	\$0.31
2036	\$0.52	\$0.24	\$0.24
2037	\$0.35	\$0.03	\$0.03
2038	\$0.99	\$1.10	\$1.10
2039	\$0.69	\$0.69	\$0.69
2040	\$0.15	\$0.26	\$0.26
2041	\$0.39	\$0.76	\$0.76
2042	\$0.29	\$0.33	\$0.33
2043	\$0.82	\$0.72	\$0.72
2044	\$0.44	\$0.46	\$0.46
2045	\$0.59	\$0.30	\$0.30
2046	\$0.59	\$0.13	\$0.13
2047	\$0.21	\$0.35	\$0.35
2048	\$0.14	\$0.67	\$0.67
2049	\$0.12	\$0.22	\$0.22
2050	\$0.62	\$0.26	\$0.26
2051	\$14.19	\$14.23	\$1.36
2052	\$12.42	\$12.39	\$0.69
2053	\$0.22	\$0.17	\$0.17

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

20.0 St George bulk

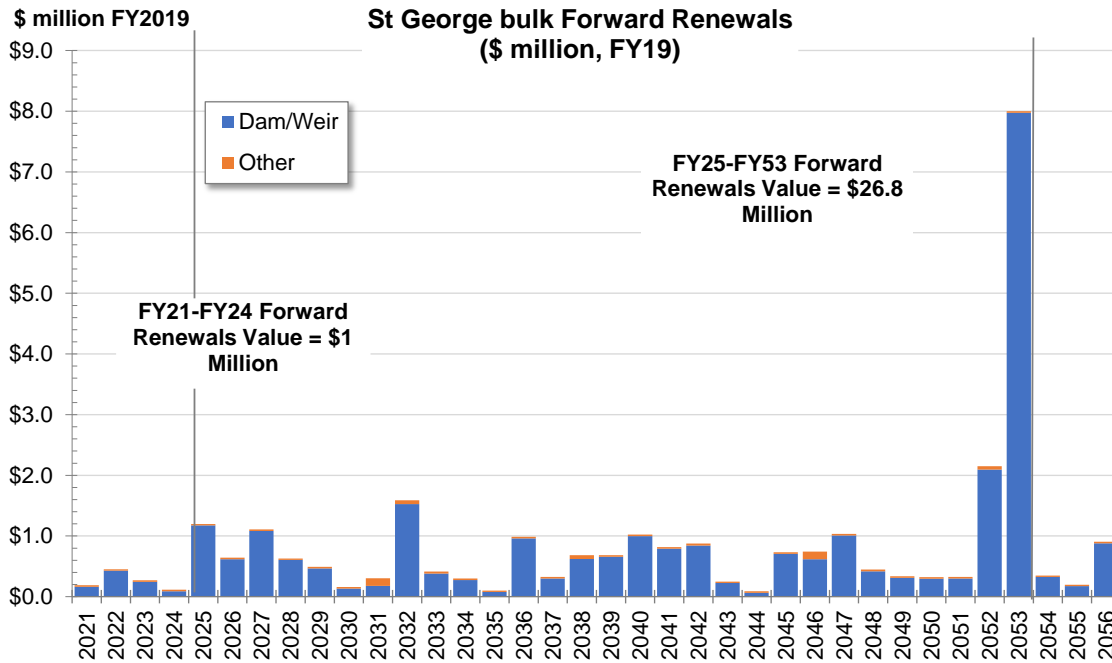


Figure 1

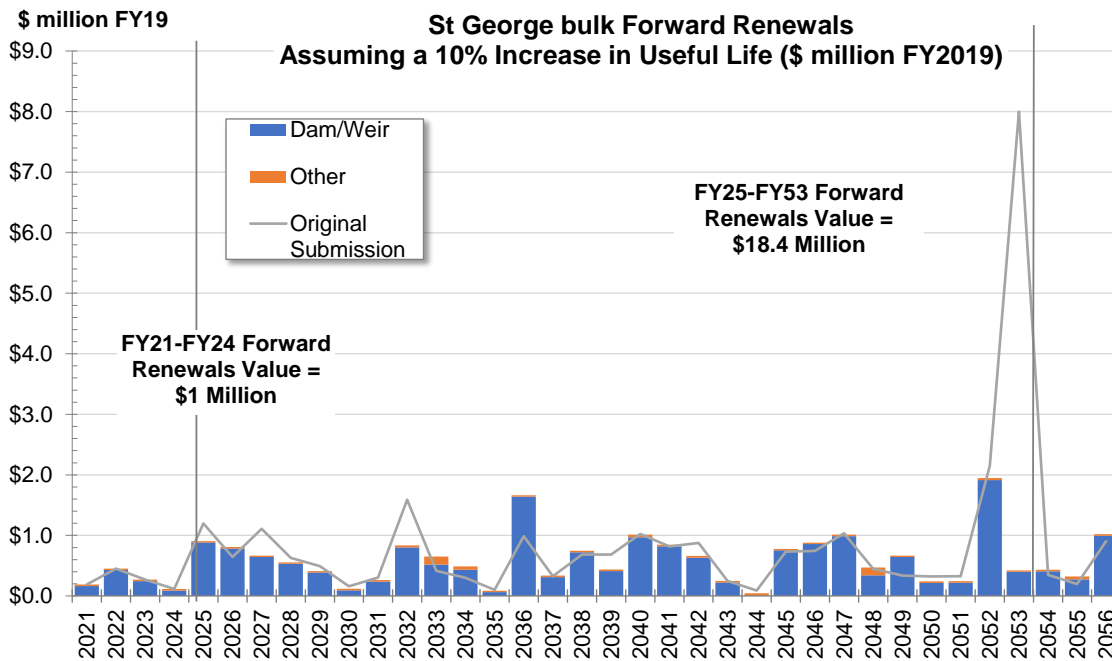


Figure 2

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Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.19	\$0.19
2022	\$0.45	\$0.45
2023	\$0.27	\$0.27
2024	\$0.12	\$0.12
2025	\$1.20	\$0.91
2026	\$0.64	\$0.81
2027	\$1.11	\$0.67
2028	\$0.63	\$0.56
2029	\$0.49	\$0.41
2030	\$0.16	\$0.12
2031	\$0.30	\$0.26
2032	\$1.59	\$0.83
2033	\$0.41	\$0.65
2034	\$0.30	\$0.49
2035	\$0.10	\$0.09
2036	\$0.99	\$1.66
2037	\$0.32	\$0.34
2038	\$0.68	\$0.75
2039	\$0.68	\$0.44
2040	\$1.02	\$1.01
2041	\$0.82	\$0.85
2042	\$0.88	\$0.66
2043	\$0.25	\$0.25
2044	\$0.09	\$0.05
2045	\$0.73	\$0.78
2046	\$0.74	\$0.88
2047	\$1.03	\$1.01
2048	\$0.45	\$0.47
2049	\$0.34	\$0.66
2050	\$0.32	\$0.24
2051	\$0.33	\$0.24
2052	\$2.15	\$1.95
2053	\$8.00	\$0.42

Figure 1 presents Sunwater's revised forward renewals submission. **Figure 2** presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. **Figure 3** (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. **Table 1** presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

21.0 Three Moon Creek

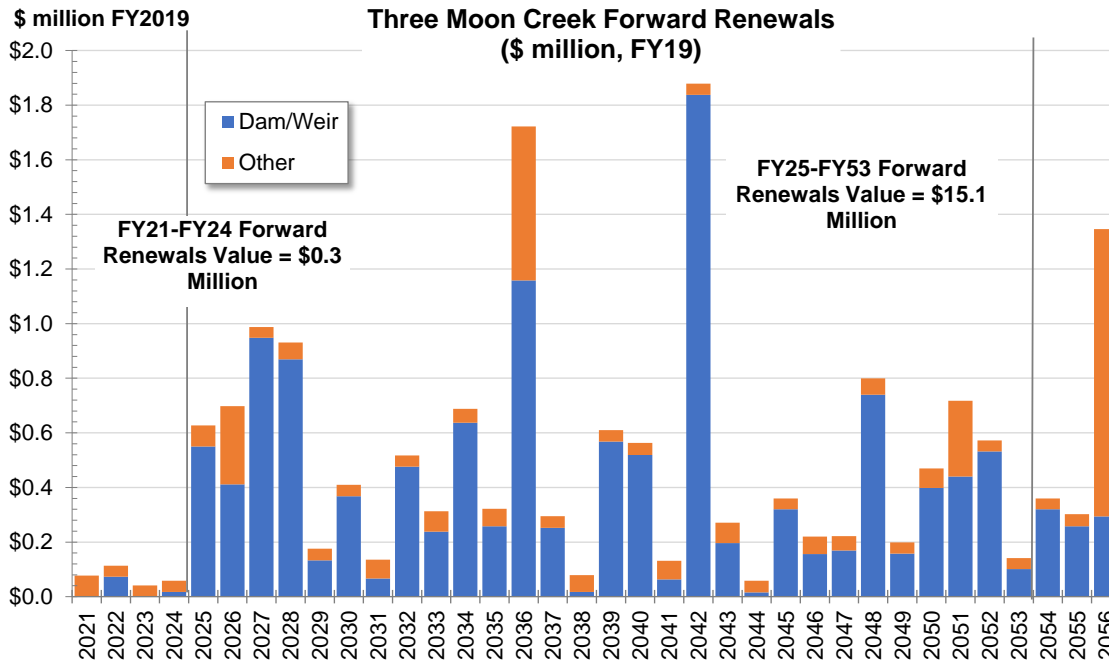


Figure 1

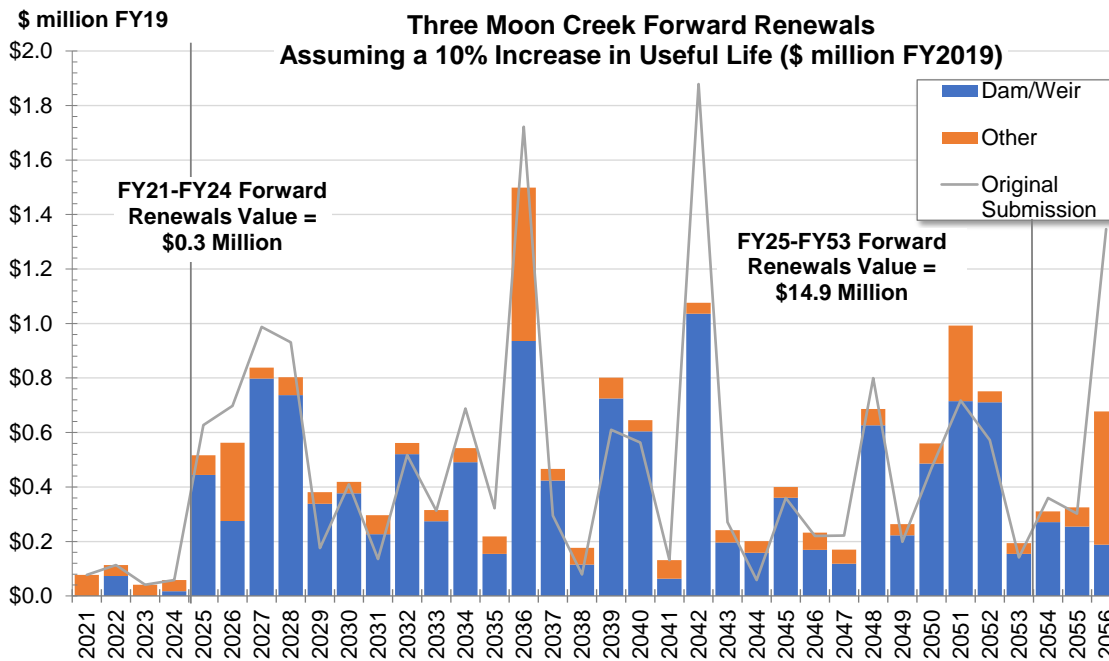


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.08	\$0.08
2022	\$0.11	\$0.11
2023	\$0.04	\$0.04
2024	\$0.06	\$0.06
2025	\$0.63	\$0.52
2026	\$0.70	\$0.56
2027	\$0.99	\$0.84
2028	\$0.93	\$0.80
2029	\$0.18	\$0.38
2030	\$0.41	\$0.42
2031	\$0.14	\$0.30
2032	\$0.52	\$0.56
2033	\$0.31	\$0.32
2034	\$0.69	\$0.54
2035	\$0.32	\$0.22
2036	\$1.72	\$1.50
2037	\$0.29	\$0.47
2038	\$0.08	\$0.18
2039	\$0.61	\$0.80
2040	\$0.56	\$0.64
2041	\$0.13	\$0.13
2042	\$1.88	\$1.08
2043	\$0.27	\$0.24
2044	\$0.06	\$0.20
2045	\$0.36	\$0.40
2046	\$0.22	\$0.23
2047	\$0.22	\$0.17
2048	\$0.80	\$0.69
2049	\$0.20	\$0.26
2050	\$0.47	\$0.56
2051	\$0.72	\$0.99
2052	\$0.57	\$0.75
2053	\$0.14	\$0.19

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

22.0 Upper Burnett

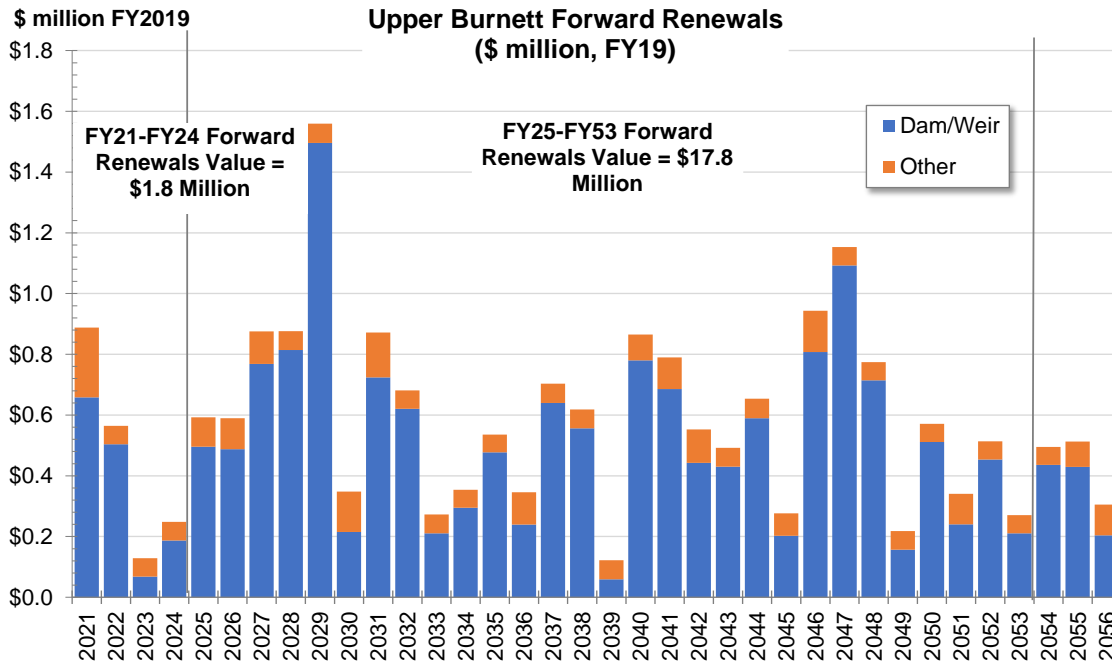


Figure 1

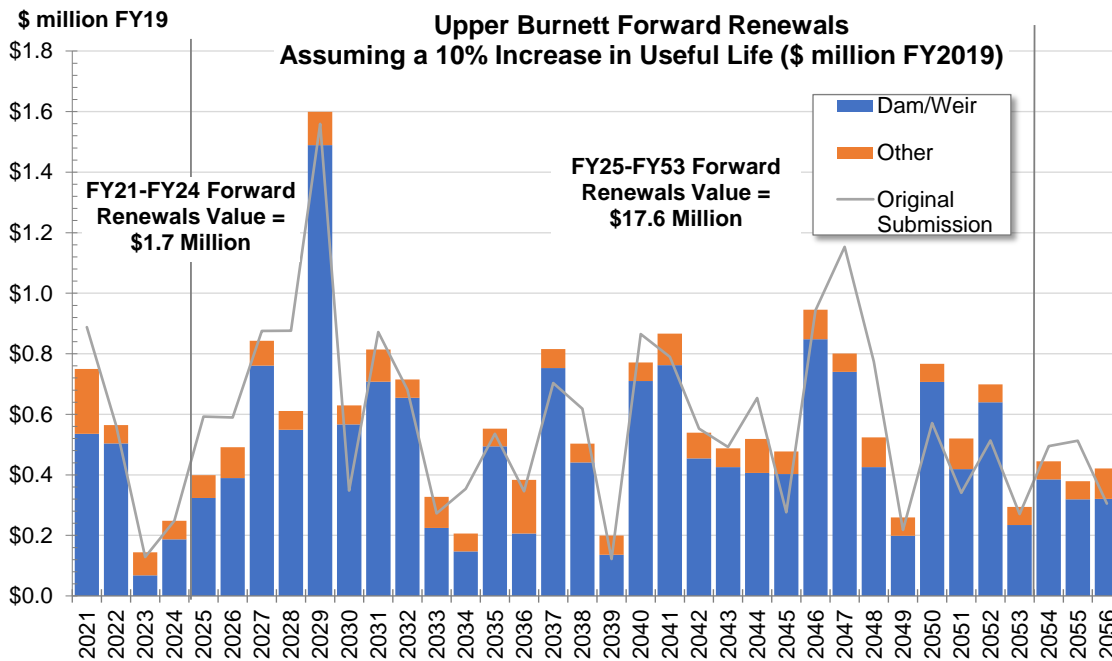


Figure 2

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.89	\$0.75
2022	\$0.56	\$0.56
2023	\$0.13	\$0.14
2024	\$0.25	\$0.25
2025	\$0.59	\$0.40
2026	\$0.59	\$0.49
2027	\$0.88	\$0.84
2028	\$0.88	\$0.61
2029	\$1.56	\$1.60
2030	\$0.35	\$0.63
2031	\$0.87	\$0.81
2032	\$0.68	\$0.72
2033	\$0.27	\$0.33
2034	\$0.35	\$0.21
2035	\$0.54	\$0.55
2036	\$0.35	\$0.38
2037	\$0.70	\$0.82
2038	\$0.62	\$0.50
2039	\$0.12	\$0.20
2040	\$0.87	\$0.77
2041	\$0.79	\$0.87
2042	\$0.55	\$0.54
2043	\$0.49	\$0.49
2044	\$0.65	\$0.52
2045	\$0.28	\$0.48
2046	\$0.94	\$0.95
2047	\$1.15	\$0.80
2048	\$0.77	\$0.52
2049	\$0.22	\$0.26
2050	\$0.57	\$0.77
2051	\$0.34	\$0.52
2052	\$0.51	\$0.70
2053	\$0.27	\$0.29

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

23.0 Upper Condamine

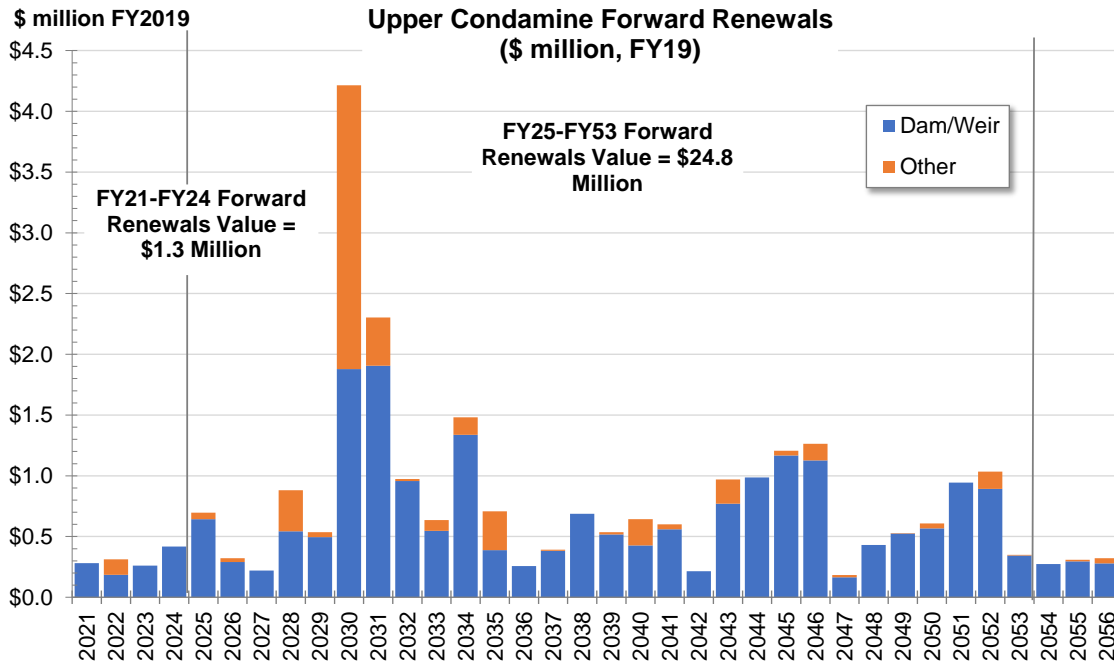


Figure 1

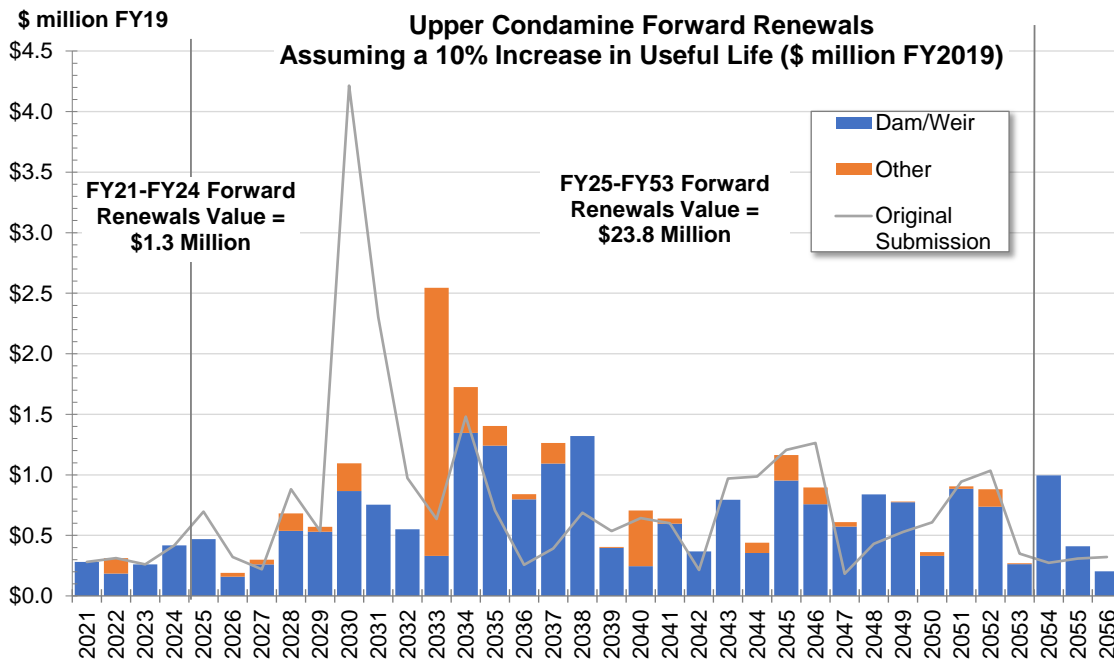


Figure 2

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Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.28	\$0.28
2022	\$0.31	\$0.31
2023	\$0.26	\$0.26
2024	\$0.42	\$0.42
2025	\$0.70	\$0.47
2026	\$0.32	\$0.19
2027	\$0.22	\$0.30
2028	\$0.88	\$0.68
2029	\$0.54	\$0.57
2030	\$4.21	\$1.09
2031	\$2.30	\$0.75
2032	\$0.97	\$0.55
2033	\$0.63	\$2.55
2034	\$1.48	\$1.73
2035	\$0.71	\$1.40
2036	\$0.26	\$0.84
2037	\$0.39	\$1.26
2038	\$0.69	\$1.32
2039	\$0.54	\$0.41
2040	\$0.64	\$0.71
2041	\$0.60	\$0.64
2042	\$0.21	\$0.37
2043	\$0.97	\$0.79
2044	\$0.99	\$0.44
2045	\$1.21	\$1.16
2046	\$1.26	\$0.90
2047	\$0.18	\$0.61
2048	\$0.43	\$0.84
2049	\$0.53	\$0.78
2050	\$0.61	\$0.36
2051	\$0.94	\$0.90
2052	\$1.03	\$0.88
2053	\$0.35	\$0.27

Figure 1 presents Sunwater's revised forward renewals submission.
Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension.
Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

24.0 Bundaberg distribution

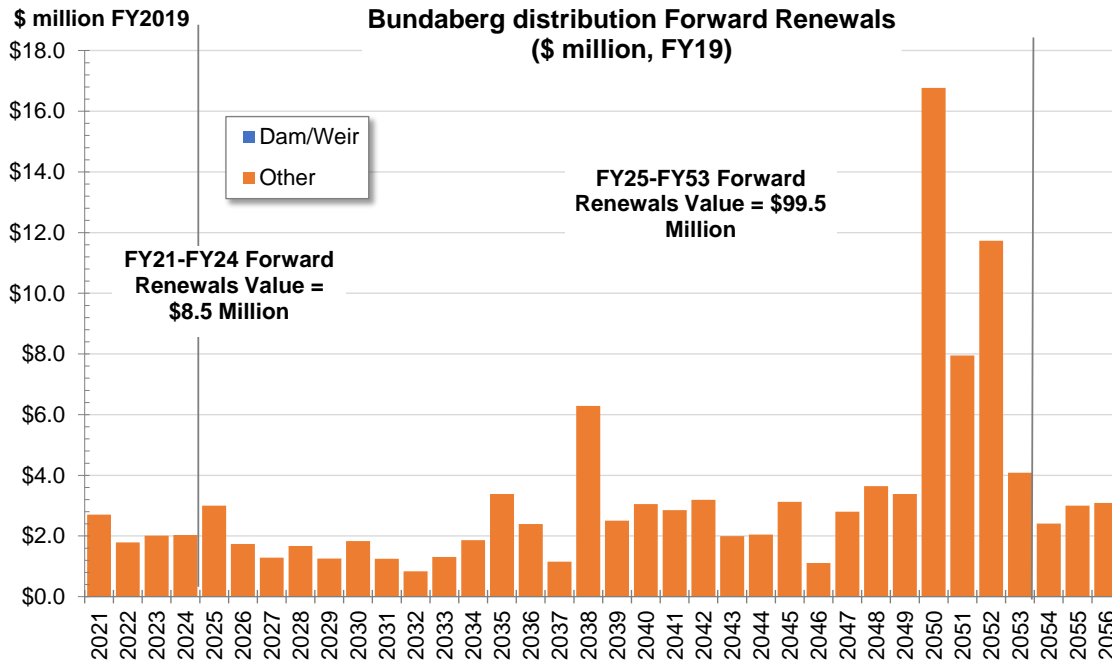


Figure 1

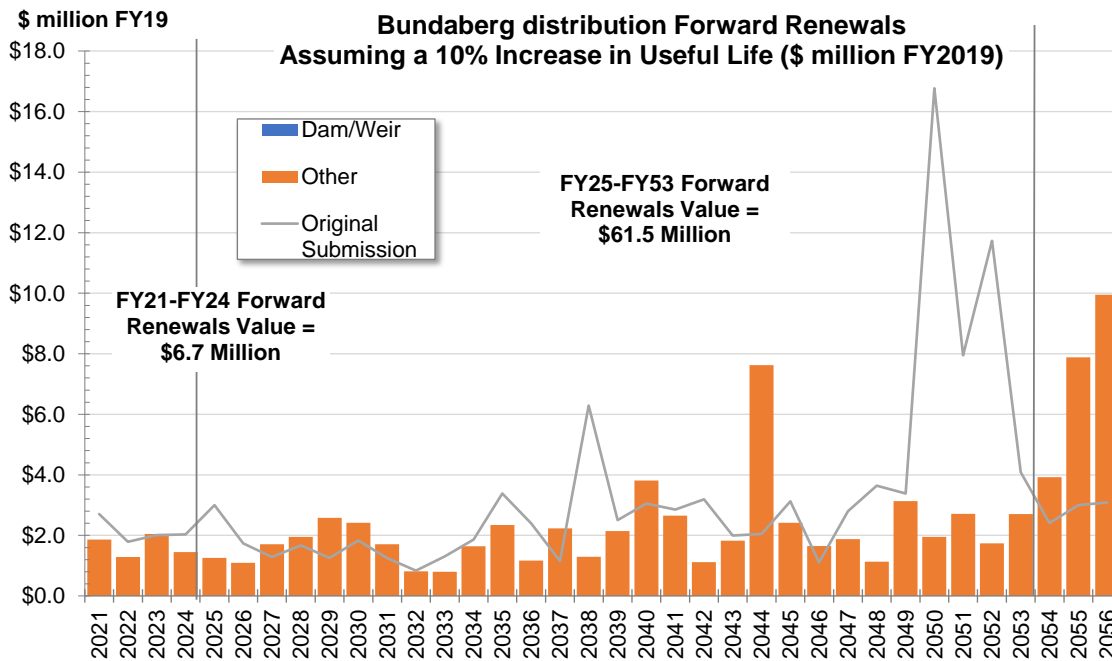


Figure 2

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Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$2.71	\$1.86
2022	\$1.79	\$1.29
2023	\$2.01	\$2.05
2024	\$2.03	\$1.45
2025	\$3.00	\$1.26
2026	\$1.74	\$1.10
2027	\$1.29	\$1.71
2028	\$1.67	\$1.95
2029	\$1.26	\$2.58
2030	\$1.83	\$2.41
2031	\$1.25	\$1.71
2032	\$0.84	\$0.82
2033	\$1.31	\$0.80
2034	\$1.86	\$1.64
2035	\$3.39	\$2.34
2036	\$2.40	\$1.17
2037	\$1.15	\$2.23
2038	\$6.29	\$1.30
2039	\$2.51	\$2.14
2040	\$3.05	\$3.81
2041	\$2.85	\$2.66
2042	\$3.20	\$1.12
2043	\$1.99	\$1.83
2044	\$2.05	\$7.62
2045	\$3.12	\$2.42
2046	\$1.11	\$1.65
2047	\$2.80	\$1.88
2048	\$3.65	\$1.13
2049	\$3.38	\$3.13
2050	\$16.77	\$1.95
2051	\$7.95	\$2.71
2052	\$11.73	\$1.74
2053	\$4.09	\$2.70

Figure 1 presents Sunwater's revised forward renewals submission. Figure 2 presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

25.0 Burdekin Haughton distribution

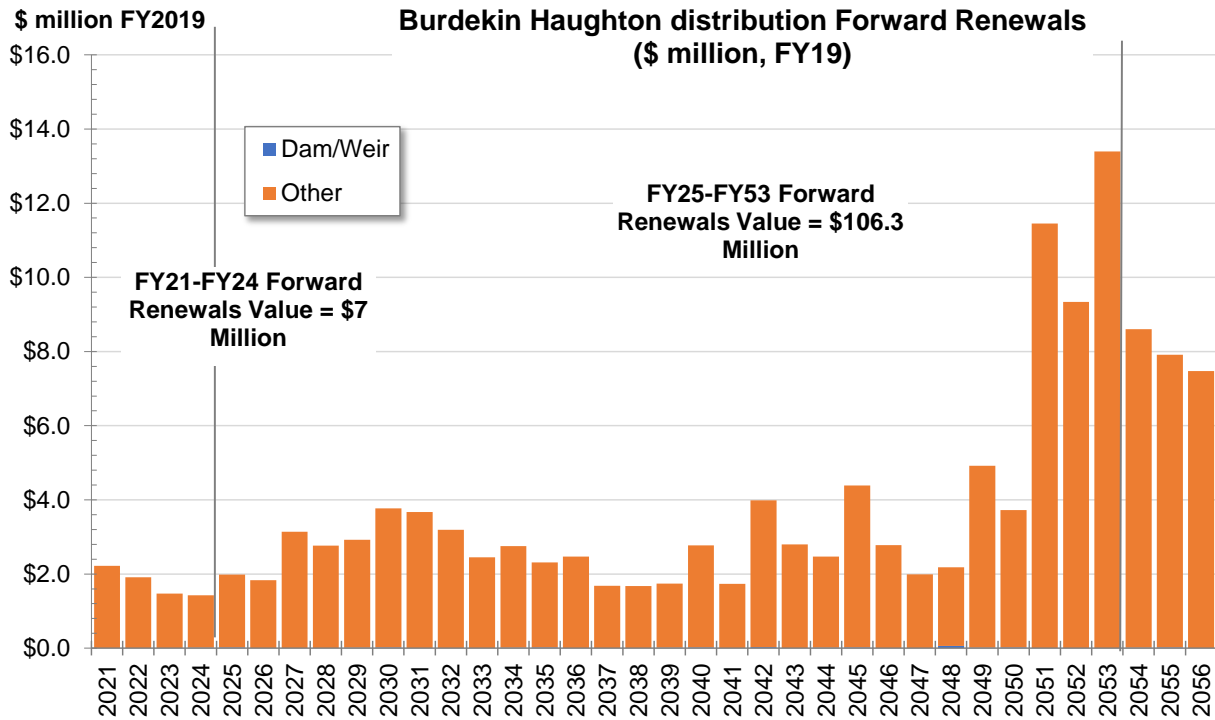


Figure 1

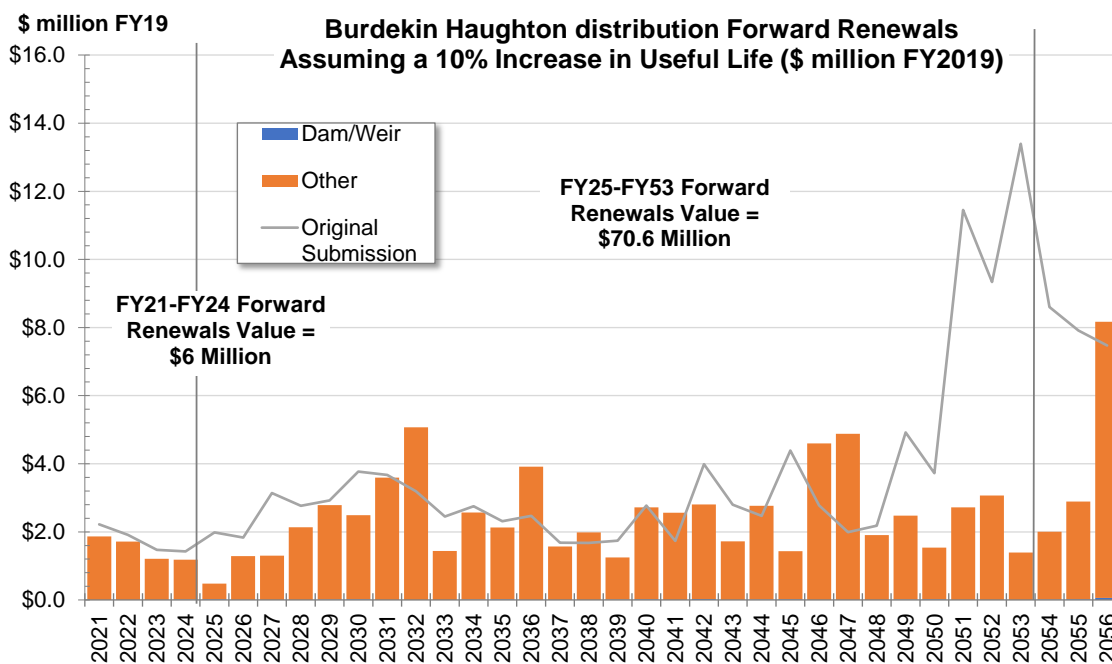


Figure 2

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Figure 3 (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes.
Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$2.22	\$1.86
2022	\$1.91	\$1.72
2023	\$1.47	\$1.21
2024	\$1.43	\$1.18
2025	\$1.99	\$0.48
2026	\$1.83	\$1.29
2027	\$3.14	\$1.30
2028	\$2.76	\$2.13
2029	\$2.92	\$2.79
2030	\$3.77	\$2.49
2031	\$3.67	\$3.59
2032	\$3.19	\$5.07
2033	\$2.45	\$1.44
2034	\$2.75	\$2.57
2035	\$2.31	\$2.13
2036	\$2.47	\$3.92
2037	\$1.68	\$1.57
2038	\$1.67	\$1.98
2039	\$1.74	\$1.25
2040	\$2.77	\$2.72
2041	\$1.74	\$2.56
2042	\$3.99	\$2.80
2043	\$2.80	\$1.72
2044	\$2.47	\$2.77
2045	\$4.39	\$1.43
2046	\$2.78	\$4.60
2047	\$1.99	\$4.88
2048	\$2.18	\$1.91
2049	\$4.92	\$2.48
2050	\$3.72	\$1.54
2051	\$11.45	\$2.72
2052	\$9.34	\$3.07
2053	\$13.39	\$1.39

Figure 1 presents Sunwater's revised forward renewals submission. **Figure 2** presents Sunwater's revised forward renewals submission adjusted for the impact of applying a 10% life extension. **Figure 3** (where provided) presents an additional adjustment for refurbishment issues identified in select bulk water schemes. **Table 1** presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

26.0 Eton distribution

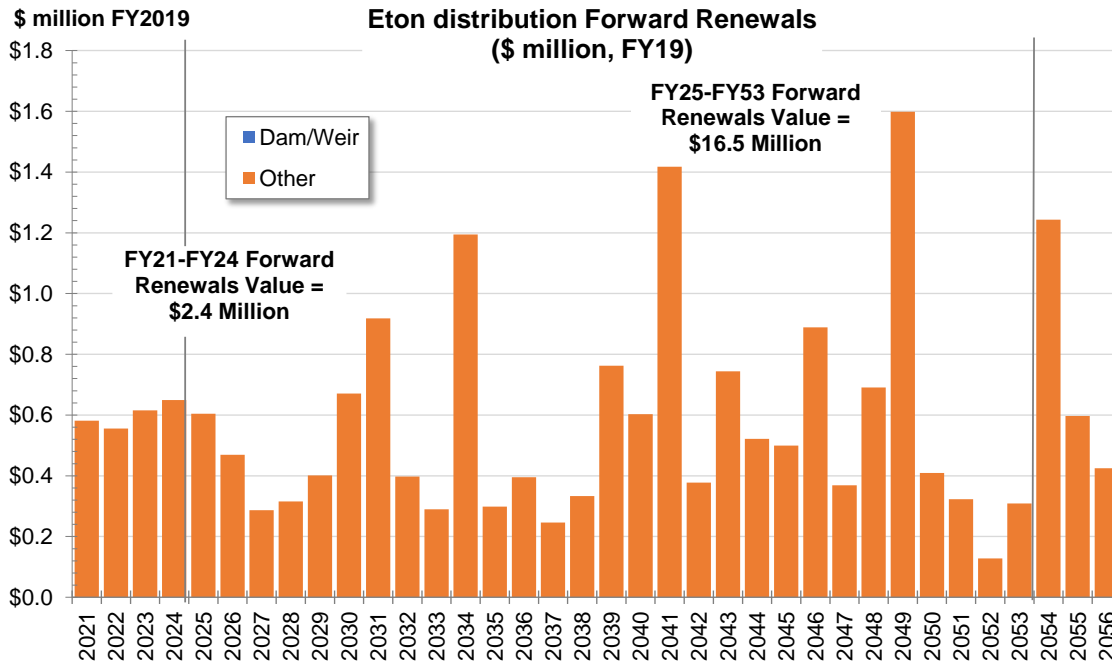


Figure 1

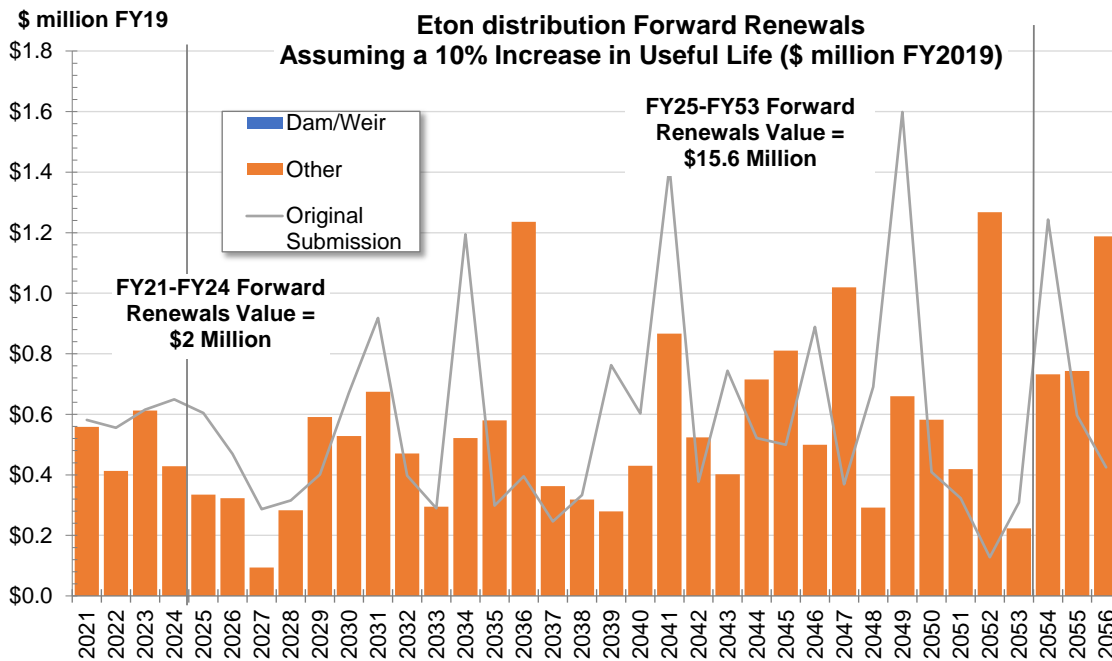


Figure 2

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Table 1 presents a tabulated annual comparison of the submitted and adjusted forward renewals submission.

Table 1 Adjustments to Sunwater's revised forward renewals submission

Financial Year	Project Value (\$ million, FY19)	
	Sunwater's revised forward submission	Adjusted for the impact of applying a 10% life extension
2021	\$0.58	\$0.56
2022	\$0.56	\$0.41
2023	\$0.62	\$0.61
2024	\$0.65	\$0.43
2025	\$0.60	\$0.33
2026	\$0.47	\$0.32
2027	\$0.29	\$0.09
2028	\$0.32	\$0.28
2029	\$0.40	\$0.59
2030	\$0.67	\$0.53
2031	\$0.92	\$0.67
2032	\$0.40	\$0.47
2033	\$0.29	\$0.29
2034	\$1.19	\$0.52
2035	\$0.30	\$0.58
2036	\$0.40	\$1.24
2037	\$0.25	\$0.36
2038	\$0.33	\$0.32
2039	\$0.76	\$0.28
2040	\$0.60	\$0.43
2041	\$1.42	\$0.87
2042	\$0.38	\$0.52
2043	\$0.74	\$0.40
2044	\$0.52	\$0.72
2045	\$0.50	\$0.81
2046	\$0.89	\$0.50
2047	\$0.37	\$1.02
2048	\$0.69	\$0.29
2049	\$1.60	\$0.66
2050	\$0.41	\$0.58
2051	\$0.32	\$0.42
2052	\$0.13	\$1.27
2053	\$0.31	\$0.22

Appendix D

Project Reviews for Dam Safety Upgrades

Burdekin Falls Dam Safety Improvement Project

Project Overview

Burdekin Falls Dam upgrade works are deemed essential by Sunwater as the F-N plot shows that the risk is currently greater than the ANCOLD Limit of Tolerability for Existing Dams. Risk reduction is mandatory in accordance with regulatory requirements. The scope of works of the dam safety improvement project is to upgrade the dam to achieve 100% of the Acceptable Flood Capacity (AFC). The project is currently at concept design phase.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (FY19\$)	FY19-20: \$12.7M
			Standard	✓		FY21-24: \$284M
			Cost	✓		FY25: \$35.1M
					Impact of findings on claim (FY19\$)	FY19-20: \$0 FY21-24: \$0 FY25: \$0
					Total Accepted (FY19\$)	FY19-20: \$12.7M FY21-24: \$284M FY25: \$35.1M

Background

Burdekin Falls Dam (BFD) comprises of a mass concrete gravity main dam and four earth and rockfill saddle dams. It was completed in 1987 and stores 1,860,000 ML of water at the full supply level of EL1540.0 AHD. It is the largest water storage dam in Queensland. The dam supplies water to urban areas such as Townsville, Ayr, Home Hill and water for the Burdekin River Irrigation Area and the industrial development in lower Burdekin.

As a result of revised rainfall and flood estimates by the Bureau of Meteorology, more extreme rainfall events in the BFD catchment is now expected compared to values used for the dam’s original design. The standard design requirement, the Probable Maximum Precipitation Design Flood (PMPDF) for the dam, has increased since it was initially designed and constructed. Consequently, BFD does not currently comply with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity (AFC). Engineering works undertaken in 2017 shows the F-N of Burdekin Falls Dam is presently above the ANCOLD Limit of Tolerability for Existing Dams. The main studies to inform the risk assessment, position of the F-N curve and concept design options and costings have been undertaken.

Based on the 2019 revised hydrology assessment and the current capacity of Burdekin Falls Dam, the risk posed to the downstream population remains unacceptable. In accordance with Sunwater’s Dam Safety Policy, the dam must be upgraded so that:

- BFD can safely pass 100% of the AFC spillway flow to meet the Dam Safety Regulator’s and ANCOLD’s Guidelines
- the current societal and individual risk posed by failure of BFD is reduced to below the Limit of Tolerability as soon as possible

- Sunwater can discharge its obligations towards safety as soon as possible in accordance with the organisation's own Dam Safety Policy and prioritisation process (Sunwater is committed to completing the improvement works by October 2024).

Drafts have been developed for the concept engineering report and preliminary business case.

Options Assessment

Sunwater engaged [REDACTED] to develop the Concept Engineering Report (November 2018). The options development process identified 10 potential options. The options were:

- 1A. Upgrade main dam and saddle dams to the 2008 Hydrology peak water levels
- 1B. Upgrade main dam and saddle dams to the 2017 Hydrology peak water levels
- 2A. Development of a new auxiliary spillway downstream of the Left Bank Saddle dam
- 2B. Use existing Left Bank Saddle dam and install spillway gates
- 2C. Development of a new auxiliary spillway downstream of the Left Bank Saddle dam, install spillway gates
- 3. Use Mount Graham North and South Saddle dams and install fuse plugs
- 4A. Development of a new Right Bank Auxiliary spillway (Main dam and saddle dams to be upgraded)
- 4B. Lowering of existing Right Abutment to form auxiliary spillway (Main dam and saddle dams to be upgraded)
- 5A. Reduce the crest level of existing ogee crest (reduce Full Supply Level)
- 5B. Install spillway gates into existing ogee crest

A "do nothing" option base case was part of the option evaluation for completeness but was not shortlisted. The "do nothing" option presented an unacceptable risk and Sunwater would be breaching their regulatory requirements.

The options were assessed using multicriteria assessment and industry-based risk assessment. The criteria were collaboratively developed with Sunwater. The criteria and their weightings were:

1. Capital Cost (20.9%)
2. Delivery Risk and Issues (18.2%)
3. Dam Safety and Capacity (16.7%)
4. Asset Management and Operations (13.2%)
5. Future-Proofing: Impact on Future Dam Raise (13.1%)
6. Customer Stakeholder and Property Impacts (11.3%)
7. Environment and Approval Impacts (6.6%)

From the original options list, four options were short listed: 2A, 2C, 1A, and 1B. Of these, two (1B and 2A). were chosen as the preferred options. Option 2A (Development of a new auxiliary spillway downstream of the Left Bank Saddle dam) was given slight preference but was to be reviewed following receipt of updated hydrology. Option 2A satisfied the 100% of the AFC requirement for 2017 hydrology, it prevented constructability risks associated with working on the main dam spillway crest, and it allowed for a future 2m dam raise without any work on the saddle dams. Its only concern was customer and stakeholder impacts as the works partially extended onto private property.

In April 2019, the concept design report was revised (in draft) to account for the revised 2019 hydrology assessment and the 2019 F-N plots. Further options were developed based on a "risk based" AFC that could address Dam Safety risk and bring risks below the line of tolerability and meet ALARP criteria. The new options were variants of the original Option 1, based on reinforcing and raising the existing dam to meet various flood levels. Each option had an incremental number of anchors applied to the spillway block. The options were:

- 1C. Two anchors per spillway block, design lake level RL 173.8m AHD

- 1D. Three anchors per spillway block, design lake level RL 175.9m AHD
- 1E. Three anchors most spillway blocks, four anchors on seven spillway blocks with lower foundation levels, design lake level RL 176.6m AHD

The new options were compared against the original preferred Option 2A. A new assessment criterion was also added, termed 'Good Practice and Precedent' referring to the degree the solution has been implemented successfully elsewhere thus providing certainty that benefits would be achieved. Weightings for other categories were also revised. The value of Dam Safety and Capacity was now deemed the most important criteria. Future-Proofing was de-prioritised to the least important. The new weightings were:

1. Dam Safety and Capacity (20.1%)
2. Capital Cost (17.8%)
3. Delivery Risk and Issues (16.6%)
4. Good Practice and Precedent (14.7%)
5. Asset Management and Operations (6.2%)
6. Customer Stakeholder and Property Impacts (9.3%)
7. Environment and Approval Impacts (9.7%)
8. Future-Proofing: Impact on Future Dam Raise (5.6%)

Following the weighted options assessment scoring, all three new options scored higher than Option 2A. Option 1C was selected as the new preferred option with a score (range 1-5) of 3.5 compared to Option 2A at 2.8. It should be noted that the new criterion of 'Good Practice and Precedent' was scored equally across all options so its inclusion is unlikely to have altered the scoring of the initial 10 options. The criteria that drove selection of Option 1C were capital cost and delivery risk.

The selection of the preferred option was considered prudent as Option 1C was the least cost option that met technical requirements using a risk-based approach. Appropriate multicriteria assessment was used in concluding the preferred option.

Implementation

Class 5 level cost estimates have been undertaken for all options (████████, 2018 & 2019) and are reasonable for the current level of design. There are appropriate inclusions for indirect costs such as contractor costs and insurance (21.5%), unlisted items (10%), owner costs, contingency and project risk (30%). The basis of estimate used information available from Sunwater and available rates from databases and other knowledge to form the opinion of probable construction cost (OPCC). The OPCC are provided with a low end range of -10% and a high end range of +40%. The two original shortlisted options 1B and 2A were costed at \$469M and \$509M respectively (both in \$FY18). The new preferred option (Option 1C) was costed at \$336M. In \$FY19, this is \$341M.

The revised concept design report also uses Monte Carlo analysis to generate a risk-adjusted median cost for the new options. Option 1C was \$351M and Option 2A was \$523M. These costs were qualified by stating they are based on the Class 5 Estimate with a qualitative risk analysis only, and would need to be revisited once the risk register has been reviewed and risks quantified. It appears that they have not been used in establishing the project cost estimate.

An initial Preliminary Business Case for the Burdekin Falls Saddle Dam and Spillway Monolith Improvement Project was approved by Sunwater Board in March 2017. Due to the revised 2019 flood hydrology and extreme rainfall probabilities, Sunwater recommenced the Burdekin Falls Improvement Project Preliminary Business Case process based on the revised 2019 Concept Design Report. A draft version of this document has been provided but is noted to be awaiting further revisions.

The draft Preliminary Business Case (April 2019) proposed a capital expenditure profile (excluding inflation and escalation) in \$FY20 terms, with data sourced from the Concept Design Report. Table 1 shows this profile. For the purpose of this review, the table includes a second row to show the amounts converted to \$FY19, as well as groupings for the proposed time periods. The total of \$346M (in \$FY19) differs from the Concept Design Report estimate of \$341M. There is no supporting documentation to explain the slight difference, but as this is the most recent corroborated cost data, it is assumed as the most representative estimate of total project cost.

Table 1 Business Case Capital Expenditure Profile for Option 1C (\$000)

	Transitional		Price Path Period				Beyond Price Path	Total
	FY19	FY20	FY21	FY22	FY23	FY24	FY25	
\$FY20	10,917	36,602	66,516	85,936	75,190	48,147	29,769	353,079 ¹
\$FY19	10,703	35,884	65,212	84,251	73,716	47,204	29,186	346,156
Total per Period (\$FY19)	46,587		270,383				29,185	346,156

Notes:

1) The sum of the individual years sum to \$353,079,432 as opposed to \$352,550,369 as reported in the Business Case.

The Appendix D of the Preliminary Business Case provides expected timelines for the project development and implementation phases of the project. It was proposed that:

- the Detailed Business Case be completed and approved by November 2019¹
- detailed design being completed in January 2021
- construction will be completed by July 2024
- project handover by October 2024

Appendix D also provided a breakdown of the project development phase costs. They are assumed as presented in nominal \$, and are presented in Table 2. The total is \$8.9M, which would primarily be incurred in FY19 and FY20.

Table 2 Project Development Costs (\$Nominal)

Activity	Budget
Evaluation Phase (revised Prelim Business Case)	\$3,373,000
Detailed Hydrology (AEP, hydrology, hydraulic)	\$750,000
Comprehensive Risk Assessment (CRA)	\$240,000
Engineering - Concept & Preliminary	\$1,350,000
Approvals	\$37,000
Business Case - Preliminary	\$346,000
Procurement	\$50,000
Project Mgt, Controls, Communication	\$600,000
Planning Phase (revised Detail Business Case)	\$3,591,000
Geotechnical, Survey & Supporting Investigations	\$1,632,000
Engineering - Preliminary	\$589,000
Business Case - Detail	\$921,000
Procurement	\$100,000
Project Mgt, Controls, Communication	\$350,000
Execution (early Detail Design, Procure, Construct Plan)	\$2,000,000
Engineering - Detail	1,500,000
Pre-Construction Readiness / Early Works (internal)	200,000
Pre-Construction Readiness / Early Works (external)	300,000

These FY19 and FY20 costs do not align with the capital expenditure profile in the main body of the document, which states that approximately \$46M would be spent in FY19 and FY20.

¹ Sunwater advised that November 2019 date is for Sunwater Board and Building Queensland approval. The detailed business case also requires approval by the Shareholding Minister (March 2020).

Another cost discrepancy exists with the revised Dam Safety Upgrade Capital Expenditure summary that was provided by Sunwater on 3 July 2019 in response to QCA RFI 58. The total is \$332M (in \$FY19), which doesn't match any of the previous estimates. Furthermore, the annual spend profile differs from that in the preliminary business case. The annual expenditure breakdown is provided in Table 3.

Table 3 Spillway & Saddle Dam Improvement Annual Capital Expenditure (\$000)

	Transitional		Price Path Period				Beyond Price Path	Total
	FY19 ¹	FY20	FY21	FY22	FY23	FY24	FY25	-
Annual (\$ Nominal)	6,778	6,048	11,103	90,161	108,840	100,247	40,280	363,456
Total per Period (\$ Nominal)	12,825		310,350				40,280	363,456
Annual (\$FY19)	6,778	5,929	10,633	84,347	99,465	89,491	35,082	331,724
Total per Period \$FY19)	12,707		283,936				35,028	331,724

Notes:

- 1) The FY19 costs represent the column titled 'Cumulative' in the spreadsheet. They are assumed as FY19 costs since the FY18 column is blank.

The proposed capital expenditure from the RFI 58 has been considered as Sunwater's final expenditure claim. The total is \$332M (in \$FY19) and is less than the figures specified in the Conceptual Design Report of \$341M (in \$FY19) and the draft Preliminary Business Case of \$346M (in \$FY19). The RFI 58 annual expenditure profile has also been modified to push out costs from the transitional years to later years. The bulk of construction costs appear to now be starting in FY22. This mirrors the indicative schedule presented in Appendix D of the preliminary business case.

The spend profile appears more reasonable in the RFI 58. Furthermore, the total project cost has been decreased by \$15M above what was stated in the Preliminary Business Case. While there is no evidence to support the decrease, it appears Sunwater has made attempts to improve cost efficiency.

Note that these costs have been confirmed to be related to construction of the new Option 1C and not related to legacy costs for repairing and maintaining the existing dam.

Findings

- Prudency:

This project is deemed prudent as the dam is currently operating at an intolerable risk as per the ANCOLD Limit of Tolerability for Existing Dams. It is a regulatory requirement to undertake works to reduce the risk. The documentation in relation to justifying the prudency of the project was of high quality and provided a clear technical basis for the dam safety improvements.

- Efficiency:

The level of documentation quality for the project is high. The Concept Design Report and Preliminary Business Case provide detailed assessment of options, scope, risk, cost, etc. The project is deemed as efficient in scope, standard, and efficiency. As the project is only at concept design stage, the cost estimates are high level concept and have been undertaken according to AACE guidelines and using information provided by Sunwater. The costs have been stated to be within an accuracy of -10% to +40%. This is more accurate than the level specified in Sunwater's cost estimate process for the preferred option concept design (+/-75%)². The total project cost claim is less than the cost estimate presented in the Preliminary Business Case and therefore assumed efficient.

² QCA Rfl A3 – Cost Estimation Process and the referenced Attachment 4 AM11_F02

Fairbairn Dam Safety Improvement Project

Project Overview

The Fairbairn Dam Safety Improvement Project was initiated in 2015 following the observation of seepage through the joints in the concrete slabs of the spillway during a five-yearly inspection in 2014 and early 2015. Without rectification, the assessed risk profiling rating of Fairbairn Dam was increased to above the acceptable limit of tolerability in accordance with the Australian National Committee of Large Dams (ANCOLD). Works to rectify the critical risks to the dam’s spillway stability have been implemented in three stages, with the final two stages of this project ongoing until 2021. The safety improvement works are essential to satisfy regulatory requirements regarding risk reduction.

Summary of Findings

Review Summary	Prudent	✓	Scope	✓	Capital expenditure claim (FY19\$)	FY16-20: \$147M FY21: \$21.0M
			Standard	✓	Impact of findings on claim (FY19\$)	FY16-20: \$0 FY21: \$0
			Cost	✓	Total Accepted (FY19\$)	FY16-20: \$147M FY21: \$21.0M

Background

Fairbairn Dam is located on the Nogoa River approximately 17 km south-west of Emerald. The dam consists of a main embankment and six saddle dams. The dam has a storage capacity of 1,304,115 ML at full supply EL 204.23 m AHD. It has a 163.07 m long uncontrolled, spillway crest. Saddle Dams 2, 3 and 4 have a crest level of 218.86 m AHD. Saddle Dams 1, 5 and 6 have a crest level of 217.94 m AHD, 0.92 m lower than the main dam.

The Portfolio Risk Assessment was initiated in June 2007 and has been regularly updated, with the latest version 7 in September 2018. The document provides a consolidation of the latest findings from comprehensive risk assessments and other relevant documents for each storage within the referable storages portfolio. The document describes various inspections, surveys, tests, and risk assessments that were completed from 2009 to 2017. Voids and subsurface drainage issues have led to the corrosion of anchors that presents a risk of uplift or transient pressures on the concrete slabs during flood events, which could in turn dislodge the concrete slabs and expose the foundation.

In accordance with the Queensland Dam Safety Regulator’s and ANCOLD’s Guidelines (Limit of Tolerability), the societal risk posed by Fairbairn Dam in its pre-Project state was unacceptable. That is, due to the identified deficiencies to the spillway, Fairbairn Dam is exposed to a higher risk of dam failure (during a flood event) than desirable. This is an issue that requires addressing as soon as practicable. The follow-on effects of a potential dam failure include significant loss of life and property damage to communities downstream of the dam, ongoing loss of regional water supply impacting commercial sustainability within the region, as well as the financial, reputational and legal implications to Sunwater’s business. The Portfolio Risk Assessment and other project risk assessments identify the F-N is presently above ANCOLD Limit of Tolerability for Existing Dams and upgrade works are required to reduce this risk

Dam safety obligations fall under regulatory requirements. Under the Water Supply (Safety and Reliability) Act 2008, dams are required to be maintained to reduce risk of dam failure and

consequential loss in line with Queensland's independent Dam Safety Regulator (DNRME), and relevant national (ANCOLD) and international guidelines.

As the dam owner, Sunwater has clear legal obligations to ensure the structural and operational integrity of its facilities and the safety of downstream communities. To ensure that this obligation is properly discharged, Sunwater utilises and has in place a Comprehensive Dam Safety Management Program (CDSMP) which adopts the standards and guidelines as stipulated by the Queensland Dam Safety Regulator and as recommended by ANCOLD.

The project has been split into stages to address the highest risk elements (at least what was considered to be at the outset of the project in FY15) prior to the imminent wet season in FY17. There are three stages to the project. Stage 1 was the immediate works required to reduce risk for the FY17 wet season. Those works were completed in December 2016. Since the Stage 1 project was commenced, additional investigations have been carried out into the substructure condition, which has presented additional intolerable risk elements. The Stage 2 and Stage 3 works are ongoing to continue to reduce the risk to tolerable in accordance with the guidelines.

Options Assessment

The February 2016 Business Case describes four options that were considered in a preliminary option assessment for the Fairbairn Dam Spillway Improvement Project. They include:

1. Do nothing
2. Implement improvement works on the existing spillway
3. Construct a secondary spillway
4. Drain and / or decommission Fairbairn Dam

The options were assessed against an MCA framework with weighted criteria including Addressing the Need (50%), Timing (20%), Net Cost (15%), and Project Delivery & Operational Risks (15%). The preferred option was Option 2 to implement improvement works on the existing spillway.

Option 2 was then further developed, and four different improvement options were defined. In the Business Case (Update) dated 19 July 2016, the following were considered in the detailed options analysis:

1. Option 1 – Do nothing
2. Option 2A – Partial repair of the 2:1 spillway portion
3. Option 2B – Full repair of the 2:1 spillway portion
4. Option 2C – Full repair of the spillway
5. Option 2D – Full repair of the spillway via staged delivery

The options were assessed with an MCA framework. The outcome of the detailed options assessment is the preferred implementation of Option 2D, which met all the proposed project objectives including to reduce operational risk profile prior to the FY17 wet season, lower project delivery risks, and optimisation of capital expenditure.

The staged delivery proposes a focus on repairs to high risk deficiencies in order of descending risk. Progressive improvements and risk reduction would be achieved at the earliest opportunity while the overall scope and timing could be reviewed and adjusted as needed. Two stages were originally proposed. Stage 1 would be implemented in 2016 prior to the FY17 wet season. Stage 2 would be scoped and designed thereafter.

Stage 1 works would include:

- Replacement of the under-slab drainage in the 2:1 sections of the spillway chute and filling of voids beneath the slabs
- Installation of corrosion resistant passive anchors in the 2:1 section of the spillway chute
- Installation of a 400mm reinforced concrete slab over the 2:1 section of the spillway chute
- Further engineering design, investigation and testing to inform Stage 2
- 3D physical hydraulic modelling

- Update Business Case to define Stage 2

Stage 2 would tentatively include works related to the 10:1 section, the dissipator, the siphon, potential anchoring of the spillway walls, and updating the comprehensive risk assessment.

Implementation

The February 2016 Business Case provided a cost estimate for the project development costs to date and the Stage 1 works. The total was \$28.8M as a P90 cost estimate. The actual construction works were estimated at \$10.25M. An addendum to the Business Case was made to account for updated design details on the anchors and potential effects from artesian flows not previously understood. The new anchors impacted the cost estimate by \$4,100 per anchor for a total of \$4.5M. Revised construction methodology to address the artesian flow conditions increased costs by \$1.7M. The total revised Stage 1 P90 cost estimate was then \$35.0M.

The construction contract was award to [REDACTED] in April 2016 in accordance with the procurement strategy.

A comprehensive risk assessment was completed as part of Stage 1 and it determined that Stage 2 would be required to reduce the risk below the ANCOLD limit of tolerability. The Business Case was updated in July 2016. The Stage 2 works were estimated at \$60M and were scheduled for completion by November 2018. The total project budget was then \$95M.

A detailed Project Management Plan was completed in February 2017, which encompassed Stages 1 & 2. From the monthly actual expenditure summary, it appeared Stage 1 construction was predominantly completed by December 2017, one year later than planned.

A Construction Management Plan was originally completed in February 2017. In December 2018, it was updated to reflect the proposed Stage 3. It described that during the design and associated modelling of the side walls in Stage 2, it was determined that the original design of anchoring and overlay slabs was no longer suitable or the most cost-efficient method. Instead, side wall training walls (gravity walls) would be constructed. This scope was defined as Stage 3. A December 2017 cost estimate was generated for Stage 3, revised three times, and finalised in September 2018. The final P90 estimate was \$45M and construction was expected to be complete December 2019.

The historical expenditure for Stages 1, 2 and 3 from the project monthly cost reports are shown in Table 1. These are in nominal dollars.

Table 1 Actual Project Costs by Stage

Task	FY16	FY17	FY18	FY19 ¹	Total
Stage 1 Planning & Design	\$3.08M	\$0.00M	-	-	\$3.08M
Stage 1 Construction	\$3.87M	\$15.7M	\$0.01M	-	\$19.56M
Stage 2 Planning & Design	\$0.87M	\$1.69M	\$1.98M	\$0.49M	\$5.03M
Stage 2 Construction	\$0.04M	\$6.10M	\$29.8M	\$5.94M	\$41.9M
Total Stage 1 & 2	\$7.86M	\$23.5M	\$31.8M	\$6.43M	\$69.6M
Stage 3 Planning & Design	-	-	\$0.72M	\$0.24M	\$0.95M
Stage 3 Construction	-	-	\$0.48M	\$11.8M	\$12.3M
Total Stage 3	-	-	\$1.20M	\$12.0M	\$13.2M
TOTAL PROJECT	\$7.86M	\$23.5M	\$33.0M	\$18.4M	\$82.8M

Notes:

1) FY19 costs are only up to February 2019.

The Stage 1 & 2 works as of February 2019 were \$69.6M, less than the original \$95M budget but work has not been completed. Based on the QCA RFI 58 cost forecast, it is projecting a final total cost of \$122M.

The October 2018 Briefing Note identifies reasons for increased costs for Stage 2 including:

- Adverse ground conditions impacting anchor installation below 10 m depths that required added design, trials and construction methodology

- Poorer strength foundation material below the ogee crest requiring increases for post tensioned anchoring
- Mitigation of possible overtopping events during potential severe wet weather events, due to an extended construction duration

An increase to \$103M for Stage 1 & 2 was approved in December 2017. As construction progressed on the ogee crest anchoring, it was determined that the original cost estimate of \$2M was insufficient. The allowance was increased to \$18M. The final approved budget was \$120M. The briefing note states that the Stage 2 & 3 works are optimistically targeting late 2020 completion, weather permitting, although it was advised that mid 2022 may be more realistic and the extended construction timeline would further increase project costs.

The summary of the QCA RFI 58 project cost claims provided on 3 July 2019 are shown in Table 2. They are in nominal dollars.

Table 2 Fairbairn Dam Safety Improvement Annual Capital Expenditure

	Historical and Transitional		Price Path Period	Total	Budget
	FY16-19	FY20	FY21	-	
Stage 1 & 2					
Capital	\$71.7M	\$25.7M	\$15.6M	\$113M	
Contingency	\$3.20M	\$2.00M	\$4.20M	\$9.40M	
Total Stage 1 & 2	\$74.9M	\$27.7M	\$19.8M	\$122M	\$120M
Stage 3					
Capital	\$20.8M	\$16.5M	-	\$37.3M	
Contingency	\$0.25M	\$5.68M	\$2.10M	\$8.04M	
Total Stage 3	\$21.0M	\$22.2M	\$2.10M	\$45.3M	\$45.0M
TOTAL PROJECT					
Annual Total	\$95.9M	\$49.9M	\$21.9M	\$168M	\$165M
Totals by Period	\$146M		\$21.9M	\$168M	

The RFI 58 cost claims for FY16-19 are \$95.9M, which are \$13.1M greater than those reported in the monthly cost reports; although the cost reports only go to February 2019. The Stage 1 & 2 cost claims are \$5.2M for the remaining 4 months in FY19. The Stage 3 cost claims are \$7.8M. Based on the 2019 Briefing Note, the higher costs are likely due to accelerating construction prior to the next wet season. The cost projected for FY20-21 appear consistent with the justifications presented in the 2019 Briefing Note. The total is \$122M compared to the currently approved \$120M budget. The additional \$2M is assumed related to another potential construction delay due to wet weather, which has been highlighted in the briefing note.

The Stage 3 total cost claim is \$45.3M, which is consistent with the September 2018 P90 cost estimate.

The total historical/transitional claim is \$146M nominally (\$147M in \$FY19). The total price path period claim is \$21.9M nominally (\$21.0M in \$FY19). No adjustments are proposed.

Findings

- Prudency: There is sufficient documentation on the risk assessments and regulatory requirements evidencing the need for this project. The project scope appears to have evolved over time. Some of this evolution was planned as part of the staged approach. Other parts were unplanned primarily as a result of unexpected sub-surface conditions. The risk assessments and detailed technical analysis carried out on each project element demonstrate the prudence of the project.
- Efficiency: While general good project governance has been adopted at a high level, it appears that efficiency may have suffered due to a lack of management of key project risks. It is evident

from a number of the project documents, namely the Design Report and the briefing note for shareholding ministers, that the project was beset by a number of challenges that affected scope, cost and schedule on the project. There appears to have been two key issues.

The first is associated with insufficient ground and condition assessments at the outset leading to additional risks being identified and subsequently managed as the project progressed in construction. The second relates to the consideration of pressure fluctuations that could occur under the side walls during significant flood events, which was not initially recognized and could lead to dam failure. Both of these issues appear to have been identified in the outset; in the case of the former identified as a low risk in the Business Case and in the latter, raised as an issue early on by the TRP, but not duly appreciated. They consequently caused issues in scope during the execution of the project. The scope could have been more efficiently planned, but not avoided.

The process of fast-tracking construction concurrently with design due to the assessed urgency of the project appears to have placed pressure on the design team to make design decisions / assumptions to allow construction to progress, which with the benefit of hindsight did not manage the associated risk appropriately and were to the potential detriment of efficiency. The substantial changes to the scope, budget and schedule post-business case cast doubt on to the initial options selection as the final cost and schedule approach that of the original Option 3 New Spillway.

Altogether, the project has a high level of documentation quality. The variations in the project are well documented and although significant, they have been appropriately justified. The project cost claims are only \$2-3M more than the final approved budget/cost estimate. The extra \$2-3M may be needed for extended construction due to wet weather, as stated in the Shareholding Ministers Briefing Note. The overruns on the original budget are more likely related to original underestimating than poor project delivery cost efficiency.

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Appendix E

Assessment Forms for Historical Renewals

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Project Name	Palmtree Creek Outlet Works
Project Number	07PIO05
Project Description	Replace Regulating Valve RV01 - Palmtree Creek Pipeline
Asset Type	Regulating Valve
Year(s) to be Delivered	2007-2012?
Cost	\$955,558

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	Insufficient information	There is a lack of definition on the need for the project, i.e. the need for the replacement fo the release valve. The comment in the scope document is that the 'outlet works are to be modified to meet WH&S and operational requirements'. While the regulating valve is clearly part of the original functionality it would appear that there have been previous failures of the valve that have resulted in long periods of it being inoperable and it is not clear of the consequence of this inoperability and equally the risk of that continued operation / justification for the project. There is a statement in the original project brief about the temporary outlet being too high a risk, however this is not detailed.	Medium	Unable to assess	Project Scope Definition document Project Brief
	Insufficient information	Refer above	Medium	Unable to assess	Project Scope Definition document Project Brief
	Insufficient information	Refer above	Medium	Unable to assess	Project Scope Definition document Project Brief
	Insufficient information	Based on the documentation, it is not possible to determine whether the expenditure was appropriate in quantum or timing. There was no clear definition of the project objective / driver to be able to assess the opportunity for deferral. As mentioned above it appears the previous failures had previously resulted in long periods of inoperation without a defined / documented consequence.	Major	Unable to assess	Project Scope Definition document
	YES	The proposed asset life of 80 years with 20 years for mechanical components. The original valve was supplied in 1996. The valve, any subsequent versions, have failed.	None	N/A	Project Scope Definition document
	YES	The assessment indicates that the asset is inoperable. Failure inspections and vibration analysis provide root cause analysis.	None	N/A	Condition assessment screenshot Valve Failure Inspection 2008 July Vibration Analysis 2008 December

Comment on Prudency

Business case and prudency and efficiency documents should have reasonably been completed for a project of this nature and size. Provided documentation lacks the definition needed to determine whether the need / business case for this project, and whether it was prudent. Documentation does not clearly define the overarching need for the regulating valve or how they manage the seemingly long periods when it has failed previously. The project appears to have commenced shortly after the (second) failure of the valve in 2007, but the works were not executed until starting in 2011/12. Despite this, the project need is clear based on the condition and inoperable status of the valve coupled with the described risk of damage to the pipeline from waterhammer.

Prudent

YES

Documentation Quality

Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

YES

Detailed options assessment with 12 options plus one additional option. Options assessment was peer reviewed.

None

Recommended Adjustment

Project Brief
Project Scope Definition document
Options Analysis 2009 July
Peer Review 2010 April
Peer Review 2010 August

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

YES

Preferred option provides technical solution, full risk reduction and at least cost. Disadvantage is that it requires manual flow control.

None

Project Brief
Project Scope Definition document
Options Analysis 2009 July
Peer Review 2010 April
Peer Review 2010 August

Were/are non-capex options considered (such as operational solutions)?

YES

Purely operational solution not possible. But preferred solution included a reduced CAPEX solution by requiring manual operational intervention.

None

Project Brief
Project Scope Definition document
Options Analysis 2009 July
Peer Review 2010 April
Peer Review 2010 August

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

YES

Minimal details available, however project scope identifies that the design will conform to Australian Standards

None

Project Brief
Project Scope Definition document
Options Analysis 2009 July
Peer Review 2010 April
Peer Review 2010 August

Is the standard if works compatible with existing and adjacent infrastructure or modern engineering equivalents?

YES

Based on the design analysis described, the modifications are consistent with the general existing infrastructure.

None

Project Brief
Project Scope Definition document
Options Analysis 2009 July
Peer Review 2010 April
Peer Review 2010 August

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

N/A

	<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	NO	<p>The project scoping document budgeted \$769,950 for the work. This included \$489,000 for the supply and installation of the vales and piping. The quotes received totalled \$348,956 from [REDACTED] and [REDACTED]. Add in \$28,129 quotes by [REDACTED] for the waterhammer review. The actual expenditures was \$394,918, which represents a difference of \$17,823. This may be attributed to the cost of the [REDACTED] review, whose quote or cost was not provided. There is no information documenting contractor variations but based on the final contractor costs from the Total Actual Cost report, any variation would have been minor. The total overrun on the project are \$185,607 and are attributed to non-direct Sunwater costs. The Sunwater labour had an overrun of \$80,417 beyond the budget. The actuals also had a line item for Prior Year Expenses of \$10,241 which should be excluded. The total non-direct costs appear to be 53% of the total project costs, which is considered high. No supporting documentation was included to justify project overruns; therefore it is expected that Sunwater would recoup some of the costs. The indirect and OH appears to be high too, but as this is managed through SAP, it is assumed as acceptable.</p>	Medium	<p>\$90,658 should be deducted from the claim, which is a sum of the Sunwater labour overrun (\$80,417) and the prior year expenses (\$10,241).</p>	<p>Scoping Document 2011 February Total Actual Costs Summary 1 July 2011 to Present TRR Butterfly Guard Valve 2012 March TRR Pepperpot 2012 June TRR Pipe Mods 2012 June Tender Assessment 2010 March</p>
	<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.</p>	NO	<p>Competitive tendering was used for the butterfly valve, but only one bid was received. The pepperpot was later sole sourced to the same supplier [REDACTED]. Early engagement of other valve suppliers may have led to more interest in the project, and a more competitive price may have been received. That said, the [REDACTED] quote was in line with the budgeted amount.</p> <p>The pipe modifications were granted a procurement exemption to sole source the work to [REDACTED] based on urgency. The urgency in the project has not been proven, therefore the need for the exemption is uncertain. That said, the cost was \$39,770 so a competitive bid would have a minor impact on total project costs.</p>	Minor		<p>Scoping Document 2011 February Total Actual Costs Summary 1 July 2011 to Present TRR Butterfly Guard Valve 2012 March TRR Pepperpot 2012 June TRR Pipe Mods 2012 June Tender Assessment 2010 March</p>
	<p>If not, why?</p>		<p>See above</p>			
	<p>Was/is the the allowance for indirect costs reasonable for the scope of the project?</p>	YES	<p>The indirect and OH costs were budgeted at 25% of the project costs. The final makeup was 34%. While they appear high, since they are managed through SAP, they are assumed reasonable.</p>			<p>Scoping Document 2011 February Total Actual Costs Summary 1 July 2011 to Present</p>
	<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	Insufficient information	<p>High level risk assessment included in project definition document. The absence of key documents though would suggest a lack of risk management rigour.</p>			<p>Scoping Document 2011 February</p>
	<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	N/A	<p>No cost escalation mentioned in any of the documentation.</p>			
	<p>Were options considered in determining the least cost or preferred option?</p>	YES	<p>The least cost technically acceptable option was selected</p>			<p>Options Analysis 2009 July</p>
	<p>Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?</p>	YES	<p>Refer above.</p>			

Did the project consider whole of life costs, including future maintenance and operating costs?

YES

Whole of life costs were discussed in the Options Analysis such as the labour required for manual flow control, but the total whole of life costs were not fully quantified.

Options Analysis 2009 July

Have any potential efficiency gains been identified?

NO

No efficiency gains were documented.

Comment on Efficiency

In the best case, there is a whole suite of documents which describe the robust project management processes, detail contractor variations, and any changes to scope that affect both contractor and internal labour costs. These were omitted from the submitted documents. The valve replacement evidently had substantial technical challenges and resulted in a cost creep, primarily from Sunwater labour and indirect costs. Procurement processes were not effective to gain appropriate market conditions for material supply and installation. Expenses from previous years were also included which should not be part of this claim. For these reasons, the project was not considered efficiency and a minimum of \$90,658 should be deducted.

Efficient

NO

Documentation Quality

Medium

Project Name	Brightley Pstn 1 & 2
Project Number	11ETO06
Project Description	Replace Switchboards and Control Equipment
Asset Type	Pump Station
Year(s) to be Delivered	
Cost	\$968,264

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Brightly PS comprises critical water supply infrastructure under the Eton Distribution Scheme. In an audit of Sunwater's electrical sites, it was found that the switchboards at Brightly PS 1 & 2 were obsolete due to their age. At the time of the audit in 2009, the switchboards at both Brightly PS 1 & 2 were noted as being 30 years old and in poor condition. The typical serviceable life of electrical infrastructure is 15 years.	None		SunWater: Audit of Electrical Sites Memorandum: Eton Irrigation Area - Switchboard Upgrade Program
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The project is to replace the switchboards at Brightly PS 1 and 2 with switchboards complying with current Australian Standards. This project will also capture improvements in the control system by replacing the superseded relay control with Sunwater's standard specifications and current practices. It will also enhance operator safety and improve Sunwater's ability to monitor the PSs remotely.	None		Scoping Document 2013 March
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Brightly PS is essential infrastructure under the Eton Distribution Scheme. Sunwater have a regulatory responsibility under the Eton Distribution Scheme and would be at risk of not meeting the agreed level of service should the pump stations fail as a result of obsolete switchboards.	None		SunWater: Audit of Electrical Sites
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are required to replace the switchboards so that they comply with current Australian Standard requirements.	None		Scoping Document 2013 March Brightley PS 1 and 2 Switchboard Upgrade Specifications
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The standard serviceable life for switchboards and other electrical infrastructure is 15 years. The existing switchboards at Brightly PS 1 and 2 have exceeded this life expectancy by double and are therefore long overdue for replacement.	None		
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The switchboard audit clearly supports the replacement of the switchboards.	None		SunWater: Audit of Electrical Sites

Comment on Prudency

The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Pioneer River Water Supply Scheme.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

NO

There was no documentation of an options analysis completed for this project. However, the recommended action per the Sunwater: Audit of Electrical Sites suggests the only viable option was replacement of the switchboards. At a minimum, an options analysis should have been completed to consider the consequences of doing nothing, as well as the type of switchboard to be installed (Sunwater standard or otherwise).

Minor

Recommended Adjustment

Information assessed

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

N/A

No options analysis completed.

Minor

Were/are non-capex options considered (such as operational solutions)?

NO

Refer above.

Minor

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

YES

The replacement switchboards are in accordance with the requirements prescribed by AS/NZS 3439.1:2002 Low-voltage switchgear and controlgear assemblies, AS/NZS 3000:2007 Wiring Rules, AS/NZS 2067:2008 Substations and high voltage installations exceeding 1 kV a.c., and Queensland Electrical Safety Regulations 2002. The contractor specification included requirements for RPEQ certification.

None

Sunwater: Audit of Electrical Sites Specifications 2012 January

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

YES

Refer above.

None

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

YES

The initial Eton Switchboard Upgrade Review 2009 estimated the switchboard replacement at \$265,000 but did not include the associated equipment. The 2011 cost estimate appears to have more appropriately scoped the project and estimated \$454,700 (exc. 10% cont and GST). Contractor quote was \$703,516 plus \$50,845 in appropriately justified variations. The final total project was completed for \$1,037,850 with the contractor component at \$756,868. The final non-direct costs were 27%, which is on the lower side for Sunwater projects. The total costs appear to be reasonable, and the initial budget cost estimates underestimated.

None

Prudency and Efficiency
11ETO06 Total Actual Costs Summary
Tender Assessment

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

YES

A procurement process was undertaken in accordance with Sunwater's Significant Procurement Plan to price the costs of replacing the Brightly PS switchboards. Three suppliers were invited to tender, two quotes were received. [REDACTED] were awarded the contract, whose price was similar to the other bidder.

None

Tender Assessment Recommendation

If not, why?

Was/is the the allowance for indirect costs reasonable for the scope of the project?

YES

The final non-direct costs were 27%, which is on the lower side for Sunwater projects. Indirect costs cannot be specifically determined as they are lumped with overhead, but appear to be close to 10%, which is reasonable.

None

11ETO06 Total Actual Costs Summary

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Insufficient information	Unable to assess whether the appropriate processes were followed to manage risk and uncertainty based on the information provided. There was no evidence of project management planning. Better forward planning may have improved early scoping and prevented the large cost overruns recorded for this project.	Minor		
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Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Insufficient information	The works were delivered over three financial years, with early works pushed to later years. Effects of cost escalation are not documented but are likely negligible.	Minor		11ETO06 Total Actual Costs Summary
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Were options considered in determining the least cost or preferred option?

NO	No options assessment.	Minor		
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Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

NO	No alternatives considered.	Minor		
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Did the project consider whole of life costs, including future maintenance and operating costs?

YES	The project was initiated as the switchboards had reached the end of their economical life. In addition to meeting legislative requirements, replacing the switchboards provided many benefits including increased remote operational ability of the pump stations and access to current (lower cost) spare parts.	None		Project Scope Definition
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Have any potential efficiency gains been identified?

NO				
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Comment on Efficiency

This project lacked documentation in several key areas that would have justified the replacement works undertaken and the funds that were exhausted. The original budget was under-scoped and underestimated and was not an accurate representation of the final funds spent. Alternatives were not formally assessed. Overall, the quality of documentation is low and did not demonstrate appropriate project management processes were followed. That said, the contractor was competitively bid and matched market conditions. It comprised the majority of the project costs. Final non-direct costs (27%) were lower than typical Sunwater projects. Therefore, the final project costs appear to be efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Boondooma Dam Flood Damage Repairs
Project Number	12BYR17
Project Description	Spillway Repairs
Asset Type	Dam spillway concrete, spillway channel and spillway walls
Year(s) to be Delivered	FY 2012 to 2019
Cost	\$36,628,761

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Prudency</p> <p>Were/are the works reasonably required to continue to deliver agreed service levels?</p>	YES	<p>As a result of the January 2011 floods, Boondooma Dam spillway and spillway channel experienced significant damage, including:</p> <ul style="list-style-type: none"> - Large scours in the spillway upper chute located between the spillway crest and Erosion Control Structure, including one hole with a depth in excess of 5 m (2010/11 event); - Severe scour to the spillway chute downstream of the ECS (2010/11 event); -Removal of approximately 60,000 m3 of material from the lower spillway chute (2013 event). <p>Geotechnical investigations (completed in 2011, 2012 and 2014) suggested that the discharge capacity of the spillway may become compromised if the damage is not rectified prior to the next major flood.</p> <p>Reformation of the access road to the spillway and repairs to the spillway surface were necessary to restore the structure to its pre-flood condition. Subsequent flood events occurred during restoration works of the January 2011 flood damage, which in turn resulted in additional repair works being undertaken.</p>	None		<p>#1093624-Scoping Document - Flood Repairs.doc</p> <p>#1135055 - Inspection of Erosion in Spillway - Memo.pdf</p> <p>#1346568 - Concept Design Report 2012.pdf</p> <p>#1380760 - Geotechnical Investigation Report 2012.pdf</p> <p>#1574597 - Geotechnical Investigation Report 2014.pdf</p> <p>#1973129 - Business Case Spillway Reinstatement and Repair to Sidewall.pdf</p>

Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Several immediate risks were identified at the spillway as a result of the flood, including: - Risk to staff of engulfment and crushing from overhanging rock - Lack of guardrail to prevent vehicles driving over edge of structure - Access track unsuitable to support heavy plant machinery to complete repairs Outcomes from geotechnical inspections of the Boondooma Dam indicate that continued back scour will result in the sidewalls of the chute becoming unstable. This instability may cause collapse which would block or reduce the discharge capacity of the spillway, becoming a dam safety issue.	None		#1093624-Scoping Document - Flood Repairs.doc
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Outlet works for Boondooma Dam are required for water management protocol under the Boyne Supply Scheme.	None		QCA Information Request FR14_Attachment 2_Summary of 12BYR17 supporting Information.xlsx
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Works to be completed prior to wet season to ensure the flood damage is repaired and spillway has full design hydraulic capacity.	None		#1346568 - Concept Design Report 2012.pdf
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Flood damage, works not related to asset life	None		
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Before Photos and Scoping Document demonstrate considerable extent of scours in spillway and resultant overhanging rock which indicate works were appropriate	None		#1093624-Scoping Document - Flood Repairs.doc #1121074-Before Photos.doc

Comment on Prudency	The damaged structures are critical to the safe operation of the Boondooma Dam and its role in managing water during flood events. The extent of damage resulting from the January 2011 and 2013 floods was well documented, with several geotechnical investigations supporting its repair. Multiple risks to the structural integrity of the spillway were identified and justified immediate repair works. The project scope was well-defined and its development in time was justified due to additional flooding affecting initial repair works. Extensive engineering and technical review were conducted to conclude the preferred option. In this regard, the prudency of the project scope is justified to a high level of confidence.
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Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	YES	<p>There were several options analyses completed as part of this project. Options are detailed in the Business Case and Design Reports. A thorough Concept Phase Study was completed to identify a long term solution to the scour. Four possible pathways were identified and investigated:</p> <ul style="list-style-type: none"> - Option A: improve the spillway chute performance beyond its original state (pre 2010/2011 flood) such that it could withstand all future flood events up to AEP 1 in 10,000 years with minimum damage. - Option B: return the spillway to an 'as was' profile. This option aimed to satisfy the essential performance characteristics of the spillway and return the spillway to "as was" functionality. - Option C: Ongoing corrective maintenance only. - Option D: Undertake works to stabilise the spillway upper chute and construction of a new ogee crest upstream. - Option E: Undertake works to stabilise the spillway upper chute and strengthen the existing crest. <p>The recommended option was Option E, but coupled with an ongoing monitoring and corrective maintenance program since the risk of scouring would remain.</p>	None		<p>#1885531 - Preliminary Design Phase Final Report.pdf #1973129 - Business Case Spillway Reinstatement and Repair to Sidewall.pdf</p>
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	YES	<p>An external consultant was engaged by Sunwater to develop an apply an option evaluation framework that would allow the various options to be assessed. Further, a separate Technical Review Panel was formed to review the soundness of the repair works proposed by the preferred option to ensure the long term longevity of the Boondooma Dam spillway.</p>	None		<p>#1885531 - Preliminary Design Phase Final Report.pdf</p>
<p>Were/are non-capex options considered (such as operational solutions)?</p>	YES	<p>A "do nothing" approach was considered but ruled out as the Erosion Control Structure may be damaged further during future floods as illustrated by Compressive Scour Method (CSM). Once this protection barrier is removed, the unlined upper chute would be exposed to the direct impact of back scour. Canonisation of the dykes or the formation of an upper chute plunge pool could follow as shown in the CSM. A "do nothing" approach was therefore not advised.</p>	None		<p>#1885531 - Preliminary Design Phase Final Report.pdf</p>

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	A Technical Review Panel convened on several occasions. The Panel supported the concept of strengthening the existing crest as opposed to constructing a new one. Reports are evident. Technical specifications for the works detailed were completed by an external consultant and provided for review. These appear to be conform with current industry standards. A Project Closure Report, Post Construction Report and Certificate of Practical Completion was provided in accordance with industry standards.	None		#1885531 - Preliminary Design Phase Final Report.pdf #1982284 - Detail Design Report 2016.pdf #1293793 - Technical Review Panel Report #1.pdf #1599463 - Technical Review Panel Report #2.pdf Technical Review Panel Report #3.pdf #1830849 - Technical Review Panel Report #4.pdf #1948834 - Technical Review Panel Report #5.pdf Technical Specifications
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The preferred option was compatible with existing infrastructure. Physical hydraulic modelling was undertaken to support the preferred design.	None		#1982284 - Detail Design Report 2016.pdf
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	None identified		None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The total actual costs for this project was \$38M. This was consistent with the anticipated cost provided by independent cost estimator, [REDACTED]	None		12BYR17 Total Actual Costs Summary.xlsx #1982284 - Detail Design Report 2016.pdf
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	[REDACTED] was selected to undertake an independent cost estimate for the detailed design works due to its experience in similar projects and prior work during the concept and preliminary design phases. The Total Contract (excluding escalation and GST) for construction works was \$37,987,187. A Significant Procurement Plan was provided and executed. The construction works were packaged appropriately and a competitive procurement process was undertaken. Offer recommendation reports document the process for selection of Contractors for each package. All exemptions from the procurement process were detailed and formal approval was provided.	None		#1982284 - Detail Design Report 2016.pdf Offer Recommendation Report Exemption Significant Procurement Plan
If not, why?	N/A		None		
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Per the Total Actual Costs Summary, the indirect costs associated with this project represent 7% of the total project costs and is considered reasonable. Overhead and Ownership labour represented a further 23% of the total project costs. The typical ranges defined for indirect costs appear reasonable.	None		12BYR17 Total Actual Costs Summary.xlsx #1221498 - Options cost estimates.xls
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	The Pre-construction Document demonstrates sufficient project management strategies.	None		#1192514-Scoping_Document PreConstruction.doc
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	This project commenced in 2011 and was completed in 2018. Escalation was considered in the Options Analysis Report, whereby a rate of 1.5% escalation was assumed in the costing. Sufficient contingency was allowed for in the estimate by the cost estimator and a P90 was completed which provided confidence in the estimate.	None		#1982284 - Detail Design Report 2016.pdf #1628195 - Spillway Options Analysis - PWC.pdf
Were options considered in determining the least cost or preferred option?	YES	Refer above.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above.	None		

Did the project consider whole of life costs, including future maintenance and operating costs?

YES

The preferred option was selected due to its lower cost, but ongoing monitoring and maintenance would be required. This was accounted for in the

None

#1982284 - Detail Design Report 2016.pdf

Have any potential efficiency gains been identified?

NO

None identified

None

Comment on Efficiency

The project appears to have followed a structured project management process. The project scope and cost developed over time due to additional damages from subsequent flood events hindering initial repair works. Throughout the project life, these variations were effectively documented and justified. The quality of documentation provided is of a high quality and thoroughly details the processes undertaken from project inception to completion. Adequate and appropriate procedures were followed regarding project management, design development, technical reviews and procurement. A competitive procurement process was undertaken for the majority of the project value. The total actual project costs were less than the P90 cost estimate provided by a third party. The project has been executed within the total approved budget. For these reasons, the project is considered efficient.

Efficient

YES

Documentation Quality

High

Project Name	Eden Bann Weir Fishway PLC and SCADA Upgrade
Project Number	12LFZ12
Project Description	Replacement of control equipment for fishlock
Asset Type	Control
Year(s) to be Delivered	FY 2015
Cost	\$139,241

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Serviceable life of the fish lock control system was nearing its end. Old parts were identified as obsolete and not supported by the manufacturer. The control system is integral to the operation of the fishway.	None	Options Analysis
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Obsolete parts relate to compliance obligation of operating the control system. This justifies the upgrade of the control system.	None	Options Analysis
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Sunwater will be in breach of The Waterway Barrier Works Development Approvals (Fish Habitat Management Operational Policy FHMOP 008) if the fishway is inoperable due to control system malfunction.	None	Options Analysis
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None	Options Analysis
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The service life of electrical equipment is generally 10-15 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.	None	Options Analysis
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Records show that the PLC and SCADA computer were built and installed in 1999. The latest inspection indicates that the equipment is still functional, however Sunwater faces operational risk should any components of this obsolete system fail. Appropriate steps were taken to determine the control system was outdated, including consultation with the manufacturer. In line with standard equipment life expectancy, the system is due for replacement.	None	Options Analysis Scope of Works
Comment on Prudency		The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure to operate the fish lock would be a breach of Sunwater's regulatory requirements.				

Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

YES

Internal and external control system models considered as options. A "do nothing option" was also considered.

None

Recommended Adjustment

Options Analysis

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

YES

Based on costs, it was more beneficial to replace the control system with Sunwater Standard PLC Hardware (Schneider).

None

Options Analysis

Were/are non-capex options considered (such as operational solutions)?

YES

A "do nothing option" was considered, however this was ruled out as this puts Sunwater at operational risk that may result in them being in breach of the regulatory requirement. Consequences of a breach include prosecution, penalties and a damaged reputation. Running the fishlock manually was considered but dismissed due to prohibitive labour costs (\$0.5M p.a.)

None

Options Analysis

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

YES

The standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1999, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for Sunwater engineers nor PLC Programming Software licencing.

None

Options Analysis
Scope of Works
As Builts
History Record

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

YES

Refer above.

None

Options Analysis
Scope of Works

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Upgrade of existing control system to modern standard. Sunwater staff are also familiar with proposed brand, Schneider, which will improve general business performance as there will be consistency across various sites regarding the control equipments used.

None

Options Analysis
Scope of Works

Was/is the incurred/proposed cost reasonable for the scope of the project?

YES

Lack of documentation breaking down project expenditure. Quote received from contractor is for \$88,796 incl. GST. Total expenditure recorded as \$139,241. Project closure report states asset cost is \$88,796; therefore, it is assumed there were no contractor variations. The non-direct Sunwater cost would then be 36% of the total project cost, which is reasonable for this type of project. The budgeted figure of \$146,208.40 is also reasonable, which is only 5% more than the actual cost.

None

Offer Recommendation
Project Closure Report

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

YES

Based on the time schedule for completion of works, Sunwater applied for an exemption from competitive procurement process. [REDACTED] were invited to provide an offer.

None

Procurement Plan

If not, why?

Was/is the the allowance for indirect costs reasonable for the scope of the project?

Insufficient information

No record of indirect costs or justification.

Medium

Offer Recommendation

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

YES

Thorough risk assessment undertaken in options analysis.

None

Options Analysis

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

N/A

Were options considered in determining the least cost or preferred option?

YES

Least cost option derived from options analysis.

None

Options Analysis

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

YES

MCA used was appropriate.

None

Options Analysis

Did the project consider whole of life costs, including future maintenance and operating costs?

YES

Cheaper maintenance as parts are available on the market.

None

Options Analysis

Have any potential efficiency gains been identified?

YES

Using Schneider equipment has a practical benefit in that Sunwater staff are experienced with the equipment and control, therefore would not require additional training or licencing of programs.

None

Options Analysis

Comment on Efficiency

As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed; however, the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Although the information provided was generally high quality, there was a lack of information regarding incurred project costs. That said, the overall cost generally aligns with the scope of works that is described, was under the original budget, appeared to have no contractor variations, and had low non-direct cost. For these reasons, the project cost can be considered efficient.

Efficient

YES

Documentation Quality

Medium

Project Name	Tinaroo Dam Gallery Light Replacement
Project Number	12MDA57
Project Description	Replace lighting system at the Tinaroo Falls Dam Gallery
Asset Type	Lighting
Year(s) to be Delivered	2015/16
Cost	\$480,001

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	N/A		None		Renewals Detailed Options Analysis
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Electrical system does not comply with current standards and is 60 years old. Asbestos in lights presents a health and environmental risk that needs to be addressed. Emergency lighting at risk of failure, presenting safety risk.	None		Renewals Detailed Options Analysis BW R&E Project Scoping and Delivery Plan
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	N/A		None		Renewals Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The asset is non-compliant and presents a risk that needs to be addressed in the immediate term.	None		Renewals Detailed Options Analysis
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the available information the assessment of life in the condition assessment appears consistent with industry standards.	None		Renewals Detailed Options Analysis BW R&E Project Scoping and Delivery Plan
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	Insufficient information	Pre project condition assessment was not provided, however, based on other project drivers the absence of it is not material to the project assessment.	None		
Comment on Prudency			The project is deemed prudent because it seems clear that the asset had reached the end of its life and posed a risk to the health and safety of the personnel entering the TFD gallery. The March 2015 detailed options assessment and the 2014 Facility Condition Assessment provide clear identification for the project and demonstration of prudent project development.			
Prudent			YES			
Documentation Quality			High			

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Clear options considered in options assessment including the do nothing option.	None		Renewals Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Evaluation of options is transparent and defensible.	None		Renewals Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	While there are no opex only options considered, an option was considered to defer capital through additional opex spend.	None		Renewals Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Based on the information provided, the project appears to conform with standards.	None		CONTRACTOR SCOPE OF WORKS 15SW4605
	Is the standard if works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Lighting system and power distribution replaced to current standards.	None		CONTRACTOR SCOPE OF WORKS 15SW4605
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Scope has considered upgrades to led fittings in replacement of fluourescent tubes	None		CONTRACTOR SCOPE OF WORKS 15SW4605
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Tendered works with demonstration of selection for value. The lower of the two tender submissions was selected to perform the contract to prove the efficiency. The original cost estimate by Sunwater was low due to the increased scope in the quantities of lightings in the tender. Estimation of internal hours appears reasonable.	None		Project closure report Updated scope of works Tender assessment report
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Pricing works through competitive tender suitable. Engineering documentation brief appears suitable and to required standards. The scoping document states the procurement strategy is to go out for 5 tenders at least, but there are only 2 tender submissions. There is no supporting doc for this tender has been sent to at least 5 tenders	None		Project closure report Updated scope of works Tender assessment report
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Build up of hours appears reasonable.	None		Cost estimate
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	While the general PM processes have been followed there appears to be a large disparity between the planned and actual costs which is unexplained by the documentation. Part of the cost increase appear to be from the higher than estimated tender pricing for the installation works.	None	Likely no material change	Project closure report Updated scope of works Tender assessment report
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	NPVs have been used in options assessment although no information on what discount rates have been used.	None		Renewals Detailed Options Analysis
	Were options considered in determining the least cost or preferred option?	YES	MCA used appears appropriate	None		Renewals Detailed Options Analysis
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used appears appropriate	None		Renewals Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	To a limited extent. No material quantification / assessment of operating costs for the new lighting.	None		Renewals Detailed Options Analysis	

Have any potential efficiency gains been identified?

YES

Potential further opportunities for additional assessment on efficient lighting options

Minor

Not considered material to the overall project based on the inherent choice of efficient lighting.

CONTRACTOR SCOPE OF WORKS 15SW4605

Comment on Efficiency

The project was delayed (from the initial recommendation) and project expenses were incurred over several years. It is not clear why these delays occurred. The original project cost estimated significantly underestimated the scope of work, particularly the total number of light fittings to meet Australian Standards. Both of the two contractors who quoted on the project had quotes significantly higher than estimated. The preferred contractor was almost \$137,000 less than the other bidder, which emphasizes the importance of competitive tenders. The contractor executed the work without variations. The non-direct costs were 48% of the total project costs. While high, this is typical for Sunwater electrical projects. Overall, the project appears to have been delivered efficiently.

Efficient

YES

Documentation Quality

Medium

Project Name	Tartus Weir - Flood Damage Repair - Protection and Erosion Works Refurbishment
Project Number	12NMA08
Project Description	Refurbish the protection works downstream of the weir.
Asset Type	Weir
Year(s) to be Delivered	2014
Cost	\$251,213

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Rock protection associated with the weir was eroded and needed repair. Significant erosion of the left and right bank abutments was observed with evidence undermining of the weir. Reinstatement of the bank was required to ensure ongoing protection of the weir during flood events.	None		Email Tartus Weir Flood Inspection Annual Inspection Report Request for Offer
	YES	The asset is "not referable under the Water Supply (Safety and Reliability) Act when assessed in accordance with the Queensland Guidelines for Failure Impact Assessment of Water Dams (DERM, 2010) due to the fact that impacts in the event of failure of the weir would be within the bed and banks and that population risk is less than 2. However, Sunwater has classified the weir as 'Major' in terms of importance of the asset within the Nogoa Supply Scheme and the complexity of components including outlet works." SunWater has a regulatory obligation under the Nogoa Supply Scheme. Safety inspections are required annually as maintenance of site safety is difficult. Evidence of unauthorised vehicle access was observed in the latest Annual Inspection Report. Rock protection was identified to reduce erosion of the river bed and scouring around weir structure. Tartus weir mitigates flooding in area.	None		Annual Inspection Report
	YES	Asset has major importance within Sunwater's Nogoa Supply Scheme and is part of the water management protocol, e.g. flood mitigation.	None		Annual Inspection Report
	YES	Damages resulting from the 2011 flood present safety risks and evidence of undermining the weir. Timing of expenditure was appropriate based on seasonal wet weather and planned capital works in accordance with the annual and five yearly weir inspections.	None		Annual Inspection Report

	<p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p>	YES	<p>Based on the available information, the assessment of run-to-failure asset life in the condition assessment appears consistent with industry standards. A material variation was required as the volume of rock and concrete used during construction had to be increased. Additional materials and labour were necessary to achieve project outcomes.</p>	None		Annual Inspection Report Prudency and Efficiency Document
	<p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	YES	<p>After photos support proposed works. Damages repaired and no further erosion observed.</p>	None		Before and After Photos As Built
Comment on Prudency		<p>The Tartus Weir was damaged after floods in 2011. Based on the information provided, the weir is of major importance to Sunwater's water supply scheme. The refurbishment of rock protection was required to reinstate the pre-flood condition of the structure and prevent further damage from occurring. The document provided was sufficient in demonstration project prudency, as without the works Sunwater could face breaches in their regulatory obligation under the Nogoia Supply Scheme.</p>				
Prudent		YES				
Documentation Quality		High				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	NO	Based on the information provided there was no options assessment. Although it is unlikely there were other suitable options to treat the damages recorded in the Annual Inspection Report, a do nothing option should still be considered. The remedial works could have been deferred, however the prudence of the project was suitably established to justify the treatment.	None		Annual Inspection Report
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	Insufficient information	Given that no options were investigated it is not possible to comment on whether the scope was the best method.	None	Unable to assess	Annual Inspection Report Scope Document
<p>Were/are non-capex options considered (such as operational solutions)?</p>	NO	Not discussed in documentation provided. Refer above.	None	Unable to assess	
<p>Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?</p>	YES	Works appear to align with industry standard treatments for rock protection reinstatement. As built drawings which detail the rock protection repairs were provided.	None		Scope Document
<p>Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?</p>	YES	Treatment suitable to restore existing infrastructure.	None		Scope Document
<p>Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.</p>		More accurate estimation of rock/concrete volume to reduce material variations. Utilisation of existing contractor and sole source quarry increased efficiency.	None		Prudence and Efficiency Document
<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	YES	Material costs were based on market conditions and variations were prices according to previous invoices for the same project.	None		Prudence and Efficiency Document
<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.</p>	YES	Contractor was competitively bid. Supply of rock to sole source quarry was justified due to locality of works and nearby quarry likely to reduce cost of materials and labour.	None		Procurement Plan Exemption
<p>If not, why?</p>					
<p>Was/is the allowance for indirect costs reasonable for the scope of the project?</p>	YES	Indirect costs were accounted for in the budget breakdown. The costs were reasonable. However, no breakdown of final expenditure was provided.	None		Prudence and Efficiency Document
<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	YES	Low risk as detailed condition assessment undertaken to scope works. Design brief includes drawings of site with defined scope of works for quotation.	None		Annual Inspection Report Scope Document
<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	YES	Variations based on work completed to-date.	None		Prudence and Efficiency Document
<p>Were options considered in determining the least cost or preferred option?</p>	YES	Alternative rock suppliers were considered although sole source was justified based on proximity to the weir thereby reducing costs for the project.	None		Procurement Plan Exemption
<p>Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?</p>	YES	Refer above	None		Procurement Plan Exemption
<p>Did the project consider whole of life costs, including future maintenance and operating costs?</p>	NO	No discussion of whole of life costs.			

Have any potential efficiency gains been identified?

YES

Utilisation of nearby quarry increased efficiency of rock supply delivery labour.

None

Procurement Plan Exemption Prudency and Efficiency Document

Comment on Efficiency

Sufficient documentation was provided to demonstrate consideration for project efficiency. The cost of the project was managed despite creep occurring due to additional rock required to repair scouring of the river bed. Funds were made available to cover cost creep from other projects. The estimated variation was based on costs incurred to date, outstanding invoices and expected internal costs. The additional work was carried out by the contractor who was established on site enabling it to be completed within the required timeframe and also making it more cost efficient. Documentation quality could be improved with consideration of alternative options and whole of life costs. The supply of rock was exempted from competitive tendering as per the procurement policy due to the distances of site from other quarries were much longer than Dingo mining, thus more costly. No record of final project expenditure breakdown was included so conclusions have been made based on a) contractor/supplier quotes and b) total project expenditure being less than original business case cost estimate. Note that the Historical Renewals spreadsheet summary provided by Sunwater lists \$229,417 of costs on this project.

Efficient

YES

Documentation Quality

Low

Project Name	Investigation and Works Required at Moolabah Weir
Project Number	12SGA24
Project Description	Dam Break & Upgrade (Phase 3)
Asset Type	Weir
Year(s) to be Delivered	2012
Cost	\$639,046

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The need for emergency works of the Moolabah Weir was evidenced in the condition assessment and a thorough justification of its repair was clear in the scoping documents and final report. The apron slabs of the weir had been lifted in various places, the clay embankment within the structure of the weir and left abutment was eroded, and several instances of advanced piping was observed resulting in loss of storage through the weir.	None		Condition Assessment Scoping Document Final Report
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Based on the information provided, the weir in its deteriorated condition did not meet compliance requirements.	None		Condition Assessment Final Report
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The weir is a regulating structure for releases from Beardmore Dam and forms a pumping pool for a number of upstream regulators. The observed failures of the weir present issues in SunWater's water management protocol. This was identified as a primary driver for the project.	None		Final Report
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The budget constrained the timing of the works. It was identified that project completion was required in FY13. Repairs were also required prior to the following wet season to prevent further damages.	None		Scoping Document
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the available information the assessment of life in the condition assessment appears consistent with industry standards.	None		Final Report Scoping Document
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Weir had failed due to piping of the embankment material.	None		Condition Assessment
Comment on Prudency	The prudency of this project is evidenced by the safety risks imposed by the reduced structural integrity of the weir after the record 2012 floods. Although emergency works were completed for part of the weir structure, the full storage of the structure was compromised. Three residents downstream of the weir were identified as housing a population at risk, driving the need for the full restoration of the weir.					

Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	The remediation works were separated into stages and a final report detailed an options assessment for the complete restoration of the weir structure. Option 4 was identified as the preferred treatment, which involved extending previous repair works of the weir (shotcreting and dam break study).	None		Final Report
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The option chosen was the least cost.	None		Final Report
Were/are non-capex options considered (such as operational solutions)?	YES	Decommissioning was assessed as an option, however this would not resolve the flood risk and would ultimately require works upstream at Beardmore Dam. Subsequently, this option was not recommended.	None		Final Report
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Based on the information provided, including detailed designs, the standard of work appears to conform with industry standards.	None		Final Report Scoping Document Design
Is the standard if works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above			
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Options assessment considered decommissioning the weir, although this was not a feasible or recommended solution. Alternative weir constructions included sheet piling, although this was ruled out due to unsuitable embankment material.	None		Final Report
Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	<p>A budget overrun of \$100,412 was recorded at project completion. Additional costs were attributed to plant hire, concrete cutting/pumping, steel, survey, overheads and miscellaneous items. While, inadequate scoping and errors in the budget estimate are the primary underlying reasons, some of the overrun may have been mitigated had Sunwater scope the project more accurately and put the works to competitive pricing based on a firm scope, rather than apply for an exemption. The urgency of the project was to annual budget availability, which is not considered appropriate. Furthermore, the construction started in May leaving one month to complete. More appropriate planning and project management would have reduced the urgency and allowed more appropriate scoping and procurement.</p> <p>The overruns related to underestimated quantities are justified, but those related to hours or rates have been considered inefficient as a result of poor planning and procurement. At a minimum, it is recommended the overrun of \$36,974 for the dam break analysis be absorbed by Sunwater.</p> <p>Another \$8,045 of overrun was omitted from the Budget Overrun Document.</p>	Medium	\$45,019	Budget Overrun Document

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	NO	Sunwater was approved for exemption from competitive pricing. Insufficient information provided to determine market conditions. While [REDACTED] is considered appropriate as a sole supplier, the other contracts should have been more properly scoped and competitively bid. Instead they were sole sourced with only hourly rates and no firm scope.	Medium	Captured in above amount	Budget Overrun Document
If not, why?	SunWater should engage in competitive purchasing process.				
Was/is the allowance for indirect costs reasonable for the scope of the project?	NO	Refer above			
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	Source data for original budget estimation was Project Manager for interim works (previous repair works at the weir). Estimations were not clearly justified.			
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	Refer above			
Were options considered in determining the least cost or preferred option?	YES	Scoping works considered the cheapest treatment.	None		Scoping Document Final Report
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The final report investigated four options with a reasonable and justified solution with least cost outcome.	None		Final Report
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The options analysis considered securing the weir for the long term.	None		Final Report
Have any potential efficiency gains been identified?	NO	None identified			

Comment on Efficiency

There were several inefficiencies observed in this project. Original budget estimations were loosely based on Project Manager experience from previous repair works. There were also errors in the quantities and rates. Cost estimation for material supply and plant hire could have been improved if a competitive purchasing process was adopted. All but one supplier / contractor were sole sourced with no clear scope, so a clear representation of market conditions could not be determined. Poor scoping and budgeting combined with exemptions from the competitive purchasing process resulted in the budget being overrun by 19%. Some of the deviations from the original budget could have been prevented by following the standard procurement process. Therefore, budget overruns should partially be absorbed by Sunwater. Furthermore, the quality of verifications of the quantities in BoQ should be improved to prevent large variances in the actual cost. It is noticed that some of the similar services were awarded to different suppliers. Had service be packaged to a single supplier, Sunwater would have more negotiation power. Furthermore, internal costs for contractor management should decrease. The proposed adjustment of \$36,974 is based on the overruns for the dam break analysis. For this task, had appropriate scoping and site inspection occurred, the work would have been conducted more effectively. Other overruns due to incorrect quantities and uncontrollable site conditions have been appropriately documented and are accepted. Lastly, the total cost from the Budget Overrun document omitted \$8,045 in project overrun. Without justification, this has been considered inefficient and added to the adjustment total. The total is \$45,019.

Efficient

NO

Documentation Quality

Medium

Project Name	Bjelke Petersen Dam Flood Repairs
Project Number	13BBA04
Project Description	Flood repairs to valve components and valve house
Asset Type	Valve house (electrical, mechanical and hydraulic components), dam spillway concrete
Year(s) to be Delivered	FY 2013/14
Cost	\$386,726

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Valve house, main electrical switchboard and hydraulic control cabinet were submerged during the January 2013 floods. Inspection report identifies operationally and WH&S risks associated with damage caused by floods.	None		Inspection Report
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None		Inspection Report
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Outlet works for Bjelke Petersen Dam are required for water management protocol under the Barker Barambah Supply Scheme.	None		Inspection Report
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Works to be completed prior to wet season to ensure the flood damage is repaired and outlet works are operational.	None		Prudency and Efficiency Documents
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Flood damage, works not related to asset life	None		
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Before photos and inspection report indicate works were appropriate	None		Inspection Report and before photos
Comment on Prudency		The components affected by the floods are critical to the operation of the Bjelke Petersen Dam outlet works. In this regard, the prudency of the project scope is justified to a high level of confidence. The timing of the works was originally planned for prior to December 2013 and the start of the next wet seasons, but the contractor was unable to start until March 2014. It is not known whether the delay led to further damages. The project closure report details all the work done and it appears that the contractor assessed equipment condition				
Prudent		YES				
Documentation Quality		Medium				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	Based on the information provided, no options analysis was undertaken.	Medium	None	Scoping Documents
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	Refer above	Medium	None	
	Were/are non-capex options considered (such as operational solutions)?	NO	Not discussed in documentation.	Medium	None	Scoping Documents
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Documentation outlines Technical Specification Requirements and refers to Australian Standards and Sunwater Standards.	None		Scoping Documents
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above	None		Scoping Documents
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	None identified		None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Work was competitively procured with the lowest bidder awarded the contract. Final costs within range of sum of original cost estimates.	None		Prudency and Efficiency Documents Tender and Award Evaluation
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Bulk of the work was competitively procured with 3 quotes received.	None		Offer Recommendation Reports
	If not, why?	N/A		None		
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	The final non-contractor costs were 20% of the project and considered reasonable.	None		Final Actual Costs Project Closure Report
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	Lack of risk management documentation.	Minor	None	
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year project	None		
	Were options considered in determining the least cost or preferred option?	NO	No options assessment was carried out.	Minor	None	
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	Refer above	None		
	Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No discussion of whole of life costs. Like or like flood damage repairs.	None	None	
Have any potential efficiency gains been identified?	NO	None identified	None			

Comment on Efficiency

The project did not appear to follow a structured project management process and the cost estimation process was fragmented and inconsistent. That said, the final costs of \$386k were within the range of the various sources of original cost estimates. The \$303k of contractor costs were a large portion of the total costs and the bulk of which were procured with a competitive process; therefore, can be considered market price. The contractor variations were not well documented but have been assumed acceptable due to the nature of the remedial work where the full equipment condition and scope of works were not known at the time of quoting. For these reasons, the project has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Ben Anderson Barrage Flood Repairs
Project Number	13BIA47
Project Description	Rock protection repairs
Asset Type	Barrage
Year(s) to be Delivered	2013/2014
Cost	\$8,313,310

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Multiple items were identified as critical to the operation and safety of the structure that require immediate repair. Large quantities of rock material was displaced from the sheet pile. The stability of the barrage relies on the ability of the upstream row of sheet piling to provide a secure water retaining barrier to prevent seepage. If enough material is removed from the upstream side, the piling may become unstable and the toe may move upstream. Seepage could lead to the formation of pipes and eventually failure of the structure.	None		Flood Damage Inspection Report Restoration Options Report Business Case
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Structural integrity of barrage highlighted as critical, subsequent safety risks identified. Fencing and hand/guard railing is missing which poses a WHS risk and site has reduced security and may be subject to unauthorised public access.	None		Flood Damage Inspection Report
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Barrage is not capable of operating as required in its current, damaged state. Major remediation works required to rectify its functionality. SunWater has a regulatory obligation to maintain operability under the Bundaberg Supply Scheme.	None		Flood Damage Inspection Report Restoration Options Report
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Restoration works are required immediately.	None		Scoping Documentation
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Probability of failure assessment completed for the barrage.	None		Business Case
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Inspection report and images clearly support the implementation of proposed works.	None		Flood Damage Inspection Report

Comment on Prudency The project was deemed as prudent as it addressed the urgent need for the rectification of structural damage caused in the 2013 floods that could have led to the eventual structural failure of the Ben Anderson Barrage.

Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Clear consideration for alternative options with recommendation of best option. The preferred option was enhancing the upstream scour protection by installing sheet piling and concrete infill across the width of the barrage. The alternative was to reinstate like-for-like to pre-flood condition.	None		Restoration Options Assessment Business Case
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Refer above.	None		Restoration Options Assessment Business Case
Were/are non-capex options considered (such as operational solutions)?	N/A	A "do-nothing" option is not feasible. Operational solutions not applicable.	None		
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Reference to relevant technical specifications including Australian Standards. Detailed tech specs completed for all components identified in scope of works.	None		Scoping Documentation
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Option 1 considered like-for-like replacement. Option 4 is an improvement on existing structure.	None		Restoration Options Assessment Business Case
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Consideration for barrage improvement to withstand major flood levels.	None		Restoration Options Assessment
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Variations and day works claim considered in incurred cost. Expenses are justified. One variation for rework not considered efficient. Could have been avoided with appropriate contractor oversight and testing.	None	\$258,806	Prudency and Efficiency Document
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Followed competitive purchasing processes including tender for contracted civil works. Exemption of process applied for cathodic protection and other smaller project scopes	None		Offer and Tender Request Documents
If not, why?		N/A	None		
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	26% of total project for Sunwater labour, indirects and OH	None		
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Estimates revised once full scope of project could be determined. Risk management procedures clearly implemented.	None		Prudency and Efficiency Document
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year construction	None		
Were options considered in determining the least cost or preferred option?	YES	Refer to options analysis / consideration of alternatives.	None		Restoration Options Assessment
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above.	None		Restoration Options Assessment

Did the project consider whole of life costs, including future maintenance and operating costs?

YES

Preferred option was selected based on its ability to withstand major flood levels, which the existing structure could not. The flood immunity of the structure would be improved from AEP 1:30 to AEP 1:170. Enhancements to the barrage was the preferred long-term solution, based on the assumption that either option considered would only achieve the remaining 65 year life driven by the age of all other components in the structure.

None

Restoration Options Assessment Business Case

Have any potential efficiency gains been identified?

YES

An alternative construction method required the construction of upstream sheet piled coffer dams. This would be a safe construction method, but would be very costly. The adopted construction method for the repair of the upstream flood damage involves placing rock and concrete from the left bank and developing a work platform as work progresses across the river. This is a much more cost effective solution. This request for project funds increase is made towards the end of the construction phase when the contract price is known and all but one of the contractor's claims has been paid. It is considered that the level of confidence of the remaining project costs is +/- 10 %.

None

Prudency & Efficiency 2016

Comment on Efficiency

The project is primarily deemed as efficient in scope and in standard. While the cost documentation level is relatively poor, the total costs appear to be reasonably efficient. A Project Management Plan was provided, but appropriate project management processes appear to have been followed as described in the Post Construction Report. This enabled effective and efficient project execution. Variations to project budgets were adequately justified in places and documented in the Post Construction Report. Only one variation for concrete rework was identified that could be considered inefficient. The majority of work was competitively tendered with more bids than usually required; therefore giving high confidence to overall cost efficiency.

Efficient

NO

Documentation Quality

Medium

Project Name	Don Beattie PSTN
Project Number	13BIA48
Project Description	FD01 (2013) Flood Damage Repairs - Don Beattie PSTN
Asset Type	Pump Station
Year(s) to be Delivered	FY16
Cost	\$1,272,616

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Don Beattie Pump Station forms a crucial part of the Bundaberg Distribution Scheme. Multiple damages were reported as a result of the 2013 flooding of Burnett River. One of the most critical was scouring of the embankment, which previously provided support and protection to the rising main at Don Beattie PS. Without the embankment, vibration of the pipe and permanent supports have been reported. The vibration has caused some spalling of the supporting concrete. Other damages include loss of the PS's access road, site drainage, deposition of debris and silt into the pump intake structure, significant scouring around the intake structure, deposition of debris around the pump well base, damage to the septic tank installation, damage to stormwater pipe, damage to pump well sump pump and discharge pipework, damage to lightning protection system.	None		Don Beattie Pump Station 2013 Flood Repairs - Summary of Works Prior to the Second Flood Peak
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Sunwater have a responsibility to supply water under the Bundaberg Distribution Scheme. The damages reported as a result of the 2013 flood have directly affected Sunwater's ability to access, operate and maintain Don Beattie PS. As such, this puts Sunwater at risk of not providing the agreed level of service to its customers. There is also a safety risk associated with the existing condition of the site, should site personnel try to access it without remediation works.	None		Don Beattie Pump Station 2013 Flood Repairs - Summary of Works Prior to the Second Flood Peak
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	Insufficient information	Could not determine from the information provided why works were delayed several years (from the peak flood event in 2013 to 2016).	Medium		
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	Insufficient information	Asset life information could not be assessed based on the information provided.	Medium		

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES

Photo evidence was provided of Don Beattie PS which clearly demonstrate prudence of repair works. In 2013, two flood peaks were recorded with many of the repair works of January.

None

Don Beattie Pump Station 2013 Flood Repairs - Summary of Works Prior to the Second Flood Peak Before Photos February 2013

Comment on Prudence

Don Beattie Pump Station forms a critical part of Bundaberg's Distribution Scheme. Its key structures include a pump well tower, rising main and offtake pipelines, and a surge tank tower. The pump station is a deep well construction, approximately 34 m deep. Access to the pump station is achieved via a bridge, although a lower road access track is available to inspect the pump well base and rising main. A summary of damages incurred to Don Beattie Pump Station were documented in several stages. The first flood peak was observed January 2013 and included the subsequent remediation works which were undertaken immediately prior to the 2nd flood peak which was recorded in April of 2013. Large quantities of earthfill berm were displaced from the wet well base, which exposed the rising main and concrete foundations of several structures including the pipe supports. The quality of documentation was medium and demonstrated project prudence.

Prudent

YES

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Four options were investigated as part of the scoping phase. These include: 1. Do nothing; 2. Replace 'like for like'; 3. Concrete encase the rising main pipe; 4. Denso wrap coating the rising main pipe then fill with free draining material and cap with concreted rockfill.	None		R&E Detailed Options Analysis
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Option 4 was recommended as this method of repair will ensure that the rising main is protected from future flood events.	None		R&E Detailed Options Analysis
Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered; however, this was disregarded as the consequences of not proceeding were too great. Sunwater would be in breach of their regulatory responsibility to operate infrastructure and supply water under the Bundaberg Distribution Scheme.	None		R&E Detailed Options Analysis
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Several drawings of the repair works were provided (DWG 246589-1, DWG 246884-0, DWG 246886-0) . These appear conform to modern technical engineering standards. Design brief was written in accordance with Sunwater Specifications including General, Conventional Concrete, Concreted Rockfill, and Free Draining Backfill.	None		DWG 246589-1 DWG 246884-0 DWG 246886-0 SunWater Specifications: #1, 2, 3, 4
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Although multiple budget revisions were provided, spanning from 2013 to 2016, the total project expenditure of \$1,272,616 was not appropriately justified. In the document Budget Increase 2016 September, it appears approval was sought to increase the budget from \$498,369 to \$898,369 so that the preferred contractor can be engaged for a contract value of \$793,430. The contractor completed the works only \$3k above their quote; therefore the construction appears to have been completed efficiently. There doesn't appear to be any documentation for budgeting of the design, planning, and procurement phases of the project (years 2013-2016). While these project development costs appear high, the total non-direct costs comprise 32% of the total project costs which is in line with typical Sunwater project delivery.	None		Cost Estimates Budget Increase 2016 September

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	The Request for Offer (RFO) No. 16SW4810 - Construction of Don Beattie Pumpstation Rising Main and Bridge Pier Works was released on the Queensland Government QTender website 29 July 2016. Six offers were received and registered accordingly. Each offer was assessed in accordance with the Evaluation Plan which was developed and accepted by the Evaluation Committee (refer to HB Doc #1989386). The contract was awarded to [REDACTED] for a sum of \$798,975.20 excl. GST.	None		Detailed Offer Evaluation Process
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Overall, the non-direct costs appear to be 32% of the whole project, which is reasonable. The indirect costs are assumed appropriate as they are managed through SAP.	None		13BIA48 Total Actual Costs Summary
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Damages were scoped at a high level in the Flood Inspection Report. Geotechnical consultants were engaged to assess the stability of the site's slopes and any observed geotechnical issues. Cathodic and lightning protection requirements were documented. The process for development of scope of works was thorough and in this regard managed risks due to scope creep. An Options Analysis was also undertaken to gauge the most appropriate repair for the damages observed.	None		Flood Inspection Report Geotechnical Inspection Report Memo on Cathodic & Lightning Protection
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	One instance of a budget increase was requested and attributed to the cost of engaging the preferred contractor for remediation works. The budget increased from \$498,369 to \$898,369. The construction phase occurred over a single year, but the start of construction was delayed multiple years without explanation. No evidence of cost planning or escalation was given.	Medium		Budget Increase 2016 September Cost Estimate 2013 - 2016 13BIA48 Total Actual Costs Summary
Were options considered in determining the least cost or preferred option?	YES	A high level cost estimate was completed for the four options assessed in the Options Analysis. The preferred option was chosen based on cost, risk and benefit.	None		Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Each option was assessed using a weighted MCA to determine the overall best option.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The preferred option addressed long-term risk of damages, which would have resulted in increased maintenance and repair costs. Increased capital expenditure would reduce ongoing costs of pipeline repairs.	None		
Have any potential efficiency gains been identified?	N/A				

Comment on Efficiency	Based on the documentation provided, there was clear consideration for the best means of repairing the damages at Don Beattie PS. The appropriate processes were followed in terms of defining project scope, consideration of capital and operational expenditure, options analysis and procurement of works. However, the original version and subsequent variations to the approved budget were not adequately recorded. No evidence for budgeting the planning/design phase was made; therefore, overall project budget overrun could not be assessed. The construction phase in FY17, however, appeared to be efficient and the overall project non-direct costs were in line with typical Sunwater projects.
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Efficient	YES
Documentation Quality	Medium

Project Name	Callide Dam Gate Rectification Project
Project Number	13CVA02
Project Description	Investigate and rectify the left gate (floating chamber) issue
Asset Type	Dam
Year(s) to be Delivered	FY 2012/13, 13/14
Cost	\$2,079,855

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Several damages were reported in the flood inspection report. The primary concern is the reduced operability of the dam gates as a result of the counterweights being positioned off the guide rails. Functionality of these gates is required to manage water levels downstream.	None		Flood Damage Inspection Report
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Loss of storage and overtopping dam were identified as risks. Project completion ahead of the following wet season reduces Sunwater's risk exposure as an organisation and ensures public safety.	None		Flood Damage Inspection Report Prudency and Efficiency Document
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Based on information provided, the gates are crucial to Sunwater's obligation under the Callide Supply Scheme to release water from the dam during a high flood event to prevent a potential overflow of water resulting in failure of embankments.	None		Flood Damage Inspection Report Prudency and Efficiency Document
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Timeline identified for works. Prudent for restoration prior to next flood event.	None		Prudency and Efficiency Document
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Project is related to flood damages not asset life.	None		
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Observations from flood damage inspection report note damage critical to operation of dam.	None		Flood Damage Inspection Report
Comment on Prudency		This project is deemed prudent due to the consequences experienced in the 2013 flood event. The risk of a repeated failure at Callide Dam without the investigations and repairs is likely and the consequence during a flood event would be catastrophic. The timing of the project for completion prior to the following wet season was prudent.				
Prudent		YES				
Documentation Quality		Medium				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Options analysis was undertaken to determine the best method for restraining the gate in the closed position while the flot is removed. Seven options were documented.	None		Prudency and Efficiency Document
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Refer above.	None		Prudency and Efficiency Document
	Were/are non-capex options considered (such as operational solutions)?	NO	No discussion of non-capex options.	Minor		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Reference to Sunwater specifications. As built were provided which detail the spillway radial gates counterweight temporary support arrangement. Engineering testing and investigation also informed quality solution.	None		Prudency and Efficiency Document
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Documentation outlines goal of project is to restore previous gate functionality.	None		Scope Documents Project Management Plan
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Not considered.	None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Variations to original project scope were identified. Existing contractor who was already mobilised on site was used to increase project efficiencies. Main works was competitively procured.	None		Prudency and Efficiency Document
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	As detailed in the Procurement Plan, a sole source approach was undertaken and an exemption to the purchasing process was applied for due to the documented genuine urgency of the restoration works. Despite this, majority of work was competitively procured.	None		Procurement Plan
	If not, why?		N/A	None		
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Indirects and OH were 28% of total costs which is reasonable. Sunwater labour accounted for 14%, which considering the level of involvement required for a safe project outcome is reasonable.	None		Prudency and Efficiency Document Estimate of Cost
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Reference to project risk analysis and strategy options to control risk in documentation.	None		Procurement Plan
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year project	None		Prudency and Efficiency
	Were options considered in determining the least cost or preferred option?	YES	Preferred option determined based on safety.	None		Scope Documentation
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Long term operation and safety of the dam was considered.	None		Investigation report	
Have any potential efficiency gains been identified?	N/A	None identified	None			

Comment on Efficiency

While there was little evidence and documentation of project management processes, the project was delivered on time within the short timeframe and within the allocated budget. Early definition of the scope and associated cost estimates is difficult before the full extent of damage can be quantified, therefore the high contingencies were deemed appropriate. The project used competitive procurement approaches for the majority of contractor/consultant costs. The combination of testing, planning, engineering, and the associated repairs by Sunwater and its contractors/consultants led to safe, quality, and efficient project outcomes. This was well documented in the contractor delivery report and investigations report.

Efficient

YES

Documentation Quality

Medium

Project Name	Flood Damage Repairs at Neville Hewitt Weir
Project Number	13DVA06
Project Description	Repair damages due to 2013 Australian Day weekend flood
Asset Type	Weir
Year(s) to be Delivered	FY 2013/14
Cost	\$164,508

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Safety risk attributed to potentially unstable crane and broken handrails/fencing. Fishlock inoperable due to debris build-up in chamber.	None		Project Scope Definition
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None		Project Scope Definition
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Operation of fishway is a regulatory requirement as per the Waterway Barrier Works Development Approvals 2012, Fish Habitat Management Operational Policy FHMOP 008.	None		Project Scope Definition
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Timing justified based on meeting regulatory requirements. Repairs needed prior to following wet season.	None		Project Scope Definition
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the available information in the flood inspection report, the assessment of life appears to be consistent with industry standards.	None		Flood Inspection Report
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Refer above.	None		Flood Inspection Report
Comment on Prudency			The project documentation provides a clear identification for the project need. Both WH&S and environmental compliance were cited as drivers for the project to enable continued operation of the weir and the ability to meet water supply obligations under the Dawson Supply Scheme.			
		Prudent	YES			
		Documentation Quality	High			

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	Options study completed for all components of repair work. Do nothing option and repair options considered for each.	None		Project Scope Definition
YES	Evaluation of options is transparent and defensible.	None		Project Scope Definition
YES	Do nothing option considered, although these were generally disregarded as Sunwater would be in breach of their regulatory obligation to provide water under the Dawson Supply Scheme.	None		Project Scope Definition
Insufficient information	Limited or lack of information to determine if works conform to industry standard.	Minor	Likely no change	Flood Inspection Report Project Scope Definition Procurement Plan
YES	Based on the design analysis described, the modifications are consistent with the general existing infrastructure.	None		Project Scope Definition As Built
	None identified	None		
YES	Procurement Plan indicates that the PM had authority to spend up to \$260,000.00 to complete works. The total project costs came under budget at \$164,508. The cost estimate breakdown included 50m3 of concrete at \$1000/m3. The normal supply and place of concrete is circa \$500/m3. While either a premium rate may have been used or it may have been overestimated, the impact was nil as the final project costs were well within the estimate accuracy bounds overall.	None		Procurement Plan Revised Budget Flood Damage Funding Report
Insufficient information	Works were sole sourced. Competitive purchasing processes not undertaken so unsure of market conditions.	Minor	Likely none	Procurement Plan
	Sole source procurement and urgent delivery	Minor		
YES	The non-contractor costs were 30% and are considered reasonable for the associated planning and PM/OH costs.	None		Flood Damage Funding Report Procurement Plan
NO	Little no evidence of risk management processes applied	Minor	None	Project Scope Definition
N/A	Single year project	None		
YES	Refer above.	None		Project Scope Definition
YES	Refer above.	None		Project Scope Definition
NO	No discussion of whole of life costs.	None		
NO	None identified	None		

Comment on Efficiency

The project documentation provided was generally of low quality, especially lacking evidence of project management processes being applied. A procurement exemption was applied for the purposes of urgency, and while reasonable, there did not appear to be sufficient evidence of contractor scope definition and it appears this was left to the contractors. That said, the project appears to have been delivered to appropriate quality and within reasonable cost. For these reasons, the project has been considered efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Eden Bann Weir
Project Number	13LFZ07
Project Description	Repair, maintain and de-silt the fishlock
Asset Type	Fishlock
Year(s) to be Delivered	FY 13/14
Cost	\$532,600

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Fishlock determined to be inoperable due to debris post-flood.	None		Project Scope Definition
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	Insufficient information	Assumed regulatory requirement for fishlock to operate.	None		Project Scope Definition
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Although not documented, it is known from previous project 13DVA06 that operation of fishway is a regulatory requirement as per the Waterway Barrier Works Development Approvals 2012, Fish Habitat Management Operational Policy FHMOP 008.	None		N/A
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Timing justified based on meeting regulatory requirements.	None		Project Scope Definition
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Based on the information provided, the proposed works align with industry standards for a fishlock.	None		Project Scope Definition
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Silt evident in fishlock, hindering its operability.	None		Before Photos
Comment on Prudency			The detailed project scope definition provides a reasonably clear identification of project scope; however there is no information around the statement of regulatory requirement for the fish lock's operation to demonstrate prudent project development. It is known from other projects that the fishway is a regulatory requirement, therefore it can be assumed prudent, but level of documentation is low.			
Prudent			YES			
Documentation Quality			Low			

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No options analysis. Like for like repairs undertaken.	Minor	Unlikely to impact price	Flood Damage Inspection Report Project Scope Definition
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A				
	Were/are non-capex options considered (such as operational solutions)?	NO	None considered.	None		Flood Damage Inspection Report Project Scope Definition
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	Lack of information to determine if installed works confirm to industry standard; however project scope definition references appropriate Australian Standards.	Minor	Unlikely to impact price	
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Based on the design analysis described, the modifications are consistent with the general existing infrastructure; like for like repairs.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Costs incurred (\$532,600) were less than the approved budget (\$680,874).	None		Budget Estimate June / September
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Various pricing approaches were adopted for this project. Hydraulic works were sole sourced so some uncertainty of whether costs matched market levels, but efficiencies in design and installation were identified by using the original supplier. Mechanical services were tendered and cost was appropriate based on market conditions.	Minor	Potentially cheaper options available for hydraulic works	Procurement Plan Short Form Evaluations
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Sufficient contingency allowed for completion of works.	None		Budget Estimate June / September
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	Inadequate risk management processes identified. Extent of risk management is large contingency (50%).	Medium		
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A				
	Were options considered in determining the least cost or preferred option?	NO	No alternative options considered	Major	Potentially cheaper alternative options.	Procurement / Offer Documentation
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A				
Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No discussion of whole of life costs.				
Have any potential efficiency gains been identified?	YES	Sole sourcing contractor with knowledge of site and internal access to as-built drawings.	None		Procurement Plan	

Comment on Efficiency

Documentation does not clearly demonstrate project efficiencies. Alternative options were not considered. Justifications for key criteria were omitted. Quality of documentation was low as multiple documents were missing, including the report of actual expenditure, and there were general inconsistencies in processes followed. That said, the project was delivered well under the allocated budget and cost estimate (even without contingency). Note that the Historical Renewals summary provided by Sunwater states \$493,849 of costs on this project.

Efficient

YES

Documentation Quality

Low

Project Name	Fairbairn Dam - Investigation of Spillway
Project Number	13NMA04
Project Description	Locate voids beneath the concrete spillway slab at Fairbairn Dam
Asset Type	Dam
Year(s) to be Delivered	2013/14 FY
Cost	\$731,843

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed		
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Initial observations of drummy concrete at a previously established repair site were investigated and later determined by Ground Penetrating Radar (GPR) to be voids. Multiple voids outside of the initial investigation area were determined, particularly in the steep, lower portion of the spillway where coloured seepage was observed. The stability of the spillway apron may be compromised by seepage under the concrete slab. Traverse drains were previously installed to facilitate under-slab drainage and to assist in relieving pore pressure. The voids observed indicate these drains are not working as intended. Failure of the dam would prevent Sunwater from meeting agreed service levels.	None		Investigations and Change in Scope
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The works are required to determine solutions to repair and prevent dam failure.	None		Investigations and Change in Scope
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The Fairbairn Dam is major infrastructure in SunWater's water resource scheme. It is critical that it operates as intended to manage water levels. Definite signs of deterioration have been observed that need to be addressed to restore the structure to design condition.	None		Investigations and Change in Scope
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	A thorough investigation of the damages was undertaken prior to the initiation of design and construction works. A formal technical review process was completed and determined that spillway stability was potentially compromised as a result of the seepage observed. Once a suitable solution was identified, it was critical to commence works as soon as possible to prevent further damage and manage risk of catastrophic failure of the spillway. Construction was delayed from FY2015 due to insufficient time to safely conduct works prior to the wet season.	None		Investigations and Change in Scope

Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.

YES

Fairbairn Dam was originally constructed between 1969 and 1972 from mass reinforced concrete. The standard life expectancy for concrete is 50 years, so the structure is nearing its serviceable life. Considering the transverse drains underneath the slab were constructed from earthenware pipes, it is possible these have since failed due to age.

None

Investigations and Change in Scope

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES

Images of the voids were reported in the Fairbairn Dam Spillway Void Repair Report. This prompted further investigation of the voids, which later developed into project 13NMA04.

None

Fairbairn Dam Spillway Void Repair Report

Comment on Prudency

It is clear from the documentation provided that a suitable process was followed to develop and justify the project scope. The initial damage was observed during superficial repair works to the spillway apron, which later prompted further investigation under the concrete slabs. The investigation determined that there was significant seepage under the spillway resulting in a 1.8m x 1.5m x 0.8m void which was undermining the structure and presenting risk of failure. Multiple voids were subsequently located and so the extent of the damage gave rise to the project's prudency. Additional investigations were need collect information to allow options assessment and design.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	An options analysis was completed post initial investigations to determine the most effective solution. As part of the options development stage, a Technical Review Panel (TRP) was involved to provide comment. The TRP made an alternative recommendation to SunWater's proposed strategy, and recommended that a set of emergency works to be undertaken in an order of priority.	None		Investigations and Change in Scope
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Refer above.	None		Investigations and Change in Scope
Were/are non-capex options considered (such as operational solutions)?	N/A	Given the scope development and advice from an external TRP, a non-capex option was not feasible for this project due to the risk of failure of the spillway structure.	None		Investigations and Change in Scope
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The design process aligned with standard industry practice. Initial scoping was determined by GPR, concrete core drilling, CCTV and geotechnical data review. The treatment strategy involved external peer review and assessment of options by a TRP.	None		Investigations and Change in Scope
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Short term maintenance works including installation of drain outlet baffles, repair of blocked drains, joint sealing, anchor replacement and void filling is required to restore the structure to its design condition. The standard of works align with original design intent.	None		Investigations and Change in Scope
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The total project spend (\$731,843) was less than the approved budget (\$764,443), presenting a reduction of \$32,600. The initial investigations costs to till end of April are \$359,943 against a budget of \$285,279, and due to further investigation required, an extra funding of \$404,500 resulting in a total of \$478,864, and the increase of scope for investigations is documented, however the overspend of \$74,364 is not explained in provided documents	Medium	\$74,364 is attributed to overspend as no supporting documents are available to show the cost breakdown.	Investigations and Change in Scope
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	A competitive procurement process was undertaken for the GPR/CCTV works with Requests for Offers being sent to [REDACTED] and [REDACTED].	None		Offer Recommendation
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Based on the funding breakdown, the allowance for indirect costs was reasonable to ensure project management and procurement processes could be followed. Sunwater's indirect cost breakdown in the cost estimates is reasonable.	None		Memorandum - Project Update and Request for Confirmation of Project Funding and Cost Estimates

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

YES	A condition and risk assessment matrix was completed.	None		Condition and risk assessment
YES	Request for additional funding was completed in the memorandum by Sunwater.	None		Memorandum - Project Update and Request for Confirmation of Project Funding
YES	Preferred option determined through assessment by TRP.	None		Investigations and Change in Scope
YES	Refer above.	None		Investigations and Change in Scope
YES	The works were undertaken to mitigate potential future maintenance costs resulting from spillway failure.	None		Investigations and Change in Scope
YES	Sunwater utilised local contractors who worked on initial investigations and who is familiar with the site to complete restoration works, making it more cost efficient. The estimate was based on costs incurred to date and expected internal and contractor costs, which proved accurate as the total budget approved was sufficient to cover costs incurred.	None		Prudency and Efficiency Document Memorandum - Project Update and Request for Confirmation of Project Funding

Comment on Efficiency

Sunwater clearly followed standard PM processes to ensure the project scope was defined, suitable solutions were identified and the funding was mostly appropriate and effectively utilised except for the identified overspend of \$74,364 in the preliminary investigation phase of the project (GPR/CCTV). The quality of documentation provided was medium, and there was generally clear consideration for project efficiencies throughout the project development phase to execution, however cost breakdown of the overspend was not provided.

Efficient

NO

Documentation Quality

Medium

Project Name	Flood Damage Repairs at Cania Dam
Project Number	13TMC04
Project Description	Rectify the flood damages at Cania Dam (Spillway)
Asset Type	Dam
Year(s) to be Delivered	2014/15 FY
Cost	\$589,176

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
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Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Scouring observed in unlined rock structure that forms the spillway chute, downstream of the concrete ogee crest and apron. The rock spillway chute is terraced in three levels, with each subsequent level exhibiting increased level of deterioration. The affected rock consists of poor quality or structural features. Channelisation of flow between spillway terraces has occurred as a result. Remedial works including shotcreting scoured areas were proposed to prevent further scouring of the spillway's rock structure in next flood event. The Cania Dam is required to provide water under the Three Moon Creek WSS.	None		Spillway Inspection Report Project Management Plan
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Erodibility of spillway terraces and subsequent instability presents a safety hazard.	None		Spillway Inspection Report Prudency and Efficiency
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		Spillway Inspection Report Prudency and Efficiency
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Remediation required prior to next flood season to prevent further scouring. Delaying works would result in increased costs as more concrete fill would be required to repair scour damage.	None		Project Management Plan
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Works related to flood damage, not asset life.	None		
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Evidence of scouring provided.	None		Spillway Inspection Report Before Photos

Comment on Prudency	This project is deemed prudent as the Cania Dam damage to the spillway chute had the potential to present a safety hazard due to the structure's instability. The documentation for project prudency, however, was deemed to be of low quality as there was limited to no information provided for statutory or contractual requirements for the proposed works. There was no business case or options assessment.
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Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	A "do nothing" option was considered in the initial scoping document. The recommended option was to undertake further survey to determine if further rectification is required. There was no options assessment for the actual repair works.	Minor		Initial Scoping Document
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	It was mentioned that anchor bars would likely still be required if a do nothing option was chosen. Further geological survey of the spillway condition was justified so that a suitable treatment could be designed.	None		Initial Scoping Document
Were/are non-capex options considered (such as operational solutions)?	N/A	Repair works were required to prevent dam failure.	None		Initial Scoping Document
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	A concrete specification was prepared, and appropriate geological investigation and surveying was conducted.	None		Concrete Specification Spillway Inspection Report
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The concrete treatment of scoured rock intends to reinstate the surface with a like-for-like repair. Therefore, the standard of works is compatible with the existing rock structure.	None		Spillway Inspection Report
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		None identified			
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The total cost of the remediation works was within the upper and lower bounds of the original budget estimate.	None		Prudency and Efficiency Document
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Competitive purchasing process initiated, although only one of the two suppliers returned an offer. The hourly hire rates from the supplier were deemed inline with current market rates for the machinery required and, being a local supplier, savings in establishment and accommodation were made.	None		Offer Recommendation Reports
If not, why?		N/A			
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	The non-direct costs were 48%.	None		
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Risk management procedure was outlined in the project management plan.	None		Project Management Plan
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year project	None		
Were options considered in determining the least cost or preferred option?	NO	No evidence of options analysis, although the preferred option used methods to minimise the amount of concrete required.	Minor		Initial Scoping Document
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above	None		Initial Scoping Document
Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No discussion of whole of life costs.	Minor	Unlikely to have cost implication as no mechanical or electrical components to structure.	Spillway Inspection Report
Have any potential efficiency gains been identified?	NO	None identified	None		

Comment on Efficiency

The project appears to have been scoped, designed, and constructed to appropriate standards and scope; although, it is not clear whether the second and third terraces were repaired under separate projects as they formed part of the original repair scope of works. Although the project documentation quality was low, the project costs appear to be efficient for the scope undertaken. The procurement approach led to market pricing, the works were delivered within approved contractor budgets, and the overall project was delivered within the accuracy bounds of the original cost estimate. The original claim amount was not fully covered by insurance due to what was deemed an error in the original design that had not been corrected prior to the flood damage. The insurance letter, however, did not identify any documentation to demonstrate the risk was communicated to Sunwater management since the original design. For these reasons, the acceptance of the original design (and error) have been assumed as prudent and efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Flood Damage Repairs at Claude Wharton Weir
Project Number	13UBP04
Project Description	2013 Flood Damage Repairs to Claude Wharton Weir
Asset Type	Weir
Year(s) to be Delivered	2012/13 and 2013/14 FY
Cost	\$2,332,308

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Details of damage to weir structure and supporting facilities was documented in the project scope definition. Severe damage was recorded for the security fencing, fishway, inlet/outlet works, abutment protection works and the controls building (including electrical, SCADA and hydraulic components). The items identified were critical to the operation of the weir.	None		Flood Damage Inspection Report Project Scope Definition Before Photos
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The operation of Claude Wharton Weir was critical to Sunwater's regulatory obligation to provide a consistent water supply under the Upper Burnett Supply Scheme. Further, several immediate WH&S risks were identified due to the damages. The site security was also compromised, which would have presented a risk of unauthorised access from the public.	None		Project Scope Definition
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		Project Scope Definition
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate repairs required to return operability of weir.	None		Project Scope Definition
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Flood damage repairs. Not related to asset life.	None		Project Scope Definition
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Photos and inspection report provide detailed information of the damages identified and demonstrate the severity of issues.	None		Flood Damage Inspection Report Before Photos
	Comment on Prudency		This project is deemed prudent as the Claude Wharton Weir was inoperable and presented WH&S risks to operators and the general public. It also inhibits Sunwater's regulatory obligation to supply consistent water as part of the Upper Burnett Supply Scheme. The damages were appropriately documented and works justified.			
Prudent	YES					
Documentation Quality	Medium					

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	An options study was undertaken as part of the scoping process., although it was dated during the construction period and did not cover the full scope of work.	None		Options Study
YES	The principal motivation for each preferred options was documented to justify the recommendations made by Sunwater. The options were selected with consideration of cost, risk, and long-term performance.	None		Options Study
YES	For the applicable recommendations, there were non-capex (i.e. do nothing) options considered.	None		Options Study
YES	A technical specifications and scope of work was prepared for the contractor tender process, and demonstrated appropriate standards.	None		Technical Specification
YES	Refer above	None		Technical Specification
	Some enhancements were included to prevent future flood damage	None		
YES	The project expenditure was separated into four packages: Stage 1 - Preliminary Safety Works, Stage 2 - Site Clean Up, Stage 3 - Electrical/Mechanical Repairs, Stage 4 - Civil Package. The cost breakdown for each stage was tracked in the Budget Estimate Spreadsheets. While no breakdown of incurred contractor costs was provided, the total is within the board approved budget plus contingency.	None		Estimate of Cost / Budget Estimates 13UBP04 Total Actual Cost Summary Prudency and Efficiency Document Description of Repairs
YES	The procurement process was packaged as documented in the budget estimate spreadsheets. All purchases under Stage 1 were executed in accordance with the SunWater Purchasing Guidelines. Stage 2 and 4 were open tenders in accordance with SunWater Purchasing Guidelines. Stage 3 was Sole Sourced to [REDACTED] but rates were evaluated for value based on other Sunwater projects.	None		Significant Procurement Plan Summary of Tender Assessment Offer Recommendation Report
	N/A	None		
YES	Final non-direct costs were 22% and considered reasonable.	None		Final Actual Costs
NO	The options study referenced various risk management processes, but there was no project management plan or similar documentation.	Minor	Unable to assess	Project Scope Definition
N/A	Predominantly a single year project	None		Estimate of Cost
YES	An options costing table was provided for soome of the components of work.	None		Options Study

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	A workshop was conducted with stakeholders to review potential options to determine which was the most effective option and with consideration to the funding available.	None		Options Study
	Did the project consider whole of life costs, including future maintenance and operating costs?	YES	There was clear consideration of the long term maintenance costs associated with the options considered. For example, it was recommended the existing control room is upgraded to a modular elevated control room above record flood level as the cost to repair the existing exceeds \$400k while the upgrade costs \$150k.	None		Options Study Estimate of Cost
	Have any potential efficiency gains been identified?	YES	Several upgrades as part of this project were identified to reduce the extent of damage in future flood events. This in turn provides a cost efficiency and reduced downtime of operation, which minimises the impact to customers receiving water supply from Claude Wharton Weir.	None		Options Study

Comment on Efficiency

This project is primarily deemed as efficient in scope and in standard. The extent of damages was documented, where possible, and appropriate technical specifications were prepared for the repairs. The contractor was sole sourced but their rates were evaluated for value based on other current and recent projects. The work was completed without a fully defined scope due to the nature of the flood damages and despite the lack of any documentation showing effective project management processes, the works were delivered within the approved budget and have been considered efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Coolmunda Dam
Project Number	14MAB05
Project Description	Adjust the lengths of the wire ropes to keep floats within the guide range
Asset Type	Dam
Year(s) to be Delivered	2014
Cost	\$283,434

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	YES	As part of the Coolmunda Dam Safety Inspection, it was observed that the counterweights, which operate the flood gates at the dam, were getting close to the end of their guide within the float well chamber. Coolmunda Dam operates in a very similar manner to Callide Dam. If the counterweight wheels are below the existing guides, there is a risk that in a flood event when the counterweight rises in the float chamber, it will catch on the guide and jam the gate. This incident previously occurred at Callide Dam, therefore increasing urgency for improved counterweight functionality.	None		Detailed Options Analysis
	YES	The functionality of the dam gates at Coolmunda Dam could be compromised during a flood event, as was previously observed at Callide Dam.	None		Detailed Options Analysis
	YES	The operation of the dam gate is critical to Sunwater's requirement to fulfil regulatory obligations as part of their water management protocol, particularly during flood events.	None		Detailed Options Analysis
	YES	Works to improve the engagement between counterweights and guiderails should be completed prior to the following wet season to ensure the gates are functional during the next flood event. Urgency of the works is reinforced by the realisation of the project risk at Callide Dam, where the gates jammed for the same reason.	None		Detailed Options Analysis
	YES	It appears as though the problem with the wheels extending past the guides is not new, as previously reported in 2008. The issue is likely the result of steel rope creep.	None		Project Scope Definition
	YES	The observations reported were supported by images taken by [REDACTED].	None		Before Photographs

Comment on Prudency

The disengagement of dam gate wheels from the guiderails had previously resulted in gate failure at Callide Dam. The risk of similar failure at Coolmunda Dam is likely, with the consequence during a flood event being catastrophic. Gate functionality during a flood is critical to ensure compliance with Sunwater's regulatory obligation to manage water resources. The prudency of this project is reinforced by the failures of Callide Dam in 2013.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Full options identification and analysis undertaken as part of scoping process. Cost-benefit and risk analysis completed to support assessment. Detailed options assessment provided in options analysis report.	None		Project Scope Definition Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	Based on the MCA, the option selected provided the most benefit, least risk and least cost of the seven options considered.	None		Detailed Options Analysis
	Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing option was considered, however it was determined to not be in Sunwater's best interest based on risk and precedent at Callide. Should SunWater proceed with doing nothing, and the risk was realised, Sunwater would be in the spotlight from the regulator for not acting on a known issue after a similar scenario occurred at one of their dams in the same year.	None		Project Scope Definition
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The re-engagement of the gate wheels with the guiderails is consistent with the structure's design requirements.	None		Detailed Options Analysis
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The treatment works aim to achieve the original design condition of the dam gates.	None		Detailed Options Analysis
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	The incurred cost was justified by the high costs of WH&S. The cost estimate is almost double the original cost estimate without a cost breakdown; although within the accuracy bound (+100%) of the options analysis stage.	Medium		Detailed Options Analysis Prudency and Efficiency Document
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	Unable to comment as an exemption from competitive offering process was granted in accordance with SunWater's Purchasing Policy and Guide, and the State Procurement Policy on the grounds that genuine urgency exists. The final expenditure claim exceeds the \$180,000 value quoted in the Exemption document, but there is no information to show much of the final expenditure claim is attributed to the contractor.	Medium		Short Form Significant Procurement Plan
	If not, why?					
	Was/is the the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	Additional costs were required to proceed with the safest option. There is no supporting document of costing indirect costs.	None		Prudency and Efficiency Document
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A risk analysis was completed as part of the scoping process and options analysis phases.	None		Detailed Options Analysis	

	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	Quotation was received from a contactor in accordance with SunWater's Purchasing Policy and Guide. However there is no cost escalation methods mentioned in the supporting docs.	None		Prudency and Efficiency Document
	Were options considered in determining the least cost or preferred option?	YES	A cost-benefit analysis was completed for the options identified. The preferred option was to put a second rope on the float and tie off to a beam.	None		Detailed Options Analysis
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA was thorough and supported the options assessment outcomes.	None		Detailed Options Analysis
	Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The project considered the long term operation of the dam gate and consequences of failure should repair works not proceed.	None		Detailed Options Analysis
	Have any potential efficiency gains been identified?	YES	The support system manufactured to undertake works has been retained by Sunwater and can be used again.	None		Prudency and Efficiency Document
	Comment on Efficiency		An appropriate approach was adopted to assess the best outcome option for the refurbishment of the dam gate wheels and guiderails to ensure operability of the Coolmunda Dam in future flood events. The project scope and proposed methodology were well defined. Safe work methods was a non-negotiable given the large mass of the counterweights being repaired. The work was undertaken incident free, and Sunwater were able to retain the support system manufactured to complete the works. The successful outcomes of this project in terms of safety, cost and operation are a demonstration of project efficiency. The increase in cost estimate in the Prudency and Efficiency document are not broken down and it is not clear how the final expenditure (twice the estimate from the options analysis) was allocated but some of it is assumed attributable to the contractor, as its original quote detailed 5 workin days whereas the final appears to have been 23 days. The cost estimate is almost double the original cost estimate but within the options analysis accuracy bound (+100%).			
	Efficient		YES			
	Documentation Quality		Low			

Project Name	Mareeba-Dimbulah Water Supply Scheme
Project Number	14MDA13
Project Description	Implement Findings: Strategic Plan for MDWSS I&D SCADA - Stage 2
Asset Type	Control System
Year(s) to be Delivered	FY15/16
Cost	\$876,952

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Mareeba-Dimbulah Water Supply Scheme (MDWSS) encompasses the towns of Atherton, Walkamin, Mareeba, Mutchilba and Dimbulah. It provides water for agricultural land and two hydro power stations: Tinaroo Dam and Barron Gorge. The Mareeba Distribution SCADA control system was installed in 1995 to provide automatic and remote control and monitoring of key water control locations in the scheme. The equipment is now 20 years old. The SCADA assets are responsible for regulating gateway control of the system. As the system is obsolete, it is necessary to upgrade to reflect modern technologies.	None		Scope of Work 2013
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	As a result of technological advancement, control system components have a typical serviceable life of 15 to 20 years. The equipment within the MDWSS is outdated and no longer compliant. SCADA allows less site work and minimizes environmental overflow.	None		Scope of Work 2013 R&E Detailed Options Analysis
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The control system forms part of the operational infrastructure used in the MDWSS. The proeject is needed to manage Sunwater losses within loss allocation.	None		Scope of Work 2013 R&E Detailed Options Analysis
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None		
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The service life of electrical equipment is generally 15-20 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.	None		
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	An audit was undertaken of the control system in the MDWSS which support the proposed works.	None		Mareeba SCADA Site List (Doc #1592348)

Comment on Prudency

The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the MDWSS.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	Five options were considered as part of a Detailed Options Analysis. These include: 1. Do nothing; 2. Remain with █████ system and refurbish, partially replace and recommission; 3. Replace all with █████; 4. Replace all with █████ based and/or other systems; 5. Partial replace with █████ and/or other systems - operate with multiple systems.	None		Detailed Options Analysis
YES	Various options were considered from doing nothing to refurbishment or replacement of the existing system with the same supplier product or to change to a new product entirely. As there are 50 sites in the current integrated channel control system, a change in supplier and/or components will necessitate duplication of system components. The cost and logistics of this is great considering that for many of these 50 sites only a refurbishment and recommissioning is required. The detailed analysis of these options as above identifies that the best option is to continue with the █████ system with most sites being refurbished, recommissioned and documented with some sites replaced if the cost benefit of the discreet site warrants. Therefore, the recommendations are: - Continue with █████ system and refurbish and replace; - Procure █████ products on a sole supplier basis.	None		Detailed Options Analysis
YES	A do nothing option was considered; however, this was disregarded as the SCADA becomes less reliable and presents a WH&S risk as more operator intervention is required during work and after hours. Further, the risk of overflows would increase, there would be a higher NPV compared to other options, risk breaching operational requirements, and could result in poor customer relations resulting from flow fluctuations.	None		Detailed Options Analysis
YES	The █████ software replacement was awarded to █████. As defined in audit documentation, the control systems must adhere to Australian and Sunwater standards. The project is still active and due for completion in FY18/19, therefore as built not yet provided for assessment.	None		Mareeba Dimbulah SCADA Site Audit and Strategic Plan Offer Recommendation Report
YES	Existing structures were provided for consideration of refurbishment with new █████ control systems.	None		Request for Offer

Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	The scoping and budgeting of the project was inconsistent, dynamic and poorly documented. The [redacted] component was sole sourced as they are the only supplier of their software/hardware. It appears they were under budget although this is assuming they completed their scope. There is no documentation to show that was done. That said, there is little recourse as they are the only supplier. Variations to the contract were well document (although slightly disorganised). The project non-direct costs were 45% of total, which is average for Sunwater electrical/controls projects which require greater Sunwater staff involvement. Overall it appears to be reasonable (assuming scope was completed).	Medium	Assuming scope was completed. If so, no adjustment is necessary.	Scope of work, Procurement plan 2015
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Because it was a refurb of an existing system, no alternative competitive tenderer was sought. [redacted] is the sole supplier of the hardware and software.	None		Procurement plan
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	NO	The original cost estimates underestimated the necessary indirect costs. A P&E document stated that tendering became more complex as they tried to reduce the [redacted] quote to below the allocated budget.	None		Cost estimate and actual cost summary
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	The scoping phase was well-documented with the entire control system part of MDWSS assessed in accordance with Australian and Sunwater standards. That said, as the scope changed, the project management documentation was not updated.	Minor		Scope of Work 2013
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	The project ran across multiple financial years, and part of the [redacted] scope was deferred to future years. There is no information to assess the impact of cost escalation from this.	Minor		
Were options considered in determining the least cost or preferred option?	YES	The preferred option was assessed against a MCA with the following criteria: time, cost, risk, and benefit.			Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The MCA used is appropriate.			
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Replacement of the obsolete infrastructure was determined to be preferred over refurbishment as this would provide cost benefits for future operations and maintenance of the infrastructure.			Detailed Options Analysis
Have any potential efficiency gains been identified?	YES	Options study #1664805 considered other known options and this chosen option was the lowest NPV and risk to achieve required outcomes. Post offer evaluation the costs of all option in this options study will increase proportionally for all options and will not change the relativity of the options.	None		Prudency and Efficiency 2016 Novemeber

Comment on Efficiency Based on the information provided, the appropriate processes for effective project management were originally adhered to but were not carried forward through the project. Five options were assessed against an appropriate MCA framework. The preferred option presented the best cost with most benefit as Sunwater was familiar with the [redacted] System currently in place. The project scope, direct costs, and non-direct costs were all underestimated, and the project scope was reduced as a result. Considering [redacted] is a sole supplier, the revised scope appears to be cost efficient; however, this is assuming the contracted scope was completed. Final non-direct costs (45%) are within the average range for Sunwater electrical/controls projects.

Efficient YES

Documentation Quality Medium

Project Name	Copper Sulphate Research Project
Project Number	14MDA33
Project Description	Study Copper Sulphate Research Project - West Barron Main Channel
Asset Type	Channel
Year(s) to be Delivered	FY15/16
Cost	\$436,167

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Sunwater uses Copper Sulphate to control filamentous algae in irrigation supply channels and in January 2003 applied to the Australian Pesticides and Veterinarian Medicines Authority (APVMA) to register copper sulphate as an algacide for use in irrigation channels to maintain reliability of water supply. The activity is currently carried out under an existing Off-Label Permit previously issued by the Queensland Government for which responsibility was later transferred to APVMA. The permit is set to expire in 2013 and so the works are required to determine forward management strategies for algae control in Sunwater's open and closed water supply channels.	None		Briefing Note for DPI&F
	YES	There is a legal and compliance obligation in association with the APVMA to obtain permits so that Copper Sulphate can be used for control of algae in Sunwater's Mareeba Dimbulah Irrigation Water Supply Scheme.	None		Permit to Allow Research Use of an Agvet Chemical Product
	YES	The permit forms an integral part of Sunwater's management of water quality and supply. Without copper sulphate dosing, algae growth would be uncontrolled and may negatively impact Sunwater's ability to supply water for irrigation purposes to its customers under the Mareeba Dimulah Water Supply Scheme.	None		Approvals For Use of Copper Sulphate in Sunwater Schemes. Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission
	YES	The works under this project form part of a rolling program which began in 2006. This project was initiated in response to the Copper Sulphate Research Permit expiry.	None		Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission
	N/A	This is a compliance based issue, not asset age/condition			
	N/A	Refer above.			

Comment on Prudence

This project was initiated to ensure that Sunwater could continue the control of algae in open and closed channels as part of their irrigation supply under the Mareeba Dimbulah Water Supply Scheme. In renewing the copper sulphate research permit, Sunwater have engaged a specialist consultant and peer reviewer to provide advice on a recommended strategy for progressing its application to APVMA. The consultant assisted Sunwater's environmental team in developing a sound understanding of the technical details of the scheme, monitoring data as well as the proposed treatment approach.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
N/A	An options analysis was not completed as this is a research project. The works undertaken were necessary to proceed with the permit approvals process. As part of the research, other alternatives are being investigated.	None		Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission
N/A	Refer above.			
N/A	Refer above.			
YES	Sunwater engaged a specialist consultant to develop strategies for algae control and the regulatory submission as part of this project. The outcome of the research may lead to the development a Code of Practice.	None		Memorandum: Copper Sulphate Research Permit - Project Plan and Budget Submission Approvals For Use of Copper Sulphate in SunWater Schemes
YES	Refer above.			
Insufficient information	There is no supporting documentations for the project scope or budget. While there is lack of information on the procurement processes for consultants and laboratory services, the majority of the project was self-performed, therefore efficiencies from procurement improvements would be minor. There are references to the a budget as of FY15 and final expenditure was below this budget. While there is no supporting evidence to show scope was completed, it has been assumed that it has been completed and as a result the project costs are deemed reasonable.	None		Actual cost summary Prudency and Efficiency 2015 Project Request Change 2019
Insufficient information	From the actual cost file, the major costs are Sunwater's internal labour and indirect costs, the only purchase order from all the supporting docs is for [REDACTED] and the purchase order \$90k is not in the actual cost summary, and the procurement process is unknown.	Minor		Actual cost summary
N/A	The project was self-performed research project and an assessment of indirect costs is not applicable.	None		
YES	The early engagement of the regulator served as appropriate diligence to mitigate risks and gain regulatory support for the project and permitting process.	None		
YES	The only impact of cost escalation was to do with laboratory services, which had a 5% escalation per year. The materiality of these costs is small, and appropriateness of escalation is minor.	None		

Were options considered in determining the least cost or preferred option?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		
Have any potential efficiency gains been identified?	N/A	Options assessment not applicable. The research project will have considered options for future implementation but no report was provided.	None		

Comment on Efficiency

The technical components of this project are in accordance with industry standards. In the document Approvals For Use of Copper Sulphate in Sunwater Schemes, Sunwater demonstrated project efficiency in their arrangements with APVMA and other federal agencies early on in the permit application process. In advance of their meeting, Sunwater prepared and sent a report outlining its proposed approach in order to identify any immediate concerns or suggestions of the federal agencies. The strategy for progressing Sunwater's application for APVMA approval for the use of copper sulphate is structured around its proposed use within closed systems (considered likely to be relatively straightforward) and open systems (likely to be more complex). The current trial is required to be continued to support full application of copper sulphate in the Mareeba System. There is a low quality of documentation for project scope, budget, and cost expenditure. As this project is predominantly self-performed by Sunwater and through regulator interaction, it appears to be executed to an appropriate standard. There is no information available to justify scope was completed and project cost efficiency, but the final budget appears to have been \$455,000 and actual costs were \$436,167 therefore, it is assumed as efficient.

Efficient YES

Documentation Quality Low

Project Name	Callide Creek Flood Review
Project Number	15CVA16
Project Description	Review of Dam Operation as Callide Dam
Asset Type	Dam
Year(s) to be Delivered	FY15 nd FY16
Cost	\$1,545,858 (Stage 1 and 2)

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project was initiated by the Queensland Government through the Inspector-General Emergency Management (IGEM) Review process following the flood impacts from Tropical Cyclone Marcia. The performance of Callide Dam and SunWater's operations during this event was also assessed. The outcome of the Government's Review Report was thirteen recommendations for implementation by the various agencies responsible (including Sunwater), as released by the Government on 4 June 2015.	None		2015 Callide Creek Flood Review Volume 1: Report
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The review was instigated as a commitment by the Premier and Minister for the Arts, the Honourable Anastacia Palaszczuk MP, to those affected by the flooding; to discover what role, if any, the Callide Dam played in the event.	None		2015 Callide Creek Flood Review Volume 1: Report
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The review was necessary as part of the disaster management strategy to reflect on past flooding events and to improve response processes in the future.	None		2015 Callide Creek Flood Review Volume 1: Report
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Expenditure was staged. Stage 1 deliverables related to the preparation of Sunwater submissions, and responding to the IGEM Review and requests for information. Stage 2 deliverable involved implementing relevant recommendations 2 to 13 from IGEM.	None		2015 Callide Creek Flood Review Volume 1: Report
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Asset life was not assessed as part of this project.			
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	In terms of the consequences of major flooding to the community, the devastation supports the review of the existing disaster management strategy and subsequent implementation of the IGEM Review recommendations.	None		2015 Callide Creek Flood Review Volume 1: Report

Comment on Prudence

Given the extent of the devastation as a result of the flood impacts caused by Tropical Cyclone Marcia, the significant loss of property and risk to livelihood, the Queensland Government initiated a review process of the disaster management strategy. Several recommendations were made, including actions to be completed with SunWater and various other agencies in the review. The review report was comprehensive and clearly demonstrates the value of the investigation and the benefits it may present to the community preparedness for future flood events.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
N/A	Works aligned with the recommendations of the IGEM Review.			
N/A	Refer above.			
N/A	Refer above.			
YES	The role of the Inspector-General Emergency Management was first established in 2013 following a review of police and community safety. The IGEM role was formalised as a statutory position in 2014. The functions of the IGEM and the Office of the IGEM are prescribed in the Disaster Management Act 2003.	None		2015 Callide Creek Flood Review Volume 1: Report https://www.igem.qld.gov.au/Pages/default.aspx
N/A	No changes to infrastructure as part of this project.			
YES	The costs incurred by Sunwater were required to implement the recommendations from the IGEM Review. The actual phase 1 and phase 2 project cost of \$1,545,858 exceeded the budget amount of \$1,410,000 by \$135,858; although the Stage 2 budget was likely understated as it excluded a contingency and was based on scope not fully defined. P&E documentation provides further justification of exceedances.	None		Project Cost Plan P&E document
YES	Flood studies were completed by external consultants as a joint study on behalf of DEWS and Sunwater. The project was initiated in response to the IGEM Review. The contract for the Project Director role and the hydraulic modelling were sole sourced, but justifications were included in the procurement plan.	None		IGEM Callide Valley Flood Review Recommendation State Update - June 2017. Request for Offers Procurement Plan
YES	Indirect project costs were used to fund project and stakeholder meetings, travel and media. These appear to be justified to meet the required delivery of joint flood studies and improved disaster management strategies involving multiple stakeholders. However the supporting document only has the sum of the indirect cost, but no details of the cost estimate breakup.	None		Project Cost Plan
N/A	Project development strictly in accordance with IGEM Review recommendations. Little to no risk of project identified.			
N/A	No cost escalation evident.			
N/A	Option analysis not part of project; improvements in accordance with IGEM recommendations.			
N/A	Refer above.			

Did the project consider whole of life costs, including future maintenance and operating costs?

N/A

Refer above.

Have any potential efficiency gains been identified?

YES

As stated in the Prudence and Efficiency document, these works are mandatory requirements in accordance with the IGEM review outcomes and to ensure optimum public safety with respect to flood warnings, public education, dam operation, gauging network improvements (flood monitoring and predictive capability) and consideration of potential flood mitigation options and benefits.

None

Prudence and Efficiency Document

Comment on Efficiency

The project was deemed efficient in terms of both scope, standard, and cost. The project included specialty technical expertise and a modelling contractor familiar with the site. A procurement plan was approved to engage these contractors on a sole source basis. The Stage 1 costs were under budget and the Stage 2 costs were over, although the original Stage 2 budget may have been understated due to the lack of a contingency amount constrained by annual annuity budgeting limitations. For these reasons, the project appears to be efficient.

Efficient

YES

Documentation Quality

Medium

Project Name	Moura Offstream Storage (MOSS)
Project Number	15DAW01
Project Description	Upgrade PLC and SCADA System - MOSS Pump Station
Asset Type	Storage
Year(s) to be Delivered	2016/17 FY
Cost	\$260,693

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The existing PLC and SCADA control system at MOSS is operating past its designated life expectancy. The PLC controllers and RTU modules are obsolete and no longer supported by equipment manufacturers. Replacement parts will no longer be easily obtainable from the market when components fail. Therefore, the control system equipment should be upgraded to reflect modern technologies.	None		Detailed Options Analysis
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	As a result of technological advancement, control system components have a typical serviceable life of 15 to 20 years. The equipment at MOSS is outdated and consequentially no longer compliant.	None		Detailed Options Analysis
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	MOSS is part of the Dawson Valley Supply Scheme, which is owned and operated by Sunwater. Failure of the control system will result in Sunwater being unable to fulfil their regulatory requirement to manage water resources at MOSS. Sunwater also have a commercial interest as the scheme supplies over 15,000 ha of irrigated land, as well as several towns and mines along the Dawson River. The scheme has 153 customers utilising 260 offtakes. The works are required to comply with the Fitzroy Basin ROP (2006) and Dawson Valley Water Supply Scheme ROL, Standard Supply Contract, Asset Management Policy, WH&S Requirement and ROP environmental requirements driven by concerns including ecological sustainability and operational continuity.	None		Detailed Options Analysis
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None		Detailed Options Analysis

	<p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p>	<p>YES</p>	<p>The service life of electrical equipment is generally 15-20 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.</p>	<p>None</p>		<p>Detailed Options Analysis</p>
	<p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	<p>YES</p>	<p>Records show that the PLC and SCADA computer were built and installed in 1999. The latest inspection indicates that the equipment is still functional, however Sunwater faces operational risk should any components of this obsolete system fail. Appropriate steps were taken to determine the control system was outdated, including consultation with the manufacturer. In line with standard equipment life expectancy, the system is due for replacement.</p>	<p>None</p>		<p>Detailed Options Analysis</p>
<p>Comment on Prudency</p>		<p>The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Dawson Valley Supply Scheme.</p>				
<p>Prudent</p>		<p>YES</p>				
<p>Documentation Quality</p>		<p>High</p>				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

YES

Three options were identified and assessed in the detailed options analysis document. Option 1 and 2 was the replacement of PLC and SCADA software with Allen Bradey and Schneider brand equipment, respectively, while Option 3 was the do nothing option.

None

Recommended Adjustment

Detailed Options Analysis.

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

YES

Based on costs, it was more beneficial to replace the control system with Sunwater Standard PLC Hardware (Schneider).

None

Detailed Options Analysis

Were/are non-capex options considered (such as operational solutions)?

YES

A do nothing option was considered, however there are significant consequences in not proceeding. Sunwater will be in breach of contractual obligations which is likely to have negative impacts on stakeholder relations if the control system fails and water cannot be supplied in accordance with the contract. Other consequential outcomes of not proceeding may include financial losses and environmental impacts. SunWater would also fail to meet public safety if the aged system failed during a flood or another emergency.

None

Detailed Options Analysis

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

YES

The standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1999, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for SunWater engineers nor PLC Programming Software licencing.

None

Detailed Options Analysis

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

YES

Refer above. The preferred option is like-for-like replacement.

None

Detailed Options Analysis

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Upgrade of existing control system to modern standard. Sunwater staff are also familiar with proposed brand, Schneider, which will improve general business performance as there will be consistency across various sites regarding the control equipments used.

None

Detailed Options Analysis

Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Multiple variations to the original project scope were cited (including approved and not approved). The variation register HB1994281 was referred to, however not provided as part of the supporting documents. The unapproved variations were documented as a new air conditioner in the control room to prolong asset life, and the installation of a power meter to determine the cause of recurring faults (this was noted as should have been included in the original scope of works). The cost estimate is revised several times and it is unclear why the initial cost estimate of \$150,612 had increased to \$277,995 as a sum of the initial cost estimate of \$150,612 and the project planning costs from FY15 and FY16 totalling \$127,385. A further increase (\$16,644) was required citing additional works to be completed resulting in a final cost estimate of \$294,639. The contractor variations appear well justified and documented. The total construction phase was within the accuracy bounds of the estimate from the Options Analysis.	Minor		Prudency and Efficiency Document
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	A competitive procurement process was completed and quotes received from three contractors. The contractor with the lowest (best) cost-effectiveness ratio was awarded the works.	None		Memorandum - Approval to increase expenditure under contract number 15SW4571
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	25% contingency was allowed as part of the project budget.	None		Cost to Complete Spreadsheet
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	Detailed risk assessment was completed as part of the options analysis phase. Project risk was effectively reduced by having a thorough process for defining scope of works.	None		Detailed Options Analysis
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Escalation is not considered as stated in the option study.			
Were options considered in determining the least cost or preferred option?	YES	Least cost option derived from options analysis.	None		Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used was appropriate.	None		Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Cheaper maintenance as parts are available on the market.	None		Detailed Options Analysis
Have any potential efficiency gains been identified?	YES	Using Schneider equipment has a practical benefit in that Sunwater staff are experienced with the equipment and control, therefore would not require additional training or licencing of programs.	None		Detailed Options Analysis

Comment on Efficiency As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. The cost estimates are revised several times but contractor variations appear well justified. The final construction phase costs (FY17 and FY18) are within the accuracy bounds of the cost estimate from the options analysis. The FY15 and FY16 project development costs are 48% of the total project costs and may be high, but overall the project has shown good cost efficiency.

Efficient	YES
Documentation Quality	Medium

Project Name	Teemburra Dam
Project Number	15PIO06
Project Description	Upgrade of Control System at Teemburra Dam
Asset Type	Control System
Year(s) to be Delivered	2015
Cost	\$472,207

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	YES	Were/are the works reasonably required to continue to deliver agreed service levels?	The control system in question operates the release of water from Teemburra Dam, the Tannalo offtake, the Palmtree Outlet and the fishlock at Dumbelton Weir. As the system is obsolete, it is necessary to upgrade to reflect modern technologies, and prevent a failure of the control system affecting the ability to meet agreed service levels.	None		Detailed Options Analysis
	YES	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	As a result of technological advancement, control system components have a typical serviceable life of 15 to 20 years. The equipment at Teemburra Dam is outdated and no longer compliant.	None		Detailed Options Analysis
	YES	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	The Teemburra control system forms part of the operational infrastructure used in the Pioneer Valley resource operations plan (ROP). If the system fails, Sunwater would be in breach of contractual obligations and this would have a negative impact on stakeholder relations. Sunwater also provides water to several customers downstream as part of their Standard Supply Contract in the Pioneer River Water Supply Scheme. Other requirements include Asset Management Policy, WH&S Requirement, and Environmental Requirement.	None		Detailed Options Analysis
	YES	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	Essential renewals of control system required to maintain service. As system was identified as being obsolete at time of inspection, immediate works are required.	None		Detailed Options Analysis
	YES	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	The service life of electrical equipment is generally 15-20 years. Considering the equipment is now obsolete as a product of time, the asset life appears to be consistent with standard run-to-failure expectancy.	None		Detailed Options Analysis

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES

Records show that the PLC and SCADA computer were built and installed in 1997. The latest inspection indicates that the equipment is still functional, however Sunwater faces operational risk should any components of this obsolete system fail. Appropriate steps were taken to determine the control system was outdated, including consultation with the manufacturer. In line with standard equipment life expectancy, the system is due for replacement.

None

Detailed Options Analysis

Design Specifications

Comment on Prudency

The appropriate procedures were followed for project scope development. Based on the high quality documentation provided, there is a clear need for control system upgrade. The assessment of the equipment age was in line with industry standards for life expectancy. Prudency was demonstrated in the documents provided, as failure of the control system would affect customers as part of the Pioneer River Water Supply Scheme.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	Four options were identified and assessed in the detailed options analysis document. Option 1 and 2 was the replacement of PLC and SCADA software with Allen Bradey and Schneider brand equipment, respectively. These options do not include the replacement of the RTUs and repeater stations' equipment, and adopts a replace-when-required approach. Option 3 is similar to Option 2, replacing like-for-like with Schneider equipment, however it included replacement of the entire system. Option 4 was the do nothing option.	None		Detailed Options Analysis
YES	Based on cost and risk, it was more beneficial to replace the entire control system with SunWater Standard PLC Hardware (Schneider), Option 3.	None		Detailed Options Analysis
YES	A do nothing option was considered, however there are significant consequences in not proceeding. Sunwater will be in breach of contractual obligations which is likely to have negative impacts on stakeholder relations if the control system fails and water cannot be supplied in accordance with the contract. Other consequential outcomes of not proceeding may include financial losses and environmental impacts. Sunwater would also fail to meet public safety if the aged system failed during a flood or another emergency.	None		Detailed Options Analysis
YES	Sunwater's standard serviceable life of control equipment is between 10-15 years. Since the PLC and SCADA equipment was installed in 1997, the system is due for replacement. The manufacturer no longer supports the components in the system, thus rendering it obsolete. Finding replacement parts would require special manufacturing, which may be costly, as well as significant lead times. A detailed options analysis indicates that the best cost-benefit would be replacement of the existing system with up-to-date equipment. There is also a practical benefit as upgraded hardware and software will be per Sunwater's standard PLC systems, therefore requiring no additional training for SunWater engineers nor PLC Programming Software licencing.	None		Detailed Options Analysis
YES	Refer above. The preferred option in like-for-like replacement.	None		Detailed Options Analysis
	Upgrade of existing control system to modern standard. Sunwater staff are also familiar with proposed brand, Schneider, which will improve general business performance as there will be consistency across various sites regarding the control equipments used.	None		Detailed Options Analysis

Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The option study is done prior to the work for identifying the lowest cost option of capital cost and O & M cost in future years. Also competitive tendering procurement strategy is used to select the best value for money contract. This demonstrates efficiency.	None		Detailed Options Analysis
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	A significant procurement plan was completed for this project. Four offers were received for this invitation, with all offers similar and within \$10k of one another. The quotes provided appear to consistent with the prevailing markets.	None		Offer Recommendation
If not, why?					
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Multiple variations (refer to HB# 1874294) to the original project scope were cited. An increase of \$69k was documented for additional contractor costs, while Sunwater had an additional \$84k to the original budget estimate. Project Management accounted for \$30k, while other costs and resources (such as procurement, travel, etc) was \$80k. These additional costs were broken down and provided in the revised cost estimate.	None		Prudency and Efficiency Document Memorandum - Approval to Increase Purchase Order No. 5700086219
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A competitive procurement process was completed and quotes received from four contractors. The contractor with the lowest (best) cost-effectiveness ratio was awarded the works.	None		Offer Recommendation
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	There is a discounted rate of 7.49% applied to compare the NPV's of different options. 20 year Australia bond yield rate is 2-3%, Clarification should be sought to Sunwater on picking up a much higher discounted rates, which would have an impact on the NPV of different options, which would result the choice of option.	Minor		Detailed Options Analysis
Were options considered in determining the least cost or preferred option?	YES	Least cost option derived from options analysis.	None		Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	MCA used was appropriate.	None		Detailed Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Cheaper maintenance as parts are available on the market.	None		Detailed Options Analysis
Have any potential efficiency gains been identified?	YES	Using Schneider equipment has a practical benefit in that Sunwater staff are experienced with the equipment and control, therefore would not require additional training or licencing of programs.	None		Detailed Options Analysis

Comment on Efficiency	As evidenced in the detailed options analysis, there was clear consideration for the best cost-benefit control system replacement option to be implemented. Several options were assessed, however the recommended option presented several efficiencies including staff knowledge and competence in Schneider PLC and SCADA equipment, reducing training costs and additional program licencing. Further, the best operational outcome and lowest risk of system failure could be achieved by replacing the entire control system. The information provided was high quality, and variations to the original budget estimate could be accounted for and justified. Based on the information provided, suitable processes were followed to demonstrate project efficiency.
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Efficient	YES
Documentation Quality	High

Project Name	Boondooma Legal Insurance
Project Number	16BYR07
Project Description	Boondooma Dam Spillway Repairs Project Insurance Claim
Asset Type	N/A
Year(s) to be Delivered	N/A
Cost	\$591,181

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
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Prudency	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	This project was created to capture legal costs associated with the Boondooma Dam Spillway Repairs Project Insurance Claim. Sunwater have stated that legal costs related to a claim are not covered under the insurance policy. There was no project documentation associated with this project.	None		
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The legal costs were required to reach the settlement with the insurance company.	None		
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The insurance claim and any dispute must be made within 6 years of the insurance claim or the flood event.	None		
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A				
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A				

Comment on Prudency	The legal costs associated with the Boondooma Dam flood damages insurance claim should have been captured under the flood damages project (12BYR17). A per documentation from 12BYR17, the insurance claim was originally rejected in full due to the insurer's stance that Sunwater had knowledge that the dam had design errors and omissions but elected not to remediate the scouring risk. Sunwater eventually received a settlement for a portion (estimated to be ~\$4M) of the original claim (assumed to be \$38M). The \$591k in legal costs were deemed prudent in order to reach the settlement.
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Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

- Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?
- Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?
- Were/are non-capex options considered (such as operational solutions)?
- Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?
- Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?
- Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.
- Was/is the incurred/proposed cost reasonable for the scope of the project?
- Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.
- If not, why?
- Was/is the the allowance for indirect costs reasonable for the scope of the project?
- Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?
- Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)
- Were options considered in determining the least cost or preferred option?
- Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?
- Did the project consider whole of life costs, including future maintenance and operating costs?
- Have any potential efficiency gains been identified?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				
N/A				

Comment on Efficiency

A review of efficiency of the legal costs is not possible; therefore, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Allan Tannock Weir
Project Number	16CUW02
Project Description	Refurbishment Outlet Works Gate
Asset Type	Weir
Year(s) to be Delivered	2016
Cost	\$25,903

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Cunnamulla township receives water supply from the storage at Allan Tannock Weir. Leaks estimated to be 1ML/day were identified by Paroo Shire Council at the outlet works of the weir. Amid concerns from the community regarding this water loss, Sunwater commenced repair works to stop leaking. Attempts to repair the gate seals were unsuccessful, as was the replacement gate installation. This project was initiated as a result of the failed corrective actions so that the gate could be properly repaired.	None		Prudency and Efficiency Document Briefing Note
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The weir gate is non-compliant as it is leaking, resulting in significant water loss and risk to the long term water security of Cunnamulla.	None		Briefing Note
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Repairs are required to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme.	None		Briefing Note
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works were required in accordance with the corrective order.	None		Briefing Note
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	At the time of the repairs, the asset was 25 years old. Mechanical parts typically have a serviceable life up to 20 years, so the gate was likely due for replacement.	None		Condition and Risk Assessment
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Before photos clearly show active water leak from the weir outlet works. A special meeting held between SunWater and Paroo Shire Council noted that readings from the Allan Tannock Weir indicate approximately 7.69 ML/day storage loss is occurring through the valve, seepage and evaporation.	None		Cunnamulla Water Advisory Special Meeting Before Photos

Comment on Prudency

The leaks observed at the Alan Tannock Weir pose a serious threat to the water security of the Cunnamulla township. It is evident, based on the information provided, that this project is prudent to the continuation of the town's secure water supply. Without repair works, SunWater will be in breach of their regulatory obligation to provide a consistent water supply under the Cunnamulla Weir Supply Scheme. Given the urgency of the project, some processes were not adhered to and documentation such as the Project Plan, Design Brief, Scope of Works, and Budget Estimate were not submitted. The overall quality of documents could be improved.

Prudent

YES

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	NO	Emergency works were required to repair the leak at Alan Tannock Weir. Initially, the proposed treatment was seal repair of the existing gate; however, undocumented modifications resulted in this being unfeasible. The following action was replacement of the gate entirely. No formal options analysis process was undertaken and the processes for corrective action were reactive.	Minor	Unlikely to impact cost if other options were considered due to urgency of repairs required	Briefing Note
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	N/A	Refer above.			
<p>Were/are non-capex options considered (such as operational solutions)?</p>	NO	A non-capex solution, such as a do nothing option, was not feasible as not proceeding with corrective works would put Sunwater in breach of their regulatory obligation under the Cunnamulla Weir Supply Scheme.	None		Briefing Note
<p>Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?</p>	YES	As built provided.	None		As Built
<p>Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?</p>	YES	Repair of gate was like-for-like.	None		As Built
<p>Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.</p>		N/A			
<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	YES	The incurred costs were attributed to immediate temporary repairs for the weir gate. Based on the attempted reseal, new gate fitting and sandbagging recorded as part of the works, the cost appears to be reasonable. However the remedial work is considered as double handling, as a temporary gate was installed, but it leaked again. Would appropriate design and factory tests have been done at the first place, the rework may not have been required	None		Revised Prudency and Efficiency Document
<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?</p>	Insufficient information	It appears [REDACTED] was used to supply and install the gate, but no details on the procurement process were provided.	Medium	Unable to assess	
<p>Was/is the the allowance for indirect costs reasonable for the scope of the project?</p>	Insufficient information	No record of indirect costs to be assessed.	Medium	Unable to assess	

	<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p> <p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p> <p>Were options considered in determining the least cost or preferred option?</p> <p>Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?</p> <p>Did the project consider whole of life costs, including future maintenance and operating costs?</p> <p>Have any potential efficiency gains been identified?</p>	NO	<p>The risk assessment provided is not sufficient to detail and confirm safe work methods were implemented during repair works. It was noted in the documents provided that there was concern the Sunwater staff, the contractors on site and members of the public (with ready access to the site) may have been at risk if the isolation had failed. Sunwater could face considerable legal liability if death or serious injury would have occurred.</p> <p>The Prudency & Efficiency document states that designs and any asset modifications must have RPEQ sign-off to ensure safety. There is no documentation showing RPEQ participation and the As-Built drawing does not show RPEQ sign-off.</p>	Major	Unable to assess	<p>Condition and Risk Assessment</p> <p>Briefing Notes</p> <p>Prudency and Efficiency Documentation</p> <p>As-Built</p>
		Insufficient information	A budget estimate was not provided for this project. No record of cost escalation.	Minor	Unable to assess	
		NO	No options analysis completed.	Minor		
		NO	Refer above.			
		NO	Scope of works was for temporary repairs to be completed. Whole of life costs, future maintenance and operating costs would be considered in a subsequent project.	Medium	Unable to assess	<p>Briefing Notes</p> <p>Prudency and Efficiency Documentation</p>
		N/A				
Comment on Efficiency			<p>Appropriate processes for project management, scoping of works, budget estimation, procurement, and general record-keeping were not followed, resulting in inefficient project execution. There was insufficient information to properly justify the project expenditure and conclude whether the treatment was appropriate for the repairs required. Despite the documentation issues and given the claim amount of \$25,903 is less than the project closure report expenditure amount of \$30,737, the scope of work and costs can be considered appropriate.</p>			
Efficient			YES			
Documentation Quality			Low			

Project Name	Mary River Barrage
Project Number	16MVA01
Project Description	Reinstate Downstream Rock Protection
Asset Type	Barrage
Year(s) to be Delivered	2016 to 2019
Cost	\$386,652 (later revised to \$973,938 to include FY19)

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The Mary River Barrage forms a tidal barrier between sea water and fresh river water. It consists of a reinforced concrete crest structure supported on compacted sand between an upstream and downstream row of sheet piling. There are rockfill zones upstream and downstream of the steel piling which provided support for the piling and scour protection. Displacement of the rock protection presents a risk to the asset. Loss of the downstream row of sheet piling and support for the crest could lead to crest failure and consequently an uncontrolled release and loss of the storage.	None		Scope of Works IAC Presentation 2016 June
	YES	Protection of downstream row of sheet piling by zone IIIB is essential to retain the integrity of the structure.	None		IAC Presentation 2016 June
	YES	Sunwater has a regulatory obligation to manage water in accordance with the Lower Mary Supply Scheme.	None		Detailed Options Analysis
	YES	Works should be completed prior to upcoming wet season to prevent further damage or scouring of rock protection.	None		Scope of Works
	YES	Construction of the barrage was completed in 1981. Historical damage of the rock protection indicate that displacement is probably after significant flood events. Previous damages were recorded in 1998-2000 and 2015.	None		IAC Presentation 2016 June
	YES	Pictures taken of the barrage after the 2015 flood clearly show the displacement of rock from the sheet piles at Mary River Barrage. Assessments of the barrage are completed after flood events, which is appropriate for the structure and damages historically observed.	None		Detailed Options Analysis Construction Report

Comment on Prudency	The barrage is critical infrastructure in Sunwater's Lower Mary Supply Scheme. Given the role of the rock protection in supporting the sheet piling, it is evident that the repairs are prudent to the water security of the scheme. The appropriate PM processes were clearly followed to ensure the scope of works was defined and justified by the most recent condition assessment of the barrage. The documentation provided was of high quality and effectively demonstrates project prudency.
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Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	YES	Several options were identified and assessed as part of the scoping process. Option 1 was do nothing, while Option 2 and 2a were to replace with 600mm and 800mm rock respectively. Option 3 was to use concreted rockfill to EL 0.0. Option 4 was replace rock with concrete slab, and Option 5 was replace rock with tetra blocks or similar.	None		IAC Presentation 2016 June Detailed Options Analysis
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	YES	Based on the assessment of the options identified, the preferred option is justified as being the best means of achieving the desired outcomes given the scope of works.	None		Detailed Options Analysis
<p>Were/are non-capex options considered (such as operational solutions)?</p>	YES	A do nothing option was considered, however it was disregarded as not proceeding with repair work would put Sunwater at unacceptable risk of not being able to continue to meet its service level standard. Loss of the downstream row of sheetpiling and support for the crest due to displaced rock protection could lead to crest failure and consequently an uncontrolled release and loss of the storage.	None		Detailed Options Analysis
<p>Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?</p>	YES	The Specification from Contract of Works includes drawings with appropriate specifications. A construction report was completed detailing the processes undertaken during the construction phase. As built drawings were provided of the repairs.	None		Specification from Contract of Works Construction Report As Builts
<p>Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?</p>	YES	The rock protection was reinstated as per the original design, with consideration for rock size to ensure the protection remains in place.	None		Detailed Options Analysis
<p>Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.</p>		N/A			
<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	YES	The incurred costs for the project were within the original budget estimate for the project scope. The increases of scope and budget are well documented in the Prudency and Efficiency doc.	None		Cost Estimate & Prudency and Efficiency
<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.</p>	YES	Sunwater followed the appropriate procurement processes for this project, with a competitive approach adopted. Six offers were received, which were documented and assessed in Offer Recommendation Report for RFO16SW4863. The offers received are a representation of consistency with market conditions.	None		Offer Recommendation for RFO16SW4863
<p>If not, why?</p>					
<p>Was/is the the allowance for indirect costs reasonable for the scope of the project?</p>	YES	The cost estimate detailed the indirect costs proposed for the project, which are reasonable given the scope.			Cost Estimate
<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	YES	A safety, quality and environmental project management plan was completed as part of the approach for managing risk at project inception.	None		Project Management Plan
<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	N/A				

Were options considered in determining the least cost or preferred option?

YES

A detailed options analysis report was completed. Based on assessment against multiple criteria, the preferred option was determined to be Option 3.

None

Details Options Analysis

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

YES

MCA used was appropriate.

None

Detailed Options Analysis

Did the project consider whole of life costs, including future maintenance and operating costs?

YES

Consideration of likelihood for future repairs was made and influenced the recommended option; although the whole of life costs were not specifically quantified.

None

Detailed Options Analysis

Have any potential efficiency gains been identified?

NO

Comment on Efficiency

It is clear from the high quality documentation provided that the appropriate PM processes were followed to ensure the project's success when assessed against the metrics of this review. There was a clear understanding of the issue at hand and thoughtful consideration for the best treatment. A detailed options assessment was undertaken, which identified seven options. A MCA approach was adopted and the most beneficial treatment in terms of cost, risk, outcome, and timing was recommended. As a result of the processes in place, the scope of works was well defined, and the project budget was adhered to despite variations due to inclement weather. Competitive tendering procurement processes were followed to ensure the costs were consistent with prevailing market conditions and selected as best value for money. Construction works were followed by a Construction Report and Certification of Practical Completion. Sunwater closed out the project with the relevant documentation. Overall, the rock protection at Mary River Barrage was successfully reinstated with the appropriate processes which in turn demonstrated project efficiency.

Efficient

YES

Documentation Quality

High

Project Name	Peter Faust Dam
Project Number	16PRO03
Project Description	Investigation of the Spillway at Peter Faust Dam
Asset Type	Spillway
Year(s) to be Delivered	2017/18 FY
Cost	\$607,160

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Peter Faust Dam provides regulated releases for downstream irrigation and urban usage from the Proserpine River and through the Kelsey Creek Pipeline and provides a degree of flood mitigation. Damages observed at the spillway and right training wall may worsen without intervention and ultimately lead to failure of the structure.	None		Options Analysis (Options Study HB#1694772)
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The works are required to maintain compliance with Sunwater's Asset Management Policy, WH&S Requirement, and Dam Safety. Peter Faust Dam is classified as an Extreme Hazard Dam in accordance with Guidelines on Assessment of the Consequences of Dam Failure (ANCOLD 2000b) and QLD Guidelines on Acceptable Flood Capacity for Warrer Dams (DEWS 2013).	None		Options Analysis
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Sunwater have a regulatory obligation under the Proserpine Supply Scheme, Resource Operating Plan (ROP), and Organisation Reputation.	None		Options Analysis
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Further investigation of the spillway was required to determine the most appropriate corrective action. The timing of the expenditure was appropriate with works to be completed prior to the following wet season to prevent further damage from occurring.	None		Business Case
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	NO	Peter Faust Dam was constructed over a two year period, completed in 1990. Given the serviceable life of concrete is typically 50 years, it can be concluded that the asset life is not consistent with standard run-to-failure life expectancy. However, the damages observed to the concrete components of the spillway chute may be a combination of spills over the dam and seepage issues resulting from blocked weep holes which have caused voids under the concrete structure.	None		

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES

The most recent inspection report and accompanying photos support the damages outlined. The timing for inspections is appropriate for the structure, with annual inspections completed for the dam in addition to five yearly safety inspections.

None

Five Yearly Comprehensive Dam Inspection Report

Comment on Prudency

It is evident, based on the Inspection Report, Options Analysis and Business Case, that further investigations are required to determine the extent of damage at Peter Faust Dam and subsequently the most appropriate treatment. There was clear demonstration of prudency given the high quality, detailed information provided.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

YES

One alternative option was scoped, do nothing. Although some rejected options were briefly described.

None

Recommended Adjustment

Options Analysis

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

YES

With consideration of timing, cost, benefits and risk, the preferred option was determined to be Option 1, which was to proceed with the repair of potential voids under "drummy" spillway slab, path Spillway Chute Flood and Right Training Wall cracks and reinstate the existing spillway drainage system.

None

Options Analysis

Were/are non-capex options considered (such as operational solutions)?

YES

A do nothing option was considered, however disregarded as the consequences of not proceeding would have resulted in greater costs in the future as well as significantly increased risk to safety and water resource management.

None

Options Analysis

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

YES

No changes to the original design were made. All testing on site was in accordance with the relevant industry standards.

None

Five Yearly Comprehensive Dam Inspection Report

Anchor Load Test

Core Hole Investigation

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

YES

Refer above.

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

N/A

Was/is the incurred/proposed cost reasonable for the scope of the project?

YES

There were several variations to the original project budget, although no changes to the project scope. Additional effort was required to finish the project. The project report dated 2016 indicates that the project scope was not completed due to insufficient funds and the fact that the concrete spillway floor was greater than anticipated. Subsequent works in 2018 were completed once more funds became available. The project completion report indicates that there were no voids, due to the thickness of concrete and relatively intact concrete cores obtained.

None

Project Report 2016

Project Completion Report 2018

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

YES

An exemption for specialist services were applied for a small part of the project in 2016. For the larger components, a competitive procurement process was adopted in both phases of the project (2016 and 2018). In 2016, offers were sought from [redacted] and [redacted]. In 2018, three companies ([redacted], [redacted] and [redacted]) submitted quotes.

None

Offer Recommendation
Procurement Recommendation
Tender Evaluation

If not, why?

Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	All indirect costs were documented in the budget estimate and prudence and efficiency documentation. Based on the information provided, the allowance appears to be reasonable given the project scope and regional location of the site.	None		Prudence and Efficiency (2016/2018) Budget Estimate
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	A condition and risk assessment was completed during the scoping phase of the project. An issues and risk analysis was also detailed in the business case.	None		Business Case Condition Assessment Risk Assessment
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	Procurement processes followed for cost estimation of additional works.	None		Cost Estimate 2018 Contractor Scope of Works 2018
Were options considered in determining the least cost or preferred option?	YES	A detailed options analysis was completed, with the preferred option recommended.	None		Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The MCA used was appropriate. The weighting of each criteria was suitable for the project scope, importance, and risks.	None		Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The project was initiated to mitigate future maintenance efforts and costs.	None		Options Analysis Business Case
Have any potential efficiency gains been identified?	NO	No significant efficiency gains were identified for this project.	None		Prudence and Efficiency

Comment on Efficiency

There were several unplanned material changes to the scope and budget throughout the first phase of the project. Larger than expected concrete thickness and the drainage pipe could not be located in the first attempt. The allocated funds were exhausted and the project scope was not completed, and instead proposed to delay the scope completion as part of a future project. The second phase was competitively bid in 2018 and the scope completed. It is clear that because the appropriate PM processes were in place, these changes were effectively managed and the project was successfully completed. The relevant approvals were provided in accordance with Sunwater's delegations (via SAP workflow / digital signature). The overall project expenditure was below the final combined budgets. The high quality documentation provided was adequate in demonstrating project efficiency.

Efficient

YES

Documentation Quality

High

Project Name	Eungella Dam - Plug Outlet Conduit Permanently
Project Number	17BBR04
Project Description	Condition assessment of main conduit, guard valve and associated pipeworks.
Asset Type	Dam
Year(s) to be Delivered	
Cost	FY16-18: \$408,257 FY19: \$1,315,000

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The main outlet conduit forms an integral part of the Eungella Dam's operation. Sunwater's inability to maintain it warrant works to restore the conduit to its intended design. Further, leaks through the stop lods which seal the inlet tower were identified as a risk to the dam in the long term.	None		Business Case
	YES	In its current state, the Eungella Dam outlet conduit does not comply with dam safety schedule requirements, as Sunwater are unable to inspect the conduit, guard valves and associated fittings.	None		Business Case
	Insufficient information	There is no reference to regulatory obligations in the business case.	Minor		Business Case
	Insufficient information	The stoplog leakage prevents safe inspection (and repair if needed) of the outlet conduit and associated equipment, which is required to comply with dam safety schedule requirements. Reference to the regulatory requirement and the timing/frequency for inspection was not provided in the business case. It is assumed as urgent.	Minor		Business Case
	NO	The dam was constructed in 1968 and is 49 years old. The assessed asset life in accordance with the risk assessment is 80 years; therefore the asset appears to have experienced premature failure. That said, hydromechanical assets may have a shorter life but this doesn't appear to be defined in the documentation.	Minor		Business Case Risk and Condition Assessment
	YES	The 2000,2004,2010 all noted small leakage through the stoplogs. The 2014 annual inspection identified that the stoplog leakage exceeded the dewater pump flow capacity of 55 L/s. This shows an increasing leakage and thus deteriorating condition. The 2017 dive investigation conluded the downstream side of the stoplogs had gaps 2 mm - 20 mm and 1.2 m - 1.5 m deep silt deposits in the inlet tower base. The condition assessment supports the proposed works.	None		Business Case

Comment on Prudence

Based on the information provided, Sunwater would be in breach of their dam safety requirements due to the unsafe access for inspection and repair of the outlet conduit, guard valves and associated fittings. Failure of the outlet conduit would lead to the inability to supply water. Sunwater are required under the Bowen Broken Supply Scheme to provide water supply from the Eungella Dam to customers. There is reasonable justification for the scope of works described under this project. The overall quality of documentation provided is medium.

Prudent

YES

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p>	YES	Five options were identified and assessed as part of the scoping process. These options include placing mass concrete upstream; installing upstream formwork, reinforcement and concrete; installing upstream stop logs, installing upstream metal baulk, and doing nothing.	None		Business Case
	YES	Based on the assessment of the options identified, the preferred option is justified as being the best means of achieving the desired outcomes given the scope of works.	None		Business Case
	YES	A do nothing option is considered, but it does not address the long term issue to the asset	None		Business Case
	NO	A Practical Completion Certificate is provided, but no construction report was provided. No Diving report is included.	None		Practical Completion Certificate, Diving report
	YES	Design and construction of the works shall be in accordance with the latest revision of applicable Australian Standards, Statutory Codes and Regulations. Where no Australian Standard exists, work shall conform to the most current International Standards.	None		General Specification
		N/A			
	NO	The cost estimate breakdown for the proposed works in the design and construction phase appear to be reasonable. The business case stated that a total of \$295,273 had been spent on the planning phase across FY17 and FY18 and that remaining \$558,060 is required for the design and construction phase, which included a large contingency of 50%. A Practical Completion Certificate states the project was completed in October 2018. The historical CAPEX claim of \$408,257 and the FY19 actual expenditure of \$1,315,000 combine for a total project cost of \$1,723,257, which is \$869,924 above the budget. The large contingency in the budget, plus a lack of documentation, leads to a conclusion this overrun is not efficient.	Major	\$869,924 in FY19	Cost estimate Business Case Practical Completion Certificate
	Insufficient information	There has been an exemption from competitive tendering for ██████████ to provide third party technical review. There appears to be a competitive bid for the inspection/options development/design component, but only one tender received. There is no tender evaluation/recommendation or full bid info of successful bidder. For the construction phase, there appears to be an intent to conduct a competitive tender.	Minor		Exemption from Competitive Procurement Business Case
YES	10% contingency is reasonable for this type of project and the proejct development phase. A 50% contingency is proposed for the design and construction phase.	None		Cost estimate Business Case	

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

YES	Risk and Assessment summary is provided, although no details have been given	None		Risk, Condition Assessment
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Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

N/A				
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Were options considered in determining the least cost or preferred option?

YES	Option study identified the costs for different options, Option 1 (\$558,059) being the lowest cost option was selected for proceeding.	None		Business Case
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Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

YES	MCA used was appropriate.	None		Business Case
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Did the project consider whole of life costs, including future maintenance and operating costs?

YES	Operating costs are considered in the business case for different options, however, the operating costs are nil for all the options	None		Business Case
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Have any potential efficiency gains been identified?

NO				
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Comment on Efficiency

For historical years (i.e., before FY19), it is identified as an efficient project (pending design and construction phase documentation). The documentation quality for the project development phase is high. Business case and detailed cost estimate have been done, and the costs are reasonable for this project. Since there is no evidence provided for the procurement of the design and construction phase, or any breakdown of project actual expenditure, the documentation quality is deemed low. This also has a significant impact on the project cost efficiency. A practical completion certificate states October 2018 project completion. It has been assumed that the project cost claim of \$408,257 includes the design and part of the construction phase up to end of FY18. The FY19 CAPEX claim was \$672,553, and later updated for actual expenditure of \$1,315,000. The combined CAPEX claim would be \$1,723,257, which is \$869,924 above the budget set in March 2018. Considering this budget had ample contingency built in, coupled with lack of documentation and justification for budget overruns, an adjustment of \$869,924 is recommended for the FY19 year. The FY17-FY18 component has been assumed reasonable.

Efficient

NO

Documentation Quality

Low

Project Name	Giru Weir Outlet Works
Project Number	17BRI31
Project Description	Install STG II Functional Outlet Works - Giru Weir
Asset Type	Weir
Year(s) to be Delivered	FY16/17
Cost	\$766,806

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed		
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Giru Weir is located in the Haughton River, just downstream of the township of Giru. The weir storage level is generally maintained at or about 3.1 to 3.5m AHD to enable surface water access to Sunwater customers. The 'nominal operating level' in the Burdekin ROP is 3.0m AHD with a minimum operating level of 2.25m AHD. Giru Weir in its present configuration and management regime is not able to comply with Section 88 Part (3) of the Burdekin ROP. The proposed works consist of a buried left abutment bypass pipeline complete with upstream offtake structure and regulating gate, in-line EM meter and pit, and downstream bubbler type overflow.	None		BW R&E Project Scoping and Delivery Plan
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Yes, maintaining streamflow is needed to maintain the river and estuary health as required under the Burdekin ROP.	None		
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	The 2009 Burdekin Basin Resource Operations Plan (Burdekin ROP) and Water Resource Plan (WRP) considered a number of environmental flow objectives (EFO's) and water allocation supply objectives (WASO's) for the Haughton River. In relation to Giru Weir, Section 88 Part (3) of the ROP sets out the following stream flow conditions to meet these objectives: 'The resource operations licence holder (Sunwater) must ensure that there is a minimum stream flow at Node 2 (Giru Weir) equal to the cumulative daily flow recorded at the flow monitoring Node C (Mt Piccanniny 119005A) and the flow monitoring Node F (Major Creek 119006A), up to 40 ML/day.' The works are required to meet the ROP requirements.	None		BW R&E Project Scoping and Delivery Plan
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are required to bring Giru Weir to compliance with the Burdekin ROP.	None		BW R&E Project Scoping and Delivery Plan

	<p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p>	YES	<p>The gates had been in service for 40 years. Asset life for high risk outlet works is 50 years, but the asset had failed according to the condition inspection.</p>	None		<p>BW R&E Project Scoping and Delivery Plan</p>
	<p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	YES	<p>Observations of Giru Weir in its present arrangement is not compliant with the Burdekin ROP.</p>	None		<p>BW R&E Project Scoping and Delivery Plan</p>
Comment on Prudency			<p>Changes to Giru Weir are necessary to meet the pass flow requirements under the Burdekin ROP. Inability to rectify this puts Sunwater at risk of persecution for breaching their regulatory requirements. As such, these works are considered to be prudent and immediate works are justified.</p>			
Prudent			<p>YES</p>			
Documentation Quality			<p>High</p>			

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Four options were considered as part of the project scoping phase. These include: 1. Design and install weir bypass pipeline and meter (manually operated) 2. Design and install weir bypass pipeline and meter (remotely operated) 3. Design and install on-weir pipeline and meter (manually operated) 4. Design and install on-weir pipeline and meter (remotely operated)	None		High Level Options Analysis
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	As described in the Detailed Options Analysis, four basis options have been considered to meet the pass flow conditions in the Burdekin ROP. All are gravity pipeline arrangements, either manually operated (Options 1 and 3) or with remote actuation (Options 2 and 4). After considering the functional requirements, risk profiles and WoL costs, Option 1 provides the most appropriate arrangement and is the recommended option for further consideration for detail design and construction.	None		High Level Options Analysis
Were/are non-capex options considered (such as operational solutions)?	YES	A do nothing and a temporary pump arrangement option have been rejected due to unacceptable WHS risks and the inability to properly meet the ROP requirements.	None		High Level Options Analysis
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The standard of works are in accordance with Sunwater technical specifications and Australian Standards. The specs provided include Concrete, Protection Works, Sheet Pile Driving, Corrosion Protection, Fabrication, Steel Works and Pipeline Installation. A detailed design report was issued at construction completion. As built drawings were provided of the works.	None		Concrete Specs Protection Work Specs Sheet Pile Driving Specs Corrosion Protection Specs Fabrication Specs Steel Work Specs Pipeline Installation Specs Detailed Design Report As Built Drawings
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The standard of works appear to be compatible with current industry standards.	None		Detailed Design Report
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	The cost to complete the project is over the initial budget. The non-direct costs are 16% and low compared to other Sunwater civil projects. The overruns appear to be due to contractor and material costs. Contractor/material costs exceeded their quotes by \$144,917 without appropriate justifications for increases.	Major	\$144,917	Briefing note Prudency and Efficiency Document Total Actual Costs
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	The construction appears to have been competitively tendered, but there are no supporting docs to show the cost of FB was least cost and competitive. Long lead item materials were sole sourced to companies with in-stock material to improve delivery times.	Medium		Exemption and procurement process
If not, why?					

Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	The final non-direct costs were 18% of the total project, which is low compared to other Sunwater civil projects.	None		Option study, actual cost
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	The appropriate processes were in place to effectively scope the works required to meet the Burdekin ROP. The project was undertaken in stages, including an Options Study, Detailed Design Phase, and Installation/Commissioning. Much of the risk was managed in the project scoping phase. The Detailed Design Report has a comprehensive HSE design risk review.	None		Scoping Document Project Management Plan Detailed Design Report
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	YES	The project was predominantly delivered in a single financial year. No cost escalation impacts.	None		
Were options considered in determining the least cost or preferred option?	YES	The preferred option was assessed using a weighted MCA framework. The key criteria included timing, cost, benefit, and risk. Option 1 was scored most favourably against this criteria.	None		High Level Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	The MCA framework was an appropriate method for determining the preferred option. The criteria and weightings applied were suitable for the project scope.	None		High Level Options Analysis
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The options analysis considered operating expenses and a whole of life approach.	None		High Level Options Analysis
Have any potential efficiency gains been identified?	NO	No other efficiency gains identified.	None		

Comment on Efficiency

To meet the requirements under the Burdekin ROP, the appropriate project management processes were in place to enable efficient project delivery. Several options were assessed against a MCA as part of a High Level Options Analysis. The preferred option was progressed to detailed design and construction, with all works completed in accordance with Sunwater technical specifications and current industry standards. The detailed design report captured all aspects of the construction works, with as built drawings provided at project completion. The contractor and materials costs appear to have incurred overruns beyond their original quotes. Lack of appropriate justifications for the overruns have led to the conclusion that an adjustment of \$144,917 is warranted.

Efficient

NO

Documentation Quality

Medium

Appendix F

Assessment Forms for
Transitional and
Forward Renewals

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Project Name	Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.
Project Number	13NMA02 - Maintenance Key_0000076370
Project Description	Complete Last Phase of the Rock Stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.
Asset Type	Dam
Year(s) to be Delivered	2023
Cost	FY21-24: \$486,960

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Prudency</p> <p>Were/are the works reasonably required to continue to deliver agreed service levels?</p>	YES	<p>Instability of the slope below the right bank lookout has been noted during an inspection undertaken in 2009 and subsequent intermittent slope failures have been recorded. Slope failures typically occurred as discrete rock falls on to the access track to the intake tower with the rocks being of sufficient size to damage the Armco guardrails. The most recent failure resulted in damage to a guard rail and Bureau of Meteorology monitoring equipment located close to the toe of the slope beyond the existing guardrail. During previous inspections, voids were identified and could be traced into the slope for in excess of a metre. An internal project (13NMA02) was initiated to investigate the Rock Face Stability which included Survey, Geotechnical Mapping, Drilling and Testing to facilitate the assessment of the stability of the rock slope below the lookout. This part of the project focuses on the last phase of the rock stability work on the rock face on the right abutment adjacent to the Weemah inlet tower.</p> <p>The rockfall risks present a safety to both staff and the public, and reduce the ability to operate the dam, increasing the risk to provide agreed service levels.</p>	None		<p>QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx</p> <p>Memorandum: Inspection of slope above the intake tower access road and Selma Road, Fairbairn Dam</p>
<p>Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?</p>	YES	<p>The works are required to minimise risk of rockfall which presents a safety risk to staff and the public.</p>	None		<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p> <p>Memorandum: Inspection of slope above the intake tower access road and Selma Road, Fairbairn Dam</p>

	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified to minimise risk of rockfall. The works have already been postponed from FY17 out to FY23.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	Insufficient information	Fairbairn Dam was constructed in 1972. It is not clear if the rock was instated at the same time the dam was constructed, or if it has been repaired previously.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The most recent Annual Inspection Report for Fairbairn Dam was completed on 28-29 July 2014. The assets inspected include the Reservoir, Main Dam, Saddle Dam 1, Saddle Dam 2, Saddle Dam 3, Saddle Dam 4, Saddle Dam 5, Saddle Dam 6, Spillway, and Outlet Works. The condition of the dam at these locations varies from good to poor. The status of recommendations from past inspections record multiple repair works required within the financial year.	None		Annual Inspection Report 2014
Comment on Prudency		Rock instability of the right abutment adjacent to the Weemah inlet tower poses a safety risk. Given that a series of rockfalls have been recorded at this location, immediate works are justified to minimise the risk of further rockfalls. There is sufficient evidence in the documentation provided to consider this project as prudent.				
Prudent		YES				
Documentation Quality		Medium				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	No alternatives were formerly identified, although some documents allude to an options assessment. A do-nothing option should still be considered as a non-capex consideration.	Medium	Unknown	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided.	Medium		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.			
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	An IFC drawing was provided for the repair works to right bank lookout rock face stabilisation, however there were no associated technical specifications or guidance documents. As such, it is difficult to assess technical quality of work.	Minor		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	Minor		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		None identified	None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	There is no defined project scope or finalized cost estimate to make an informed assessment. Based on the IFC drawing cut volumes, the Option 2b cost estimate could be scaled up. This estimate is within the range of the proposed FY23 CAPEX claim. Assuming no work was completed in FY17-FY22, the costs can be considered reasonable.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions. There is also no documentation of planned procurement approach. Rates used in the cost estimate appear to be reasonable.	Minor		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Several cost estimates were provided for the project. Estimate 2b appears to be the most comparable of the four estimates provided to the proposed budget. The typical % range for indirect costs was provided and appears to be reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Cost Estimate
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	Insufficient information	Options were alluded to, but there is no documentation to define the options and show an appropriate assessment.	Medium	Unknown	

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Insufficient information

Options were alluded to, but there is no documentation to define the options and show an appropriate assessment.

Medium

Unknown

Did the project consider whole of life costs, including future maintenance and operating costs?

Insufficient information

Options were alluded to, but there is no documentation to define the options and show an appropriate assessment.

Minor

Have any potential efficiency gains been identified?

Insufficient information

None identified

None

Comment on Efficiency

For the proposed rock stabilisation works, there is insufficient information provided to comment on project efficiency. No alternatives were formerly identified. The cost estimates do not match the Issued for Construction drawings. There were no technical documents provided including procurement details despite it being understood that the project is in its final stages and was supposed to be delivered in FY17. Assuming all works have been delayed to FY23 and scaling the Option 2b cost estimate for higher excavation/reprofiling quantities, the CAPEX claim would appear to be reasonable.

Efficient

YES

Documentation Quality

Low

Project Name	16BAL12 Beardmore Dam - Thuraggi Channel Repair
Project Number	16BAL12 - Maintenance Key_0000076381
Project Description	Beardmore Dam - Thuraggi Channel Repair
Asset Type	Dam
Year(s) to be Delivered	2016-2020
Cost	FY16-18: \$874,315 FY19-20: \$6,275,000

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	YES	Beardmore Dam is the major storage for the St George Water Supply Scheme and is located 21 km upstream of the town of St George. The dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. The dam also has minor flood mitigation ability. Condition inspections reveal the outlet channel is at risk of failure, and requires repair to maintain agreed service levels.	None		Comprehensive Risk Assessment Renewals Detailed Options Analysis
	YES	The current condition of the channel was determined to be a safety and operational risk that could put Sunwater in breach of their regulatory requirement under the St George Bulk Scheme. Several key conclusions from the Risk Assessment include: 1. There is evidence that an active piping process has developed within the foundation sands below the outlet structure; 2. The estimated probability of failure of the outlet structure is very high (1 in 6). The dominant failure mode is backward erosion piping through the foundation sands below the structure; 3. The societal risk for the outlet structure in its existing condition plots about half an order of magnitude above the limit of tolerability for existing dams, and therefore the risks are assessed to be unacceptable according to the ANCOLD guidelines; 4. Sunwater have already implemented interim risk reduction measures to manage the risk in the short term, and this includes operational restrictions on water levels in the channel, more frequent inspections and stockpiling of emergency materials at site; 5. The preferred upgrade option is to infill the channel downstream of the outlet structure. This option is predicted to reduce the risk to negligibly low levels.	None		Comprehensive Risk Assessment

	<p>Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?</p> <p>Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?</p> <p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p> <p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	<p>YES</p> <p>YES</p> <p>YES</p> <p>YES</p>	<p>Beardmore Dam supplies water to meet allocation demands by regulating releases in the Balonne River and to the St George Irrigation area via the Thuraggi Diversion Channel. These works are required to maintain strategic alignment with SunWater's Corporate Plan and Statement of Corporate Intent which is to, "Operate and maintain SunWater's existing water infrastructure assets to ensure continued delivery of water to customers and communities in line with shareholder expectations." Ultimately seepage leading to instability of the dam embankment is a dam safety issue that needs to be addressed.</p> <p>A Needs Analysis by SunWater in the Detailed Options Analysis shows that the works are required to ensure compliance with ROP/ROL, Asset Management Policy, WH&S & Dam Safety, and Reputation.</p> <p>Immediate works are justified by the high risk of failure and subsequent potential impact to irrigation supply.</p> <p>Construction of the dam was completed in 1972. At the time of proposed works, the dam will be 47 years old. While the channel has not reached its expected asset life of 80 years, but Suwater has a strategy is to refurbish after 40 years.</p> <p>Images taken clearly demonstrate erosion of sand potentially associated with piping of sands from the foundation. Active sand boils were documented in bed of channel and evidence of seepage besides outlet right bank training wall.</p>	<p>None</p> <p>None</p> <p>None</p> <p>None</p>		<p>Renewals Detailed Options Analysis</p> <p>Comprehensive Risk Assessment</p> <p>Renewals Detailed Options Analysis</p> <p>Thuraggi Channel Outlet Structure Final Report - Thuraggi Outlet Channel Geotechnical Investigation</p>
Comment on Prudency		<p>Beardmore Dam forms a critical part of the St George Bulk Scheme. Piping of the outlet right bank training wall among other issues such as erosion and sand boils present sufficient evidence that the dam's structural integrity is at risk. With a high chance of failure predicted for the dam (1/6 probability), it is evident that these issues must be rectified immediately. Given the consequence of dam failure both in terms of flood mitigation and irrigation supply, this project is therefore considered prudent.</p>				
Prudent		<p>YES</p>				
Documentation Quality		<p>High</p>				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	Four options were identified in the scoping phase. This includes: 1. Extend outlet culvert downstream; 2. Construct upstream clay blanket; 3. Construct sheet piling cut off; 4. Do nothing.	None		Renewals Detailed Options Analysis
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The preferred option was to proceed with Option 1. This involves construction of a base slab in the channel bed then installing two barrels of 1500 x 1500 box culverts for 40m. The channel would then be backfilled to effectively move the outlet 40 m downstream. A set of rockfill mattresses would be installed at the conduit exit for score control in the earth channel. This is supported as the long term remediation option in the Final Geotechnical Report.	None		Renewals Detailed Options Analysis Final Report
	Were/are non-capex options considered (such as operational solutions)?	YES	Not proceeding could lead to failure of the embankment resulting in SunWater being unable to supply water to customers in the St George Irrigation Area.	None		Renewals Detailed Options Analysis
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Preliminary and concept design drawings appear to be in accordance with industry standard. No detailed design drawings provided to assess. Detailed risk analysis and geotechnical report completed by relevant and qualified persons including external from Sunwater. Furthermore, significant engagement with water authorities and dam safety regulators were conducted.	None		Preliminary Drawings 2016 August Concept Drawings 2018 June
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.			
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		None identified			
	Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	A breakdown of the construction quotes were not provided, but based on the detailed scope of works and the competitive procurement process, it has been assumed to be of reasonable cost. The original project cost estimate was significantly underestimated. An increase to budget was requested in January 2019 to \$4M for the construction phase. It was later proposed to increase the budget by an additional \$2.28M to allow additional works related to managing water levels during construction that were deemed necessary due to a longer construction period and a large April 2019 rainfall event. Sunwater also conducted significant customer engagement activities. They had also agreed with customers to bear the costs of project inefficiencies up to FY19 and costs for downstream rock protection.	Medium	FY16-18: \$437,158 FY19-20: \$241,139	Briefing Note Budget Increase Request 2018 November Briefing Note Budget Increase Request 2019 January Cost Summary 2018 February Information Request FR52 June 2019 budget approval annexure
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	YES	Requests for offer were published on 19 October 2018 and closed on 16 November 2018. Two offers were received, both of which were above the project budget. A budget increase request was subsequently submitted to match the market conditions.	None		Briefing Note Budget Increase Request 2019 January
	If not, why?					

Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	The breakdown in the Jan 2019 briefing note shows a reasonable percentage (18%) of non-direct costs for FY19. Sunwater PM and contract management costs were (20%) of the original \$4M construction budget.	None		Cost Estimate
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	A Project Management Plan was provided but was only partially completed.	Minor		Project Management Plan
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information provided on any escalation from FY19 to FY20.	None		Briefing Note Budget Increase Request 2018 November Briefing Note Budget Increase Request 2019 January
Were options considered in determining the least cost or preferred option?	YES	The preferred option was chosen based on meeting the needs of the project to rectify the risks of failure due to piping of the dam.	None		Renewals Detailed Options Analysis
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	Whole of life costs were not applicable to this assessment, it was based purely on capital expenditure.	None		Renewals Detailed Options Analysis
Have any potential efficiency gains been identified?	N/A	None identified	None		

Comment on Efficiency	A defined project scope has been provided and a detailed options analysis completed. While the procurement process appears to have been competitive, the two offers were not provided for review. It has been assumed that they match current market conditions and the initial project cost estimate was significantly underestimated. Due to an unanticipated longer construction schedule and a large rainfall event in April 2019, \$2.28M in additional works were required above the former \$4M construction budget. Sunwater has previously agreed with customers on adjustments for inefficiencies in works prior to FY19 as well as \$241,139 for downstream rock protection works. These had not been deducted from the CAPEX claim and therefore require adjustment.
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Efficient	NO
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Documentation Quality	Medium
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Project Name	17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Condition Based (Rfr DS Insp Rpt #2288631)
Project Number	17BBR02 - Maintenance Key_0000075187
Project Description	17BBR02 FD01 (2017) Gattonvale OSS - Refurb - EMBK - Inside Batter RIP RAP Replenishment - Condition Based (Rfr DS Insp Rpt #2288631)
Asset Type	Embankment
Year(s) to be Delivered	2020
Cost	FY19: \$574,135

BBR-GOS-OSS

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Prudency</p> <p>Were/are the works reasonably required to continue to deliver agreed service levels?</p>	YES	The Gattonvale Offstream Storage (GOSS) embankment is part of the Bowen Broken Rivers Water Supply Scheme, which includes Eungella Dam, Bowen River Weir. Water is harvested during flood periods and released back to the weir to meet water demands. In 2017, the site was damaged by Cyclone Debbie. Along the majority of the damaged section, the rock protection has moved downgradient within the storage forming a bench, with sliding enabled by the surface provided by the geofabric installed directly onto the embankment. This fabric has been rolled as a result of wave action, leaving the embankment material directly exposed to the waves. Within the damaged zone, limited notching of the embankment material has occurred. In the northeast corner of the embankment, the notching is significant with the embankment having been removed by wave action to the inner wheel track of the crest roadway, marginally reducing the width of the embankment at a few locations. Remedial works have been identified and planned under project 17BBR02. SunWater has scheduled re-armouring works of a 1,400m length of the storage inner wall in 2019. Until these works are completed, the storage is being operated at a reduced level.	None		QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx Memorandum: Repair works for damaged sections upstream of the GOSS embankment Annual Inspection Report
<p>Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?</p>	YES	Although GOSS is not referable under the Water Supply (Safety and Reliability) Act. When assessed in accordance with the Queensland Guidelines for Failure Impact Assessment of Water Dams (DERM, 2010), the impact in the event of failure of the embankment would be within a restricted area and population at risk is less than 2. However, SunWater has classified the storage as "Major" in terms of importance of the asset within the Bowen Basin Scheme due to the essential nature of the storage to supplement Bowen River Weir.	None		Annual Inspection Report

Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?

YES	Refer above.			
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Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?

YES	Immediate works are justified as the operation of the weir and subsequent supply capability has been detrimentally impacted.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment Annual Inspection Report
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Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.

YES	The GOSS was constructed in 2005. At the time of refurbishment, it will be 15 years old. Given that the damage was inflicted by extreme natural causes (Cyclone Debbie), an assessment of standard run-to-failure asset life expectancy is not applicable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
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Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES	Images from the Repair Works Memo and Annual Inspection Report clearly show the damages resulting from Cyclone Debbie. A risk assessment of the embankment identified a moderate risk in terms of financial and productions / operations.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment Annual Inspection Report
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Comment on Prudency	The Gattonvale Offstream Storage forms a critical part of the Bowen Broken Rivers Scheme. The embankment structure has experienced significant damage caused by Cyclone Debbie in 2017 and has since been operating at a reduced storage level. Access to the GOSS has also been impacted, with the erosion extending to the inner track. Based on the importance of the GOSS within SunWater's Bowen Basin Scheme and the extent of damaging to the embankment, this project is considered prudent.
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Prudent	YES
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Documentation Quality	High
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Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	High level options comparisons of four options was undertaken. Options included: • Option 1 - Like for like replacement (geofabric, sand and gravel) • Option 2 – ArmorMax (turf reinforced and anchored mats) • Option 3 – Dumped rock riprap (bedding layer with stones and rock fragments dumped in place on top) • Option 4 – Other solutions (grass, soil cement, gabion, etc.) Option 3 was the preferred option using sand and gravel bedding.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The preferred option was the best option in terms of proven and expected performance and low cost.	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment
Were/are non-capex options considered (such as operational solutions)?	NO	A do-nothing option was not considered appropriate	None		Memorandum: Repair works for damaged sections upstream of the GOSS embankment
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Detailed technical specification provided with references to appropriate standards.	None		Technical Specifications 2018 July
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer above.	None		Technical Specifications 2018 July
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The project costs are within the original budget estimate, the scope was well defined, and the project used a competitive tender process for the contractor. For these reasons, the costs appear to be reasonable.	None		Evaluation of Quotes 2018 October Technical Specifications 2018 July
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	YES	Competitive tender was used for contractor. 2 bids received. Details of each bid were not provided, but were stated to be similar. Least cost bidder selected.	None		
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	The non-direct costs appear to be approx 10%, which is low for typical civil Sunwater projects. It is likely due to Sunwater nominating the contractor as principal contractor.	None		Contractor Determinatino 2018 November
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	A project mangement plan, scoping document, or risk assessment was not provided.	Minor		
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year project	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	Insufficient information	Cost of each option were only discussed at high level.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	Cost of each option were only discussed at high level. No options scoring method was used.	Minor		

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

Options assessment did not discuss whole of life

Minor

Have any potential efficiency gains been identified?

NO

None identified

None

Comment on Efficiency

The project included a high level options analysis, and high quality technical specifications were prepared based on the preferred option. A high level original budget of \$600,000 was set but no documentation was included to support it. The project underwent a competitive procurement process with two bids received. The project will be delivered with the contractor as principal contractor; therefore, Sunwater non-direct costs are expected to be low. The total planned and actual CAPEX cost in FY19 were within the original budget and appears reasonable.

Efficient

YES

Documentation Quality

Low

Project Name	18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)
Project Number	18BDK06 - Maintenance Key_0000075973
Project Description	18BDK06 Installation of transformer 12 - Burdekin Falls Dam (carry over)
Asset Type	Transformer
Year(s) to be Delivered	2019
Cost	FY19: \$110,577

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Burdekin Falls Dam Caravan Park and Dam facilities are powered via two Transformers TX11 and TX12. The transformers are 11KV/415V 300KVA and pad mount types. Transformer 12 (TX12) is located near the Dam Crest and it is supplying power to Dam facilities. The transformers are in poor condition and beyond their asset life. Failure of the transformer puts Sunwater at risk of failing its agreed service levels.	None		Scope of Works
	YES	The transformers are required to maintain operation of the Burdekin Falls Dam Caravan Park and Dam facilities. An emergency generator is located in the Burdekin Falls Dam intake Structure which is providing back up power to dam facilities during a power outage. This generator can supply power to dam facilities via the Main Switchboard in case Transformer TX12 fails, but the emergency generator is a secondary and costly means of supply and it is not reliable source of energy for a long period of time. The transformer enclosures are also badly corroded and thus unprotected leading to a safety risk. They are also unbanded leading to an oil leak environmental risk.	None		Detailed Options Analysis
	YES	A needs analysis was completed and compliance/standard requirements for the transformers were identified as justification for the works including the ROP.	None		Detailed Options Analysis
	YES	Based on the condition of the transformers, immediate replacement is justified.	None		
	YES	The transformers were manufactured in 1980 and 1979. At the time of proposed replacement, the transformers will be approximately 40 years old, which is beyond the standard serviceable life of electrical equipment (per WSA 03 Section 1.2.6).	None		Scope of Works
	YES	Images of the transformers demonstrate their poor condition.	None		Scope of Works

Comment on Prudency

Sufficient information was provided to demonstrate project prudency. The two transformers at Burdekin Falls Dam are critical to the operation of the Caravan Park and Dam facilities. Power is supplied by these transformers to Housing, Office, Workshop, Caravan Park, entertainment area, and dam facilities. The transformers were observed as being improperly maintained and subsequently in poor condition, requiring replacement. The replacement is justified to ensure compliance with the Resource Operations Licence.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	YES	A detailed options analysis was completed for the Burdekn Falls Dam Power Transformers. Four options were identified in the scoping phase. These include: 1. Refurbishment and upgrade transformers; 2. Replace transformers; 3. Refurbishment of transformers at site; 4. Do nothing.	None		Renewals Detailed Options Analysis
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	YES	The preferred option was determined to be Option 2 as it scored the best compared to the options considered based on addressing the needs of the project, net cost, benefits, and risks.	None		Renewals Detailed Options Analysis
<p>Were/are non-capex options considered (such as operational solutions)?</p>	YES	Based on the current condition of transformers if no preventative maintenance is undertaken, the transformers are going to breakdown and the Burdekin Haughton Water Supply Scheme will be disturbed. The consequences of not proceeding may be anything from regular inspections, oil test and analysis to transformer failure that requires transformer replacement. The lead time to supply new transformer is above 20 weeks.	None		Renewals Detailed Options Analysis
<p>Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?</p>	YES	Technical specifications were with reference to appropriate Australian Standards.	None		Specification Supply 2018 February Specification Install 2018 February
<p>Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?</p>	YES	Refer above.	None		Specification Supply 2018 February Specification Install 2018 February
<p>Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.</p>		None identified			
<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	YES	The proposed expenditure appears to be reasonable for the scope of the project, based on the budget and expenditure breakdown provided. Project expected to be delivered on budget.	None		Cost Estimate 2018 June Project Management Plan
<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.</p>	YES	Two offerors were invited to submit a quote for the supply and delivery of two substations to Burdekin Falls Dam. A quote was only received from [REDACTED] for a price of \$78,000. The installation appears to have been sole sourced. Both quotes were within budget.	Minor		Procurement Process and Recommendation
<p>If not, why?</p>					
<p>Was/is the allowance for indirect costs reasonable for the scope of the project?</p>	YES	Indirect costs are less than typical Sunwater electrical costs.	None		Cost Estimate 2018 June Project Management Plan
<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	YES	A suitable project management plan was implemented as a framework to manage risk and uncertainty at project inception.	None		Project Management Plan
<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	N/A	Single year delivery	None		
<p>Were options considered in determining the least cost or preferred option?</p>	YES	The preferred option was the best cost.	None		

	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	An appropriate MCA framework was adopted to assess the four options. The criteria for assessment include needs analysis, cost, risk, timing and benefit.	None		Renewals Detailed Options Analysis
	Did the project consider whole of life costs, including future maintenance and operating costs?	YES	The preferred option, to replace the transformers, provided the most cost benefit. An additional 20 years service was identified compared to the next closest option which was refurbishing the transformers.	None		Renewals Detailed Options Analysis
	Have any potential efficiency gains been identified?	N/A	None identified	None		
Comment on Efficiency		A defined project scope has been provided and a detailed options analysis was undertaken. The cost estimate in the Project Management Plan was detailed. While an attempt at competitive procurement was made, it appears only one quote per scope item were received. That said, the quotes were within the allocated budget. The project cost has been considered reasonable.				
Efficient		YES				
Documentation Quality		Medium				

Project Name	19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)
Project Number	19BBR05 - Maintenance Key_0000070052
Project Description	19BBR05 Eungella Dam - Replace - BLD-BLA - COMPST TOILET BLK - DESTROYED BY FIRE - Replace & Refurb Life Strategy (#956033)
Asset Type	Building
Year(s) to be Delivered	2019
Cost	FY19: \$19,144

Assessment Notes

Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	Insufficient information	Toilet Block 1 is a compost system that is part of the amenities at Eungella Dam. It was installed in 1993 and was last valuated in 2008. In 2018, it was totally destroyed by a fire and subsequently requires replacement to restore amenity to the area. There is no business case to confirm how it is tied to service levels.	None	QCA Information request A40_Summary of support information (4).xlsx QCA Information request A40_Remaining projects supporting information.xlsx QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The toilet facilities are necessary to provide sanitation. This project addresses compliance obligations regarding safety with respect to hygiene and basic health.	None	QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above.	None	QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are required to reinstate the toilet block.	None	QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Since the toilet block was affected by an external fire hazard, the actual asset life cannot be compared to the standard run-to-failure life expectancy.	None	QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The most recent condition assessment of the asset was completed in 2018. The toilet facility was given the worst possible rating of 6, which reflects the destroyed state that it is in as a result of fire.	None	QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx

Comment on Prudency Toilet Block 1 at Eungella Dam was completely destroyed by fire in 2018. This project was initiated to replace the toilet block and restore the area's amenity. Given the importance of toilet facilities for general health and wellbeing, including proper sanitation, the project is considered to be prudent. Sunwater need to clarify the anticipated expenditure date and cost for this project.

Prudent

YES

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the age of the pump it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration. The consequences of not proceeding would form part of the justification for progressing with the toilet block replacement.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	Different options for toilet types should be investigated.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are non-capex options considered (such as operational solutions)?	NO	No non-capex options were considered.			
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	No works completed or proposed to assess standard conforms with industry best practice.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	Refer above.			
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The replacement cost for the toilet block and grawwater pump based on its 2008 valuation is \$236,952 in \$FY19.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.			
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	N/A	No options assessment has been undertaken.			
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.			
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	No options assessment has been undertaken.			
Have any potential efficiency gains been identified?	N/A	None identified			

Comment on Efficiency

For the proposed toilet block replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The originally proposed FY19 project costs were close to the asset register replacement value were therefore considered reasonable; however, the actual expenditure was \$19,144. It has been assumed that full replacement was not completed and instead a minor refurbishment was undertaken

Efficient

YES

Documentation Quality

Low

Project Name	Refurbish Pump 1 - Gattonvale PSTN
Project Number	19BBR09 - Maintenance Key_0000069873
Project Description	Refurbish Pump 1 - Gattonvale PSTN
Asset Type	Pump
Year(s) to be Delivered	2025
Cost	FY19-20: \$32,633 FY21-24: \$0 FY25-53: \$451,000

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The model C3531/985 Flygt pump at Gattonvale Pump Station was installed in 2005. It is proposed this pump, Pump 1, is refurbished in FY19 and every 6 years thereafter for an estimated cost of \$70,000-\$92,000 per refurbishment; although actual costs in FY19 have been updated to be \$32,633. The works are required to follow the asset management strategy for a low risk asset and maintain the pump station in service.	None	QCA Information request A40_Summary of support information (4).xlsx QCA Information request A40_Remaining projects supporting information.xlsx QCA Information Request A40_Attachment 1_Asset Register including condition and risk as at 5 June 2019.xlsx
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	Insufficient information	None identified. The criticality of the pump station in the irrigation scheme should be identified.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above.	None	
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	NO	The pump refurbishment frequency is appropriate, but the timing does not match the installation year of the pump. Furthermore, the impacts of future pump replacement cycles are not accounted for.	Medium	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Low risk pumps are refurbished on a 6 year cycle or upon failure.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	Insufficient information	There was no condition assessment documented for Pump 1 at Gattonvale Pump Station. The refurbishment cannot be justified based on its condition due to lack of information.	Minor	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency

Refurbishment of the pump is justified based on asset management strategy for 6-year refurbishment cycle for a low risk asset. In this regard, the project's prudency is demonstrated; however, the timing of the proposed refurbishments do not align with the install date of the pump. Without information on the date of the last refurbishment, a revised schedule is recommended to match the asset strategy. Furthermore, the replacement cycles were not accounted for in the refurbishment cycle. As such, an unnecessary extra year of refurbishment was included.

Prudent

NO

Documentation Quality

Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency					
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process nor are there any details of scope of refurbishment. The cost of refurbishment appears to be 4x higher than replacement.	Medium		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	None described	Minor		
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	None described	Minor		
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		None identified	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	NO	There are no cost basis for the refurbishment. The proposed cost of refurbishment also does not match the replacement value in the asset register. The cost of refurbishment should be less than that of replacement. The asset register replacement value is \$18,378 valued in 2015. In \$FY19, this is \$19,656. Assuming refurbishment is 50% of the cost of replacement, the cost would be \$10,000. Furthermore, the refurbishment cycle should account for 30-year replacement cycle. A pump does not need refurbishment in the year that is replaced.	Major	FY19-20: \$32,633 FY21-24: +\$10,000 FY25-53: \$411,000	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	Insufficient information	No information provided. As a refurbishment was planned in FY19, there should be a scope, cost, and procurement details available.	Minor		
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

	Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken. The cost of refurbishment being greater than replacement reinforces a need for review of the strategy.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken. The cost of refurbishment being greater than replacement reinforces a need for review of the strategy.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx QCA Information Request A1_Attachment 2_Whole of Life Maintenance Strategy & Object Codes.xls
	Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No options assessment has been undertaken. The cost of refurbishment being greater than replacement reinforces a need for review of the strategy.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Have any potential efficiency gains been identified?	NO	None identified	Minor		

Comment on Efficiency

A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. The proposed refurbishment costs do not align the replacement costs as documented in the asset register. Three adjustments are recommended – one for the timing of the refurbishments, one for removing a refurbishment close to the year of replacement, and one for the individual cost of a refurbishment.

Efficient

NO

Documentation Quality

Low

Project Name	Refurbish Hydraulic System and cylinders - Stage 3
Project Number	19BDK01 - Maintenance Key_0000074061
Project Description	Refurbish Hydraulic System and cylinders - Stage 3
Asset Type	Hydraulics
Year(s) to be Delivered	2020
Cost	FY19-20: \$247,070 FY21-24: \$0 FY25-53: \$426,370

Assessment Notes
- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Clare Weir on the Burdekin River at Clare has 150 hydraulically operated flap gates on the weir crest to provide an increased upstream pool level for pump stations of the Burdekin Irrigation Area. Failure events were recorded in 2012 and 2013. Risk and condition assessments of the asset have classified the asset as having an "extreme" risk with the gate seals and cylinders requiring refurbishment to reduce the risk to an acceptable level. Therefore, it is proposed that the hydraulic system and cylinders are refurbished starting in FY20. This project forms part of a rolling program which is currently at "Project Phase 4 - Preliminary Design".	None		QCA Information Request A40_Remaining projects supporting information.xlsx
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Operation of the gates are necessary to maintain upstream water level at Clare Weir. Previous failure in 2012 and 2013 have resulted in several hazards identified. These include: - Failure of the weir; - Failure of a gate bank; - Failure of a single gate; - Unsafe access; - Oil loss to environment; - Impairment of fishway function. This project aims to rectify these hazards. Failure to do so puts Sunwater at risk of breaching their regulatory requirement to manage water under the Burdekin Haughton Bulk Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Clare Detailed Options - Renewal of Flap Gates
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	As this project is part of a rolling refurbishment and condition has confirmed urgent need, the timing is considered appropriate.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

	<p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p>	<p>YES</p>	<p>The hydraulically operated flap gates were installed in 1984. They undergo minor yearly maintenance. At the time of the proposed refurbishment, the flap gates will be 36 years old. The typical serviceable life for mechanical equipment is 20 years, and so the gates will have exceeded the standard run-to-failure asset life expectancy. Sunwater's asset strategy for hydraulic systems is to maintain into perpetuity by undertaking periodical refurbishments based on condition and risk.</p>	<p>None</p>		<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p>
	<p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	<p>YES</p>	<p>A high-level condition assessment was completed in 2015 for the gate cylinders. They were rated as level 4, which is fair to poor condition. This is supported by the March 2014 inspection report.</p>	<p>None</p>		<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p>
<p>Comment on Prudency</p>		<p>Sufficient information was provided by Sunwater regarding the refurbishment of the flap gates at Clare Weir. The failure history, hazard assessment, and condition inspection inform the need for the project. The refurbishments form part of rolling works to reduce the high level of risk currently identified for the weir to an acceptable level. In this regard, the project's prudency is demonstrated.</p>				
<p>Prudent</p>		<p>YES</p>				
<p>Documentation Quality</p>		<p>High</p>				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	Several options were identified to address the risks, including: 1. Removal of the gates and lowering of the weir; 2. Permanent raising of the weir; 3. Refurbishment of mechanical equipment by a contractor; 4. Refurbishment of mechanical equipment by SunWater direct management; 5. Do nothing; 6. Addition of PLC and SCADA control to the weir.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Clare Detailed Options - Renewal of Flap Gates
YES	The recommended option to proceed with is Option 3, a project to procure 29 hydraulic cylinders to give a total of 36 spare, then swap out a bay of cylinders at a time for refurbishment while also replacing the seals and hoses on each gate in the bay. An MCA was used to select Option 3.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Detailed options analysis
YES	A do nothing option was considered, however disregarded as it would put Sunwater at operational risk and in breach of their regulatory requirements under the Burdekin Houghton Bulk Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
YES	The cylinder technical specification provides appropriate standard of works.	None		Specification Hydraulic Cylinders 2018 September
YES	Refer above.	None		Specification Hydraulic Cylinders 2018 September
	None documented	None		
YES	The Options Analysis estimated a cost of \$2,550,000 for a rolling program. The CAPEX claim is for a single year (once in FY20 and then again in FY50), and appears to not match the scope of the options analysis. However, considering the quality of the options analysis, the technical specification, and the procurement process, it has been assumed the costs are reasonable despite the lack of information on actual scope.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Insufficient information	A competitive tender was completed with 4 bids received and three being technically compliant. The details of the individual bids were not provided, therefore it cannot be confirmed the preferred bidder was within range of the other bids.	Minor		Procurement Process & Rec 2019 March
	Refer above	Minor		
Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered in the FY20 and FY50 claims.	Minor		
Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	Minor		

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

NO

No information on cost escalation has been provided, however, the CAPEX claim is for a single year.

Minor

Were options considered in determining the least cost or preferred option?

YES

The least cost option was not selected, as an MCA was used.

None

Clare Detailed Options - Renewal of Flap Gates

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

YES

The least cost option was not selected, as an MCA was used.

None

Did the project consider whole of life costs, including future maintenance and operating costs?

YES

An NPV calculation including OPEX was performed.

None

Clare Detailed Options - Renewal of Flap Gates

Have any potential efficiency gains been identified?

NO

None identified

None

Comment on Efficiency

For the proposed hydraulic cylinder refurbishments, there is insufficient information provided to comment on project efficiency. The CAPEX claims in FY20 and FY50 do not match the concept of a rolling program nor do the cost estimates correlate with those from the options analysis. It appears that the amounts have only been allocated to fund a portion of the cylinder refurbishments and the remaining cylinders would be refurbished under a separate project. With this assumption, and given the quality of the options analysis and procurement process, the project costs have been assumed as reasonable.

Efficient

YES

Documentation Quality

Low

Project Name	Reinstate 10 refurbished and build& install 10 new shutters at Ben Anderson Barrage (#2242651)
Project Number	19BUN10 - Maintenance Key_0000067246 and 0000076177
Project Description	Reinstate 10 refurbished and build& install 10 new shutters at Ben Anderson Barrage (#2242651)
Asset Type	Shutters
Year(s) to be Delivered	2019 / 2020
Cost	\$243,216 / \$306,402

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	YES	During the January 2013 floods, the Ben Anderson Barrage was severely damaged. Flood water inundated the site causing damage to the entire site infrastructure. This included the collapsible steel shutters, which are designed to collapse when the storage level exceeds 0.3m above full supply level (FSL). Emergency civil works were commenced to remove 20 shutters to commission the barrage to an operational standard, but more work is required for the shutters under the renewals budget. This project is part of a longer term annual strategy to restore shutters.	None		QCA Information Request A40_Remaining projects supporting information.xlsx Business Case
	YES	Ben Anderson Barrage forms a critical part of water supply under the Bundaberg Bulk Scheme. Without the shutters, storage at Ben Anderson Barrage will be decreased. This project also aligns with SunWater's statement of corporate intent, which is to maintain the structural integrity of Sunwater's infrastructure.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Business Case
	YES	Refer above.			
	YES	Immediate works are justified to ensure compliance of Ben Anderson Barrage with the requirements under the Bundaberg Bulk Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	YES	The steel shutters were first installed in 1984. At the time of proposed refurbishment, they will be 35 years old. The expected operational life of the new shutters is 40 to 50 years, which are improved versions of the existing. Based on this, it is assumed the existing shutters have reached the end of their life standard expectancy.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are the works reasonably required to continue to deliver agreed service levels?					
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?					
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?					
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?					
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.					

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES

A high-level condition assessment was completed in 2015. At the time, the shutters were given an overall rating of 4, which represents poor condition. Some shutters were rated as 5, nearing failure, due to heavy corrosion. The condition assessment therefore supports these works. The shutters were given a moderate risk rating, with additional pumping costs and potential lower water allocations the result of not proceeding with refurbishments.

None

QCA Information Request
A40_Attachment 1_Asset Register
including Condition and Risk as at 5
June 2019.xlsx

Comment on Prudency

Sufficient information was provided by Sunwater regarding the proposed replacement of 20 (out of 110) collapsible steel shutters at Ben Anderson Barrage. Replacement is justified based on the poor condition of the shutters and the criticality of their role in storage capacity within the Bundaberg Bulk Scheme. The replacement option was deemed to increase asset life, reduce operational risks, and whole of life costs. In this regard, the project's prudency is demonstrated.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	YES	<p>Three options were identified as documented in the Business Case for this project. These include:</p> <ol style="list-style-type: none"> 1. Swap out and refurbish 10 shutters each shut down 2. Fabricate 10 new shutters and then have 20 shutters ready for swap out 3. Do nothing. 	None		<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p> <p>Business Case</p>
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	YES	<p>It was recommended in the Business Case that approval be given for Option 2 to proceed, which includes redesign, fabrication and installation of 10 new shutters and involves the following works:</p> <ul style="list-style-type: none"> - Contractor design - investigation and redesign of the shutters; - Presentation of three price options for the fabrication of the shutters; Sunwater to choose the preferred option, based on price, maintainability and expected life; - Fabrication of 10 new shutters; - Installation of the 10 new and 10 already refurbished shutters. <p>Option 2 is the preferred option for the following reasons:</p> <ul style="list-style-type: none"> - It provides a long term solution to ongoing corrosion; - It provides a much longer life of each new shutter compared to the remaining life of refurbished shutters. It is expected to receive a 20 year life warranty from the fabricator and an expected 40 to 50 year life of the new shutters, compared to an expected 10 year remaining life of refurbished shutters; - Fabricating new shutters is not much more expensive than refurbishment but provides twice or more the life; - The current budget comfortably allows for this option. 	None		<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p> <p>Business Case</p>
<p>Were/are non-capex options considered (such as operational solutions)?</p>	YES	<p>A do nothing option was considered, however disregarded as the consequence of not proceeding would delay the progress of rectifying the corrosion issues which currently affect the shutters. Corrosion is an ongoing issue that requires refurbishment approximately once every 10 years. Doing nothing increases the likelihood of large leaks or failure of the shutters. The consequence of this is a loss of storage capacity of the barrage. That said, it was also mentioned that the shutters may not be needed pending an outcome on the Paradise Dam in FY19. No further information was provided on the Paradise Dam consideration, but it could deem the entire project unnecessary.</p>	Major	Potential to cancel entire program	<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p> <p>Business Case</p>
<p>Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?</p>	YES	<p>The proposed designs by [REDACTED] appear to conform with industry standard. RPEQ involvement.</p>	None		
<p>Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?</p>	N/A	<p>Refer above.</p>	None		

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

	Switching to the replacement strategy (From refurbishment) has a lower whole of life cost.	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES Cost estimates were provided for the FY18 Budget Setting and 2019 Delivery. The initial budget estimate was up to \$461,396 including 10% contingency. The subsequent estimate of cost was \$249,176. The FY19 actual costs of \$243,216 are lower than the February 2019 Project Scoping and Management Plan budget of \$249,176. The FY20 budget appears reasonable when adding the cost of installation and additional shutters (from 8 to 10) to the original FY19 \$249,176 budget.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information A procurement evaluation plan for RFO16SW4836 was provided and responses were documented from [REDACTED]. The figures appear to be for rolling works over 2017-19. While competitively tendered, only one bid was received. The successful company was then sole sourced the proposed replacement works.	Minor		Offer Recommendation Report
If not, why?				
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES The indirect costs provided in the cost estimates appear to be reasonable for the project scope.	Minor		Cost Estimates
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information A project management plan or risk assessment was not completed for this project.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A This is a two year program so cost escalation impacts are minor.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	YES The preferred option was the most expensive, however similar in price to the alternative (other than the do-nothing option) and presented significant increases in benefit from a whole of life perspective.	None		Business Case
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES The options were assessed against a MCA framework. The criteria (benefits, timing, net cost customer/client impact, risks) and weighting for assessment are considered to be appropriate for the scope of works.	None		Business Case
Did the project consider whole of life costs, including future maintenance and operating costs?	YES The key driver for proceeding with Option 2 was the efficiency of capital expenditure. Spending more upfront would result in longer asset life and therefore decrease the need for future expenditure to achieve the same outcome.	None		Business Case
Have any potential efficiency gains been identified?	YES Efficiency of capital expenditure was identified as reducing the net cost of the project.	None		Business Case

Comment on Efficiency

A defined project scope was provided with clear consideration for alternative strategies. The preferred refurbishment option had the highest capital expenditure, however presented project efficiencies which would in turn result in least net costs over the project lifetime. Detailed cost estimates, including supplier quotes for the shutters, were provided and appear reasonable. The actual FY19 expenditure was less than the budgeted amount and the higher costs in FY20 appear to be justified due to the additional number of shutters; therefore, it has been considered efficient.

Efficient

YES

Documentation Quality

Medium

Project Name	Study: 20yr Dam Safety Review
Project Number	19BYR09
Project Description	Study: 20yr Dam Safety Review - Boondooma Dam
Asset Type	Dam
Year(s) to be Delivered	2019
Cost	FY19-20: \$218,859 FY25-53: \$355,420

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Boondooma Dam supplies water to Tarong Power Station and irrigation for Boyne River and Burnett River irrigators. It is prescribed as a Category 2 dam in Water Regulation 2002. In accordance with Condition 12 of the Dam Safety Condition Schedule, the dam owner (Sunwater) must carry out a safety review every 20 years. The dam safety review is a regulatory compliance requirement as regulated by the Water Act and Development Conditions for the Integrated Planning Act. The Development Conditions for the Dam nominates that a Safety Review in accordance with the <i>Queensland Dam Safety Management Guidelines (Feb 2002)</i> is required to be completed by 01/06/19, then again in FY39.	None		Boondooma Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	YES	Refer above.	None		Boondooma Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	YES	Refer above.	None		Boondooma Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	N/A	Timing is based on the requirements of the <i>Queenland Dam Safety Management Guidelines - February 2002</i> .	None		
	N/A		None		
N/A					

Comment on Prudency A dam safety review of Boondooma Dam is required by 01/06/19 and every 20 years thereafter, and is prudent to Sunwater's compliance with the dam safety requirements prescribed in *Queenland Dam Safety Management Guidelines (Feb 2002)*.

Prudent

YES

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
N/A	No alternatives evaluated as this project is complying with regulation.	None		Boondooma Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
N/A	No alternatives evaluated as this project is complying with regulation.			
N/A	No alternatives evaluated as this project is complying with regulation.			
YES	Appropriate standards showed in SOA Project Brief and █████ proposal.	None		SOA Project Brief █████ Proposal
YES	Refer above	None		
YES	The consultant proposal was \$97k but Sunwater added 50% contingency to account for likely variations. There was no budget breakdown for the overall budget, but with a total of \$147k allocated to █████ and assuming 100% markup for indirects and Sunwater labour, a total budget of approx \$300k is estimated. Since the █████ proposal at \$150k was still much lower than the other 6 bidders, for additional risk contingency, the original CAPEX claim of \$336,607 appears reasonable. The actual expenditure was lower at \$218,859.	None		QCA Information Request A40_20 year dam safety reviews supporting information.xlsx
YES	A competitive procurement was used to do dam safety reviews at Boondooma, Cania, and Fred Haigh. 7 offers were received. The preferred bidder and lowest bidder was █████ at a cost of \$97,695 for Boondooma, which was 1/3 to 1/2 the others.	None		PPR Dam Safety Review 2018 October
Insufficient information	No information provided to asses.	None		
NO	None identified	None		
N/A	Single year project			
N/A	No alternatives evaluated as this project is complying with regulation.			
N/A	No alternatives evaluated as this project is complying with regulation.			
N/A	Not applicable for a study			
NO	None identified	None		

Comment on Efficiency

While the scope and standard appear to be reasonable, there was insufficient information to provide a strong determination of cost efficiency. The consultant proposal was \$97k but Sunwater added 50% contingency to account for likely variations. There was no budget breakdown for the overall budget, but with a total of \$147k allocated to [REDACTED] and assuming 100% markup for indirects and Sunwater labour, a total budget of approx \$300k is estimated. Since the [REDACTED] risk adjusted proposal (at \$150k) was still much lower than the other 6 bidders, for additional risk contingency, the original CAPEX claim of \$336,607 and the actual expenditure of \$218,859 appear reasonable.

Efficient

YES

Documentation Quality

Low

Project Name	Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir
Project Number	19CHW03 - Maintenance Key_0000076554
Project Description	Study: Develop Recreational Use Storage Management Plan - Chinchilla Weir
Asset Type	Weir
Year(s) to be Delivered	2019
Cost	FY19: \$43,368

Assessment Notes
- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	NO	Chinchilla Weir forms a critical part of the Chinchilla Weir Scheme. This study is proposed to develop a recreational use storage management plan. It is unclear from the information provided what the driver for this study is.	Major	\$43,368	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	NO	Refer above.	Major	Refer above.	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	NO	Refer above.	Major	Refer above.	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	NO	Refer above.	Medium	Refer above.	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	Standard run-to-failure asset life expectancy does not apply to this project. The weir was constructed in 1973. At the time of the study, the weir will be 46 years old.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	Condition assessments were completed for various aspects of the weir ranging from in 2012 to 2019. Generally the weir is in good to fair condition overall. There is a moderate risk rating for the weir in regard to WH&S, Production/Operations. Although it is unclear how a study on the recreational use relates to the asset.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Comment on Prudency	As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.				
Prudent	NO				
Documentation Quality	Low				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

NO

No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.

None

Recommended Adjustment

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

N/A

Refer above.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Were/are non-capex options considered (such as operational solutions)?

N/A

Refer above.

None

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

N/A

Not application as this is a study regarding storage management plan.

None

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

N/A

Refer above.

None

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

None

Was/is the incurred/proposed cost reasonable for the scope of the project?

Insufficient information

Unable to assess proposed cost as it is a high level estimate. There is no defined project scope to make an informed assessment.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

N/A

Storage management plan would likely be an internal Sunwater project.

None

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Insufficient information

No detailed cost estimate has been provided to determine whether indirect costs have been considered.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Insufficient information

No scope of works document has been prepared hence risk management has not been assessed.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Insufficient information

No information on cost escalation has been provided.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Were options considered in determining the least cost or preferred option?

N/A

No options assessment has been undertaken.

None

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

N/A

No options assessment has been undertaken.

None

Did the project consider whole of life costs, including future maintenance and operating costs?

N/A

No options assessment has been undertaken.

None

Have any potential efficiency gains been identified?

N/A

None identified

None

Comment on Efficiency

For the proposed study for recreational use storage management plan, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. No cost budget estimates were included in the documentation from Sunwater. More information is required to assess the project's efficiency.

Efficient

Insufficient information

Documentation Quality

Low

Project Name	19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - [REDACTED] Options Study Review Report' Doc Ref #2242568 Option #4
Project Number	19ETO06 - Maintenance Key_0000000789
Project Description	19ETO06 Victoria Plains PSTN - Replace - PSTN-CNTL - COMPONENT RPLC - [REDACTED] Options Study Review Report' Doc Ref #2242568 Option #4
Asset Type	Controls
Year(s) to be Delivered	2019, 2039
Cost	FY19-20: \$220,092 FY25-53: \$335,174

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
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	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The Victoria Plains Pump Station discharges into the Victoria Plains Balancing Storage, which feeds the gravity pipelines that service the area. The Victorian Plains Operational System has 129 metered offtakes supplying 76 customers. Continuing the operation of the existing switchboard and controls presents a considerable WH&S risk. Furthermore, unplanned shutdown, as a result of electrical or controls failure, would lead to service interruptions and risk not meet agreed service levels.	None		QCA Information Request A58_All projects supporting documentation.xlsx Briefing Note
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	The works are necessary to comply with safety requirements. Continuing the operation of the existing switchboard and controls presents a considerable WH&S risk.	None		SunWater Asset Management Detailed Options Analysis
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	NO	Replacement of the switchboard and controls are justified based on its redundancy as a function of age, condition, and technological advancements. The timing is in line with the Sunwater asset strategy. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.	Medium		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The switchboard was installed in 1989. At the time of proposed replacement in 2019, the switchboard will be 30 years old. The typical serviceable life for electrical equipment and SCADA is 15 years. This is largely attributed to the rapid advancements in technology which render electrical equipment obsolete. Switchboards are replaced at 35 years according to Sunwater asset strategy.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Sunwater Asset Management Detailed Options Analysis

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES

A high-level condition assessment was undertaken in 2015. The switchboard was rated as 5, which indicates it is in very poor condition and will need remediation. It was noted in the condition assessment that Elpro RTU modules are no longer available on the market, should they need replacing.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency

Sufficient information was provided by Sunwater regarding the proposed replacement of the switchboard at Victoria Plains Pump Station. Replacement of the system is justified based on the age, condition and risk of the asset having exceeded the typical serviceable life for electrical/SCADA equipment. It is in line with Sunwater's asset strategy, and in this regard, the project's prudency is demonstrated. That said, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

Prudent

NO

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	Four options were considered in the Detailed Options Analysis. These include: 1. Base Case - maintaining current operating procedures, infrastructure and maintenance routines; 2. Refurbishment case - refurbishing or replacing all switchboard and control system infrastructure with comparable equipment; 3. Replacement case - replacing all current infrastructure with upgraded equipment suitable to accommodate pump VFDs; 4. Partial replacement - replacing certain deteriorated, critical and failure prone switchboard and control system infrastructure or components with new modern equivalent equipment.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Sunwater Asset Management Detailed Options Analysis
YES	Option 4 was determined to be the best means for achieving the desired outcomes based on the detailed options analysis undertaken. It was the least cost (after do-nothing). Later, the preferred option was revised based on a more detailed site visit, but the cost was only slightly higher.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
YES	A non-capex solution was considered in Option 1, where Sunwater would maintain current operating procedures, infrastructure and maintenance routines. Doing nothing was discounted as it presented the greatest risk, especially in terms of safety because it is not current with modern safety standards.	None		Sunwater Asset Management Detailed Options Analysis
YES	Yes, appropriate technical specifications were generated.	None		Sunwater Specification
YES	Refer above.	None		
YES	A March 2019 estimate costed the option at \$259,353 (matching the briefing note), but after obtaining a contractor quote (which was 33% higher than budget), the estimate became \$332,754. According to QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx, the full replacement value for the control equipment is \$175,925 (\$188,155 in \$FY19). The switchboard is valued at \$172,774 (\$184,785 in \$FY19). The actual FY19 capital expenditure was \$220,092, which is less than the combined asset register replacement costs. The FY39 cost of \$335,174, while higher, still appears reasonable if the scope is to do a full replacement of the switchboard and control system.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	It appears the project was competitively procured, with four bidders to submit an offer. The quotes or a tender evaluation were not provided for review, so market conditions cannot be confirmed.	Minor		
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	YES	Non-direct costs were estimated at 22%, which is reasonable, and low for typical Sunwater electrical projects.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No project management or scoping document was provided.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	YES	Options assessment used MCA. Least cost technically acceptable option was selected.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Options assessment used MCA. Least cost technically acceptable option was selected.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Maintenance costs considered in MCA	None		
Have any potential efficiency gains been identified?	Insufficient information	None identified	None		

Comment on Efficiency	A detailed options analysis was undertaken, and the preferred option was identified as being partial replacement of the control system. The options analysis was later revised twice more, essentially returning to the original recommendation of full replacement; although at a lower cost. It appears a competitive procurement process was used. Both the final cost estimate and actual FY19 costs appear to be reasonable and less than the asset register's asset replacement value for the control system and switchboard.
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Efficient	YES
Documentation Quality	Medium

Project Name	19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)
Project Number	19ETO12 - Maintenance Key_0000003896
Project Description	19ETO12 Oakenden MC - Refurbish - RG04-GATE - AVIS GATE - Float Regulating Gate Refurbishment Strategy (#1837279)
Asset Type	Gate
Year(s) to be Delivered	2019
Cost	\$41,114

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	This project forms part of Sunwater's strategy of 10 yearly rolling refurbishments. The timing of regulator gate refurbishments is cyclic. After refurbishment or replacement, asset condition decays at an assumed rate (2 condition points over 10 years) until reaching the particular Options trigger score (4) before intervention.	None		QCA Information Request A58_All projects supporting documentation.xlsx
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	This project addresses compliance obligations. Float controlled channel regulator gate arrangements provide reliable and cost effective channel regulation. Refurbishment will include: - Removal, blasting and painting of all external surfaces, protection of all threaded bolt holes from paint intrusion; - Replacement of bearings and all fixings; - Reassemble, clean and grease pivot points to reduce WH&S risks associated with routine maintenance activities.	None		Options Study Scope of Works
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Sunwater's Asset Management Policy (AM01) objectives are to 'manage assets in a sustainable manner to meet Sunwater's business objectives of safeguarding asset integrity and ensure continuing asset serviceability.	None		Options Study
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The proposed timing is in accordance with SunWater's rolling strategy of 10 year rolling refurbishments.	None		Options Study
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The gate has been in service since 1983. It was last refurbished in 1999. At the time of the proposed refurbishment, the gate will be 36 years old. Based on the asset condition score and asset age presented in the Options Study, the gate is due for refurbishment.	None		Options Study

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

YES

The last condition assessment was documented in 2013. At the time, the gate was rated as having an overall score of 3, which indicates it is in fair condition. This aligns with the condition deterioration figure provided in the Options Study.

None

QCA Information Request
A40_Attachment 1_Asset Register
including Condition and Risk as at 5
June 2019.xlsx

Options Study

Comment on Prudence

Sufficient information was provided by Sunwater regarding the proposed refurbishment of Regulator Gate 4 of Oakenden Main Channel. Refurbishment is justified based on the 10 year rolling strategy by Sunwater and the latest observed condition of the structure. In this regard, the project's prudence is demonstrated.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	Several options were considered in the Options Study for Float Regulating Gate Refurbishment Strategy. These include: A. Existing refurbishment strategy; B. Patch Paint and Extend Refurbishment Period; C. Mechanical Overhaul and Extended Refurbishment Period; D. Run to Failure and Replace.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Options Study
YES	The preferred strategy for float gate refurbishment was determined to be Option A. In a planning sense, there is little benefit in changing the medium to long-term strategy away from the base case (Option A).	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Options Study
YES	Option D is run to failure, which is the equivalent of doing nothing. Sunwater has recognised that this presents considerable risk in terms of safety, cost and reputation and was subsequently disregarded.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Options Study
N/A	No works completed or proposed to assess standard conforms with industry best practice.			
N/A	Refer above.			
YES	According to QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx, the full replacement cost of the gate is \$324,120. The proposed capital expenditure claim is \$42,000 (amended to FY19 actual \$41,114) which is less than the full replacement cost. Since this is a refurbishment project, it appears as though the proposed expenditure is proportional to the work expected.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
YES	Based on the information provided in the Procurement Process and Recommendation document, a competitive tendering process was undertaken. The preferred contractor was awarded based on cost and demonstrated ability having completed similar works for Sunwater in the past. The processed undertaken for procurement are reflective of the prevailing market conditions.	None		Procurement Process and Recommendation
Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	Scope of works document does not address project risk management.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Scope of Works
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	YES	A detailed options study was undertaken to determine the best rolling refurbishment strategy. The study considered cost, risk, benefit and timing. The options were assessed against a MCA framework.	None		Options Study
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	YES	Refer above.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	YES	Consideration of project whole of life costs were demonstrated in the Options Study.	None		Options Study
Have any potential efficiency gains been identified?	N/A	A detailed cost estimate with breakdown has not been provided.			

Comment on Efficiency	A thorough Options Study was undertaken to determine the most appropriate rolling refurbishment strategy for the floating regulator gates in the Oakenden Main Channel. Based on the criteria for assessment, the best strategy was to continue with the existing process. A competitive procurement process was completed and the preferred contractor was awarded based on least cost and demonstrated ability to complete the works. However, there is insufficient information regarding incurred costs (if any so far) and documentation of works completed to date to assess technical standards.
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Efficient	Insufficient information
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Documentation Quality	Medium
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Project Name	Study: 5yr Dam Comprehensive Inspection
Project Number	19TIN07 000008492
Project Description	Study: 5yr Dam Comprehensive Inspection (by Dec, see notes)
Asset Type	Dam
Year(s) to be Delivered	2019, every 5 years thereafter
Cost	FY19-20: \$91,081 FY21-24: \$158,014 FY25-53: \$875,237

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Tinaroo Falls Dam supplies water for irrigation and urban use. It is prescribed as a Category 2 dam in Water Regulation 2002. In accordance with Condition 11 of the Dam Safety Condition Schedule, the dam owner (Sunwater) must carry out a comprehensive inspection of the dam every five years. The comprehensive inspection is a regulatory compliance requirement as regulated by the Water Act and Development Conditions for the Integrated Planning Act. The Development Conditions for the Dam nominates that a comprehensive inspection in accordance with the <i>Queensland Dam Safety Management Guidelines (Feb 2002)</i> is required to be completed by 01/12/19.	None		Tinaroo Falls Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	YES	Refer above.	None		Tinaroo Falls Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	YES	Refer above.	None		Tinaroo Falls Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	YES	Timing is based on the requirements of the <i>Queenland Dam Safety Management Guidelines - February 2002</i> .	None		
	N/A		None		
	N/A		None		

Comment on Prudency

A comprehensive inspection of Tinaroo Falls Dam is required by 01/12/19 and is prudent to Sunwater's compliance with the dam safety requirements prescribed in *Queenland Dam Safety Management Guidelines (Feb 2002)*.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	N/A	No alternatives evaluated as this project is a study/investigation to comply with regulation.	None		Tinaroo Falls Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	Insufficient information	Only (very limited) commentary on the delivery of the scope of works. Details in Text information in QCA Information Request A40_5 yearly comprehensive insp supporting information suggests that it will be carried out using internal resources with hiring of equipment etc. No other options presented.	None		
<p>Were/are non-capex options considered (such as operational solutions)?</p>	N/A		None		
<p>Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?</p>	YES	Based on the intent described in Text information in QCA Information Request A40_5 yearly comprehensive insp supporting information the compliance with the QDSMG 2002 would meet legislative standards.	None		
<p>Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?</p>	N/A	No information provided	None		
<p>Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.</p>		Not applicable	None		
<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	Insufficient information	<p>Based on information provided in the document QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to:</p> <ul style="list-style-type: none"> -Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks; -Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks; -Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks; -Other site-specific peculiarities which may influence the task requirements; -Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks. <p>While no information was provided to show how the methodology was applied, the methodology itself appears reasonable. The average study cost of \$168,000 is also within range of other 5-Yr Dam Inspection projects.</p>	None		

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.
 If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

Insufficient information	There is no indication on how the work will be procured (or self-performed).	None		QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx
Insufficient information	No information provided to review	None		
Insufficient information	It appears that no risks have been identified at project outset	None		
N/A	Single year project	None		
N/A	Options not applicable. Regulatory requirement.	None		
N/A	Options not applicable. Regulatory requirement.	None		
N/A	Not applicable for a study	None		
NO	None identified.	None		

Comment on Efficiency

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

Efficient

YES

Documentation Quality

Low

Project Name	Study: 5yr Dam Comprehensive Inspection
Project Number	19UCO03 000009478
Project Description	Study: 5yr Dam Comprehensive Inspection (by 1 Jun 2019)
Asset Type	Dam
Year(s) to be Delivered	2019, every 5 years thereafter
Cost	FY19-20: \$60,267 FY21-24: \$117,670 FY25-53: \$650,904

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	Leslie Dam supplies water irrigation, town water supply and industrial use. It is prescribed as a Category 2 dam in Water Regulation 2002. In accordance with Condition 11 of the Dam Safety Condition Schedule, the dam owner (Sunwater) must carry out a comprehensive inspection of the dam every five years. The comprehensive inspection is a regulatory compliance requirement as regulated by the Water Act and Development Conditions for the Integrated Planning Act. The Development Conditions for the Dam nominates that a comprehensive inspection in accordance with the <i>Queensland Dam Safety Management Guidelines (Feb 2002)</i> is required to be completed by 01/06/19.	None		Leslie Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	YES	Refer above.	None		Leslie Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	YES	Refer above.	None		Leslie Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
	N/A	Timing is based on the requirements of the <i>Queenland Dam Safety Management Guidelines - February 2002</i> .	None		
	N/A		None		
	N/A		None		
	Comment on Prudency		A comprehensive inspection of Cania Dam is required by 01/06/19 and is prudent to Sunwater's compliance with the dam safety requirements prescribed in <i>Queenland Dam Safety Management Guidelines (Feb 2002)</i> .		

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives evaluated as this project is a study/investigation to comply with regulation.	None		Leslie Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	Only (very limited) commentary on the delivery of the scope of works. Details in Text information in QCA Information Request A40_5 yearly comprehensive insp supporting information suggests that it will be carried out using internal resources with hiring of equipment etc. No other options presented.	None		
Were/are non-capex options considered (such as operational solutions)?	N/A		None		
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	Based on the intent described in Text information in QCA Information Request A40_5 yearly comprehensive insp supporting information the compliance with the QDSMG 2002 would meet legislative standards.	None		
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	No information provided	None		
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Not applicable	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	Based on information provided in the document QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx, the cost estimate was derived from a review of actual costs of historical comprehensive inspections across SunWater's portfolio and experienced judgement applied to scale the estimate value which considered the following but not limited to: -Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which will largely influence the scale of the inspection and assessment tasks; -Existing risk and condition profile specific to each site which may influence the scope of some inspection and assessment tasks; -Updates and changes to dam safety standards and guidelines which may influence the scope of some inspection and assessment tasks; -Other site-specific peculiarities which may influence the task requirements; -Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks. While no information was provided to show how the methodology was applied, the methodology itself appears reasonable. The average study cost of \$125,000 (excluding FY19 actuals) is also within range of other 5-Yr Dam Inspection projects.	None		

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.
 If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

Insufficient information	There is no indication on how the work will be procured (or self-performed).	None		QCA Information Request A40_5yearly comprehensive insp supporting information.xlsx
Insufficient information	No information provided to review	None		
Insufficient information	It appears that no risks have been identified at project outset	None		
N/A	Single year project	None		
N/A	Options not applicable. Regulatory requirement.	None		
N/A	Options not applicable. Regulatory requirement.	None		
N/A	Not applicable for a study	None		
NO	None identified.	None		

Comment on Efficiency

The project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other 5-Year Dam Inspection projects, it has been considered reasonable.

Efficient

YES

Documentation Quality

Low

Project Name	22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)
Project Number	22MDA01 - Maintenance Key_000008682
Project Description	22MDA01 West Barron BSTR - Refurbish - BSTR-SCRN - ROTATING SCRN - Irrigation Scheme Common Strategy (30Yr Pln) (Item 10.1)
Asset Type	Screen
Year(s) to be Delivered	2020, 2026, 2032, 2038, 2044, 2050
Cost	FY19-20: \$47,054 FY21-24: \$0 FY25-53: \$240,860

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	Insufficient information	The rotating weed screen within the West Barron Distribution is proposed to be refurbished in FY20 and every 6 years thereafter for an estimated average cost of \$48,000 per refurbishment. The screen protects the WB7 inlet pipe, which is assumed as important for operation of the irrigation scheme. No evidence was provided to show its criticality in the scheme. It is, however, consistent with the Sunwater asset management strategy.	Minor	QCA Information Request A58_All projects supporting documentation.xlsx
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	Insufficient information	Refer above.	Minor	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above.	Minor	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

	<p>Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?</p> <p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p> <p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	<p>YES</p>	<p>Per Sunwater's Overall Strategy Common to all Irrigation Schemes, the new strategy suggests that the screens should be patch painted, with minor in-situ repairs every 5 years and replace at 20 years unless condition / material warrants a different approach. The reasoning behind the strategy was that aluminium screens are good for 30 years, whereas galvanised items are only suitable for 10 to 15 years. In essence, the screens should have their life extended with patch painting, although should be replaced when the condition warrants it. The rotating screen was installed in FY05, therefore its refurbishment schedule aligns with the FY20 refurbishment. The remaining 6-year cycles appear to be consistent with the Whole of Life Maintenance Strategy document, but not the Asset Strategy.</p> <p>A high-level condition assessment of the screen was completed in 2018. The asset was observed as having failed, with a rating of 6 (the worst score in Sunwater's condition rating system). Immediate repairs are justified based on this.</p> <p>Considering the condition of the screen has been rated as failure, as well as the fact it may be nearing a replacement cycle, the FY26 refurbishment cycle may not be needed. On the same principle, of not needing to refurbish during a replacement cycle, the FY44 refurbishment may also not be necessary.</p>	<p>Medium</p>	<p>FY25-53: \$97,570</p>	<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p> <p>Overall Strategy Common to All Irrigation Schemes by Object Type</p>
	<p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p>	<p>YES</p>	<p>Refer above.</p>	<p>None</p>		<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p>
	<p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	<p>YES</p>	<p>A high level condition assessment of the screen was completed in 2018. The asset was observed as having failed, with a rating of 6 (the worst score in Sunwater's condition rating system). Immediate repairs are justified based on this.</p>	<p>None</p>		<p>QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx</p>
<p>Comment on Prudency</p>		<p>Sufficient information was provided by Sunwater regarding the proposed refurbishment of the rotating weed screen. The 6-year refurbishment cycle matches that in the Whole of Life Maintenance Strategy but not the Asset Strategy, which recommends 5 years. The FY20 repairs are further supported by observations in the latest condition assessment which indicates the screen is in the worst possible condition and has reached failure. In this regard, the project's prudency is demonstrated. The 6-year refurbishment cycle does not appear to have accounted for the years when the screen will be replaced (every 20 years pending condition). As such the FY26 and FY44 refurbishments may not be necessary. An adjustment of \$97,570 is recommended to remove refurbishment from these years.</p>				
<p>Prudent</p>		<p>NO</p>				
<p>Documentation Quality</p>		<p>Medium</p>				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the age and condition of the rotating screen it will likely need repairs regardless. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	The scope of repairs does not identify appropriate standards for recommended repairs. For example, surface preparations and coating types/thicknesses.	None		Non Routine Work Initiation Document
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		None identified	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Following, the condition inspection in 2018, a Non-Routine Work Initiation Document was completed in December 2018. The document states that works shall be completed before June 30, 2020. The unit was removed from service and a temporary screen put in its place. The cost of refurbishment was estimated at \$50,000 (+/- 15%). According to the document QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx, the full replacement cost for the screen is \$183,560. The proposed capital expenditure claim under this project on average is \$48,000, which is 26% of the replacement cost. The CAPEX claim is within the accuracy bounds of the December 2018 cost estimate and considered reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Refurbs would occur in a single year.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	N/A	No options assessment has been undertaken, but asset strategy likely do have developed a least coast approach to overall asset type.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	No options assessment has been undertaken.	None		
Have any potential efficiency gains been identified?	N/A	None identified.	None		

Comment on Efficiency	The scope of refurbishment appears to be reasonable, but there was insufficient information to assess standard. For example, no documentation showing type of surface preparation or coatings was provided. The cost estimate provided was very high level and the basis for its estimation could not be determined. That said, the CAPEX claim is within the accuracy bounds of the refurbishment cost estimate and appears reasonable.
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Efficient	YES
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Documentation Quality	Low
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Project Name	Isis System - Irrigation Common Strategy
Project Number	24BIA20
Project Description	Irrigation Common Strategy
Asset Type	Pipe
Year(s) to be Delivered	2029
Cost	FY25-53: \$2,578,670

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The Isis irrigation system forms part of the Bundaberg Distribution Scheme. The channels are necessary to convey water to customers and meet service levels. They are maintained according to the Irrigian Systems Asset Management Strategy.	None		QCA Information Request A58_All projects supporting documentation.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	YES	Refer above.	None		QCA Information Request A58_All projects supporting documentation.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	YES	Refer above.	None		QCA Information Request A58_All projects supporting documentation.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	YES	The timing of the expenditure matches the asset age and asset strategy.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	YES	The irrigation system was constructed in 1989. In 2029, the asset will be 40 years old which matches the start of a planned refurbishment program according to the asset strategy.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	YES	A high-level condition assessment was completed in 2003 for the Isis irrigation system which rates the condition as level 2, which is generally good. The asset's condition should be reviewed in detail closer to 2029.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudence	The start and frequency of the proposed Isis system concrete channel refurbishment program is in line with the asset strategy and is therefore considered prudent.
Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	N/A	No alternatives were identified. There is no evidence that a scoping process was undertaken, but it may be needed until closer to the first refurbishment. The program is consistent with the asset strategy.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	Refer above.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	Refer above.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		None identified		None	
	Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	The CAPEX claim is for an average refurbishment cost in \$FY19 of \$437,620. This converts to a total valuation of \$5.25M. Sunwater later clarified that the project has a second stage under a separate project number (0000073055), which has an average refurbishment cost in \$FY19 of \$407,500. This second stage converts to a total valuation of \$4.89M. The combined valuation of the two stages is \$10.1M, which is \$0.76M greater than the asset register value. The difference may be as a result of varying (and potentially lower) 5-yearly allocations beyond FY53.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type

If not, why?				
Was/is the the allowance for indirect costs reasonable for the scope of the project?	YES	Indirect costs are accounted for within the asset register replacement cost valuation process.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	N/A	No scope of works document has been prepared hence risk management has not been assessed.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	N/A	No options assessment has been undertaken.	None	
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	No options assessment has been undertaken.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Have any potential efficiency gains been identified?	YES	Efficiencies identified in optimization of asset strategy.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Irrigation Schemes by Object Type

Comment on Efficiency

The asset strategy divides the replacement cost by 60 years to spread the refurbishments and replace and repair bays on a 5-year frequency. Sunwater has divided this refurbishment program into two stages with stage two occurring the year after stage one. The combined average cost of each refurbishment appears to be in line with the asset register replacement value.

Efficient

YES

Documentation Quality

Low

Project Name	Replacement meter program as per 2015 UCO strategy (\$41,595 / yr)
Project Number	000008908
Project Description	
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$77,690 (FY19 actuals: \$30,879) FY21-24: \$153,128 FY25-53: \$1,146,412

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are replaced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency	Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No				
Prudent	YES				
Documentation Quality	Low				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Efficiency</p> <p>Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?</p>	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
<p>Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?</p>	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
<p>Were/are non-capex options considered (such as operational solutions)?</p>	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
<p>Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?</p>	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
<p>Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?</p>	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
<p>Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.</p>		Not Applicable	None		
<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20 estimate of \$77,690 was made up of FY19: \$39,855 and FY20: \$37,835. Actual FY19 spend was reported to be at \$30,879. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?</p>	N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
<p>Was/is the allowance for indirect costs reasonable for the scope of the project?</p>	Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
<p>Were options considered in determining the least cost or preferred option?</p>	NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Study: 20yr Dam Safety Review -Burdekin Falls Dam
Project Number	0000001060 and 0000076265 (Two Projects)
Project Description	
Asset Type	Dam
Year(s) to be Delivered	2019 & 2020, then 2039 & 2040
Cost	FY19-20: \$275,666 FY21-24: \$0 FY25-53: \$298,750

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The dam safety review is a regulatory compliance requirement as regulated by the Water Act and Development Conditions for the Integrated Planning Act. The Development Conditions for the Dam nominates that a Safety Review in accordance with the Queensland Dam Safety Management Guidelines (Feb 2002) is required to be completed by 1/07/21, then every 20 years thereafter.	None	BFD - Development Conditions
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	See above	None	BFD - Development Conditions
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	See above	None	BFD - Development Conditions
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	N/A		None	
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A		None	
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A		None	

Comment on Prudency	The 20 year Dam Safety Review is required to be completed by the 1/07/21 and every 20 years thereafter in accordance with regulatory requirements. It is therefore considered prudent.
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Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
N/A	Options not applicable. Regulatory requirement.	None		Procurement Exemption September 2018
N/A	Options not applicable. Regulatory requirement.	None		
N/A	Options not applicable. Regulatory requirement.	None		
YES	Project brief and ██████ proposal show appropriate standard	None		██████ Proposal/Contract SOA Project Brief
N/A	Refer above	None		
	Not Applicable	None		
YES	The revised budget in the briefing note appears to account for the supposed lower ██████ cost, as well as a large Sunwater labour and indirect cost allowance. The total is \$263,215, which appears reasonable. The original CAPEX claim should be adjusted to match this.	Medium	FY20: \$25,325	██████ Proposal/Contract Briefing Note
YES	This response is based on the decision to undertake the Safety Review on a Sole Supplier basis. It was determined that there would be a \$30k saving if ██████ were invited to undertake the project on a Sole Supplier basis instead of seeking tenders from an additional two consultants. ██████ was selected as the sole supplier due to recently completed works on the Dam (completed to a high standard) hence their knowledge of the dam and its operation were without peer. It is generally agreed that there would be savings with this approach but it appears that it has not been tested (i.e. compared to other safety reviews recently completed).	None		██████ Proposal/Contract Briefing Note
		None		
N/A		None		
Insufficient information	It appears that no risks have been identified at project outset	None		SOA Project Brief
Insufficient information	Not defined	None		
N/A	Options not applicable. Regulatory requirement.	None		
N/A	Options not applicable. Regulatory requirement.	None		
N/A	Not applicable for a study	None		
YES	Yes, sole sourcing ██████	None		██████ Proposal/Contract Briefing Note

Comment on Efficiency

Sunwater has identified savings with the approach of utilising a sole supplier for the project based on their knowledge and experience with the dam. The savings are reflected in the revised budget, but they are not reflected in the original CAPEX claim. An adjustment is recommended for the FY20 year, but not for the future FY39/40 year as the same opportunity for savings may not be available at the time.

Efficient

NO

Documentation Quality

Medium

Project Name	Replace Pipeline 1352.0 - 4307.0
Project Number	N/A - Maintenance Key_0000015726
Project Description	Replace Pipeline 1352.0 - 4307.0
Asset Type	Pipe
Year(s) to be Delivered	2053
Cost	FY25-53: \$1,428,795

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	The section of pipeline forms part of the Burdekin Haughton Distribution Scheme. It is unclear from the information provided what role this section of pipe plays within the Burdekin Haughton Distribution, but it is assumed to be required to maintain service levels.	None		QCA Information Request A58_All projects supporting documentation.xlsx
	Insufficient information	It is unclear from the information provided what role this section of pipe plays within the Burdekin Haughton Distribution. Clarification is required from SunWater to confirm that it is critical infrastructure and the consequences that may be faced in terms of breaching regulatory requirements if it is no longer in operation.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Insufficient information	Refer above.	None		

Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?

NO

The pipeline was constructed in 2001 and would be 52 years old at the time of replacement. Per Sunwater's Overall Strategy Common to all Irrigation Schemes by Object Type, the strategy for HDPE pipe is to adopt an asset life of 80 years subject to condition and risk assessment and NPV of pipe leaks on a case by case basis.

In the asset risk register, the pipeline was classified as a low risk asset in 2018. The Whole of Life Maintenance Strategy for low risk HDPE pipe is to replace at 50 years.

The QCA Information Request A40_Remaining projects supporting information spreadsheet states that the Asset Management Strategy only applies to a 30-year outlook and planning items outside this timeframe would default to the Whole of Life Maintenance Strategy. The 30-year outlook from FY20 is FY50. Since the replacement is proposed in FY53, the 50-year life would apply, which indicates the proposed replacement timing would be prudent; however, it is likely that this replacement will be pushed out once the planning item enters the outlook of the Asset Management Strategy. Based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended.

Medium

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.

YES

The pipeline was installed in 2001. At the time of the proposed replacement, the asset will be 52 years old, which is in line with the Whole of Life Maintenance Strategy, and could even be brought forward several years on that basis.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

Insufficient information

A high-level condition assessment was completed for the pipe in 2001, which was when the pipe was installed. Accordingly, the pipe was in new condition. More recent information is not available for comment.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency

More information is required from Sunwater regarding the section of pipeline between 1352 and 4307 m and the role it plays within the Burdekin Haughton Distribution. Replacement of the pipe is justified based on the current Whole of Life Maintenance Strategy and the age of the asset; although in future planning forecasts, it will likely be pushed out. Furthermore, based on the condition score and the modelling completed under the annuities assessment an increase in useful life has been recommended. For this reason, the timing of the project has not been considered prudent.

Prudent

NO

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
NO	No alternatives were identified. There is no evidence that a scoping process was undertaken. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Insufficient information	There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
N/A	Refer above.			
N/A	No works completed or proposed to assess standard conforms with industry best practice.			
N/A	Refer above.			
Insufficient information	The asset register 2016 valuation of the pipe estimates the full replacement cost for the pipeline section to be \$1,985,427 in \$FY15. In \$FY19, this is \$2,123,451. The proposed capital expenditure claim is \$1,428,795, which indicates that only partial replacement of the pipeline is planned. Otherwise, the budget may be underestimated.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.			
Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
N/A	No options assessment has been undertaken.			
N/A	No options assessment has been undertaken.			
N/A	No options assessment has been undertaken.			
NO	None identified	None		

Comment on Efficiency

For the proposed pipeline replacement, there is insufficient information provided to fully comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The proposed capital expenditure claim is \$1,428,795, which is less than the asset register replacement value which although deemed efficient, may indicate that only partial replacement of the pipeline is planned or that the costs may be underestimated.

Efficient

YES

Documentation Quality

Low

Project Name	Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervious fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)
Project Number	N/A - Maintenance Key_0000057410
Project Description	Ref:Knock in conc on front face of weir and @ imp rock to prot Zone 1 impervious fill (HB 1323193),weepholes+sealant+rockmatt(DS rec)
Asset Type	Weir
Year(s) to be Delivered	2021
Cost	\$50,592 (\$FY19)

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The Cunnamulla township receives water supply from the storage at Allan Tannock Weir. An emerging issue at Allan Tannock Weir was raised at the Toowoomba Office during the annual budget meeting. During an inspection when the water levels were lower, it appears that the protection concrete on the upstream side of the sheet piling has been undermined. This project was initiated to repair the weir to its original design. In addition to repairing the rock apron, works are required to unblock the weep holes and reinstate the broken rock mattresses.	None		QCA Information Request A40_Remaining projects supporting information.xlsx
	YES	Undermining of the weir may worsen to the point of structural failure. Without intervention, it may result in a risk to the long term water security of Cunnamulla.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	YES	Repairs are required to ensure Sunwater do not breach their regulatory requirement to supply water to Cunnamulla in accordance with the Cunnamulla Weir Supply Scheme.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	YES	Immediate works are required to repair the weir.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	NO	The weir was constructed in 1992. At the time of proposed repair, the weir will be 29 years old. Typically, unreinforced concrete has a design life of 50-100 years, however it was noted that wave action has caused the condition to worsen progressively with time. With the loss of supporting soil, the concrete condition has deteriorated considerably in the time since it was poured.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	YES	Site inspection photos adequately represent undermining of the weir and resulting damaged concrete protection.	None		Business Case

Comment on Prudency

The Allan Tannock weir provides storage of water and supply to the township of Cunnamulla. The rock protection at the weir was designed to protect the sheet piles. Immediate repairs are required to reinstate the rock protection to its original condition to prevent further damage to the sheet piles and overall dam structural integrity. The 5-Yearly Dam Inspection also recommended repairs to the rock mattresses and weep holes.

Prudent

YES

Documentation Quality

Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

NO

No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the condition of the rock protection it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Insufficient information

There were no options scoped as part of the forward planning process, given the project is not proposed to be implemented until 2021. The appropriateness cannot be commented on at this stage, based on the information provided.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Were/are non-capex options considered (such as operational solutions)?

N/A

Refer above.

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Insufficient information

Design details have not yet been completed.

Minor

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Insufficient information

Design details have not yet been completed.

Minor

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Design details have not yet been completed.

Was/is the incurred/proposed cost reasonable for the scope of the project?

NO

Draft cost estimates were provided by Sunwater, which show the predicted expenditure as being \$37,000 with an additional \$10,000 for rock mattress repairs. When converted to \$FY19 and planned in FY21, the total is \$49,600. The CAPEX claim of \$51,000 (in \$FY19) does not match. A slight adjustment of \$1,400 is recommended so that it matches the only cost estimates available.

Minor

\$1,400

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Undermining Issues 2013 January
Draft Scope 2013 January

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

N/A

This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.

None

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Undermining Issues 2013 January
Draft Scope 2013 January

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

NO

The early cost estimates do not include allowances for indirect costs.

Medium

QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Undermining Issues 2013 January
Draft Scope 2013 January

	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	NO	No scope of works document has been prepared hence risk management has not been assessed.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Have any potential efficiency gains been identified?	NO	None identified.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January

Comment on Efficiency

For the proposed rock protection replacement, unblocking of weep holes, and rock mattress reinstatement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. An adjustment of \$992 to the CAPEX claim has been made such that it matches the cost estimates provided.

Efficient

NO

Documentation Quality

Low

	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January
	Did the project consider whole of life costs, including future maintenance and operating costs?	NO	No options assessment has been undertaken.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Have any potential efficiency gains been identified?	NO	None identified.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Undermining Issues 2013 January Draft Scope 2013 January

Comment on Efficiency

For the proposed rock protection replacement, unblocking of weep holes, and rock mattress reinstatement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. An adjustment of \$1,200 to the CAPEX claim has been made such that it matches the cost estimates provided.

Efficient

NO

Documentation Quality

Low

Project Name	Study: 20yr Dam Safety Review
Project Number	N/A - 0000058091 (Maintenance Key)
Project Description	Study: 20yr Dam Safety Review - Cania Dam
Asset Type	Dam
Year(s) to be Delivered	20,192,039
Cost	FY19-20: \$220,310 FY25-53: \$265,510

Assessment Notes
Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Cania Dam supplies water recharging alluvial aquifers around and downstream of the Township of Moonford. The dam also provides flood mitigation. It is prescribed as a Category 2 dam in Water Regulation 2002. In accordance with Condition 12 of the Dam Safety Condition Schedule, the dam owner (Sunwater) must carry out a safety review every 20 years. The next safety review is due 1 December 2019. The dam safety review is a regulatory compliance requirement as regulated by the Water Act and Development Conditions for the Integrated Planning Act. The Development Conditions for the Dam nominates that a Safety Review in accordance with the <i>Queensland Dam Safety Management Guidelines (Feb 2002)</i> is required to be completed by 01/12/23.	None	Cania Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None	Cania Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None	Cania Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	N/A	Timing is based on the requirements of the <i>Queensland Dam Safety Management Guidelines - February 2002</i> .	None	
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A		None	
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A			

Comment on Prudency A dam safety review of Cania Dam is required by 01/12/19 and every 20 years thereafter. It is prudent to Sunwater's compliance with the dam safety requirements prescribed in *Queensland Dam Safety Management Guidelines (Feb 2002)*.

Prudent

YES

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
N/A	No alternatives evaluated as this project is complying with regulation.	None		Cania Dam Safety Condition Schedule Queensland Dam Safety Management Guidelines

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

N/A	As above			
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Were/are non-capex options considered (such as operational solutions)?

N/A	As above			
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Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

YES	Appropriate standards showed in SOA Project Brief and ██████ proposal.	None		SOA Project Brief ██████ Proposal
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Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

YES	As above	None		
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Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

N/A				
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Was/is the incurred/proposed cost reasonable for the scope of the project?

N/A	The consultant proposal was \$209,265 and Sunwater added \$30k contingency to account for geotechnical risks. There was no budget breakdown for the overall budget, but with a total of \$239k allocated to ██████ and assuming the remainder for indirects and Sunwater labour, a total budget of approx \$348k is estimated. Since the ██████ proposal matched market conditions and indirect/Sunwater costs appear lower than average (as a 5), the budget estimate appears reasonable. It is also within the same range as other Dam Safety projects. The budget was split over FY19 and FY20, but the CAPEX claim only has costs allocated to FY19 for \$231,124. Actual FY19 costs were \$220,310. It is assumed the FY20 costs were accounted for under a separate work order.	None		Briefing Note ██████ Proposal
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Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

YES	A competitive procurement was used to do dam safety reviews at Boondooma, Cania, and Fred Haigh. 7 offers were received. The preferred bidder and second lowest bidder was ██████ at a cost of \$209,265 for Cania, which was within the same range of the majority of other bids.	None		Briefing Note ██████ Proposal
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If not, why?

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Was/is the allowance for indirect costs reasonable for the scope of the project?

Insufficient information	No information provided to assess.	None		
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Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

NO	None identified	None		
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Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

N/A	Single year project			
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Were options considered in determining the least cost or preferred option?

N/A	No alternatives evaluated as this project is complying with regulation.			
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Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

N/A	No alternatives evaluated as this project is complying with regulation.			
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Did the project consider whole of life costs, including future maintenance and operating costs?

N/A	Not applicable for a study			
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Have any potential efficiency gains been identified?

NO

None identified

None

Comment on Efficiency

While the scope and standard appear to be reasonable, there was insufficient information to provide a strong determination of cost efficiency. The consultant proposal was \$209,265 and was within the same range as the other suppliers but the second least cost offer. There was no budget breakdown for the overall budget, but with a total of \$239,265 (inc. contingency) allocated to [REDACTED] and assuming the remainder of the \$348,728 budget is for indirects and Sunwater labour, the costs appear reasonable. The actual expenditure in FY19 was lower at \$220,310. It is noted that the budget had a budget allocation in FY20 but the CAPEX claim did not include FY20 costs. It is assumed these are under a separate maintenance key, similar to the Burdekin Falls Dam Safety Review project.

Efficient

YES

Documentation Quality

Low

Project Name	20 Dam Safety Review (to be done by 1st June 2020)
Project Number	N/A - Maintenance Key_0000064409
Project Description	
Asset Type	Dam
Year(s) to be Delivered	2020
Cost	FY19: \$253,628

Assessment Notes
- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The dam safety review is a regulatory compliance requirement as regulated by the Water Act and Development Conditions from the Integrated Planning Act. The Development Conditions for the Dam nominates that a Safety Review in accordance with the Queensland Dam Safety Management Guidelines (Feb 2002) is required to be completed by 1/06/2020.	None	Kroombit Dam - Development Conditions
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	See above	None	Kroombit Dam - Development Conditions Overall Strategy Common to all Bulk Water Schemes by Object Type
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	See above	None	Kroombit Dam - Development Conditions
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	N/A	There is no option to delay as it is a development condition to complete the works by June 2020	None	Kroombit Dam - Development Conditions
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	The project is for the preparation of a study only with the outcomes nominating future capital works	None	Text information in QCA Information Request A40_20 year dam safety reviews supporting information
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been reviewed. It is unlikely that the condition assessment will have any bearing on the requirements for the works as it is a regulatory requirement	None	Text information in QCA Information Request A40_20 year dam safety reviews supporting information Text information in QCA Information Request A40_Attachment 1_Asset Register Including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency This project is deemed prudent as it is a regulatory requirement. The safety review and subsequently safety review report will need to be completed by 1 June 2020. The project scope of works will align with the relevant Acts and Guidelines. It is noted that the future 20-Year Dam Safety Review required in FY40 was not included in this project. It is assumed it has been accounted for under a separate work

Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
N/A	No alternatives evaluated as this project is complying with regulation.	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
N/A	Refer above			Text information in QCA Information Request A40_20 year dam safety reviews supporting information
N/A	Refer above			Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Insufficient information	No information provided to review.	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Insufficient information	No information provided to review.	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
	Not Applicable	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Insufficient information	<p>As described in the document QCA Information Request A40_20 year dam safety reviews supporting information.xlsx, the cost estimate was derived from review of actual costs of historical safety reviews across Sunwater's portfolio and experienced judgement applied to scale the estimate value which considers the following but not limited to:</p> <ul style="list-style-type: none"> -Extent of new investigations / assessment / data inputs requiring review and updating, specific to each site; -Physical features such as size, construction material, construction method, gated/non-gated spillway, site geology etc. specific to each site which may influence the scale of the study; -Existing risk profile specific to each site which may influence the type and number of tasks required for the study; -Updates and changes to dam safety standards and guidelines which may influence the scale of the study; -Other site-specific peculiarities which may influence the task requirements of the study -Locality and accessibility of the specific site which will impact the logistical requirements to undertake tasks. <p>While no specific information on the basis of the scaled cost estimate was provided, based on the methodology described, and the fact is within range of other Dam Safety projects, the capital expenditure claim of \$253,628 is considered reasonable.</p>	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Insufficient information	No information provided on how it will be procured, or whether it will be self-performed.	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information

If not, why?			None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No cost breakdown to show indirect cost allowances were provided.	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No risk assessment yet completed.	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	Single year project			Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Were options considered in determining the least cost or preferred option?	N/A	No alternatives evaluated as this project is complying with regulation.			Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No alternatives evaluated as this project is complying with regulation.			Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	Not applicable for a study			Text information in QCA Information Request A40_20 year dam safety reviews supporting information
Have any potential efficiency gains been identified?	NO	None identified	None		Text information in QCA Information Request A40_20 year dam safety reviews supporting information

Comment on Efficiency	This project lacks any specific documentation to be able to adequately assess project efficiency. Based on the methodology described to estimate the cost, and the fact it is within the same range as other Dam Safety Review projects, it has been considered reasonable.
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Efficient	YES
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Documentation Quality	Low
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Project Name	Replace Crane Control Equipment
Project Number	N/A - Maintenance Key_0000064960
Project Description	Replace Crane Control Equipment
Asset Type	Crane
Year(s) to be Delivered	2024
Cost	FY21-24: \$154,440 FY25-53: \$167,250

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	It is proposed that the crane control equipment at Leslie Dam is replaced in 2024 for an estimated cost of approximately \$160,000 (in 2024 and 2044). Leslie Dam forms part of the Upper Condamine Scheme.	None		QCA Information Request A40_Remaining projects supporting information.xlsx
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	According to Sunwater's Overall Strategy Common to all Bulk Water Schemes by Object Type, cranes are considered under Existing Developed Strategies. Cranes and lifting equipment are replaced on a 30 to 80-year internal and refurbished after 6 to 20 years based on condition, risk and object type. The control system has a typical life of 15-20 years. A crane control system is critical to its safe operation.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Bulk Water Schemes by Object Type
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Based on the age of the crane, it is likely the timing for replacement is appropriate.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The crane was acquired in 1985. The typical serviceable life for electrical and mechanical equipment as defined in WSA 03 (Section 1.2.6) is 15 and 20 years respectively. At the time of the proposed replacement, the crane will be 39 years old and will have exceeded the standard run-to-failure asset life expectancy. This is also in accordance with SunWater's existing strategy per Overall Strategy Common to all Bulk Water Schemes by Object Type.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx Overall Strategy Common to all Bulk Water Schemes by Object Type
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	A high level condition assessment completed in 2019 indicates the gantry crane switchboard internal components is in overall condition of 3, which is fair, with some components rated 4 indicating some aspects are in poor condition.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency

Sufficient information has been provided in regard to the proposed replacement of control equipment at Leslie Dam. Replacement of the equipment is justified based on the age of the asset having exceeded the typical serviceable life for mechanical/electrical equipment. Sunwater's Existing Strategy for Crane Equipment is supported by their Overall Strategy Common to all Bulk Water Schemes by Object Type. In this regard, the project's prudency is demonstrated.

Prudent

YES

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. There is no evidence that a scoping process was undertaken, although given the age of the crane and control equipment it will likely need replacing regardless. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process, given the project is not proposed to be implemented until 2024. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	No works completed or proposed to assess standard conforms with industry best practice.	None		
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Information provided in QCA Information Request A40_Attachment1_asset Register Including Condition and Risk as at 5 June 2019.xlsx does not identify a replacement cost for the control equipment at Leslie Dam. However, replacement costs for similar items in the register indicate figures between \$115,000 and \$200,000 are likely. Therefore, the proposed expenditure of \$160,000 appears reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	N/A		None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.	None		

Did the project consider whole of life costs, including future maintenance and operating costs?

YES

This project forms part of SunWater's existing strategy for assets part of the Bulk Water Scheme.

None

Have any potential efficiency gains been identified?

N/A

A detailed cost estimate with breakdown has not been provided.

None

Comment on Efficiency

For the proposed crane control equipment replacement, there is insufficient information provided to comment on project efficiency. A defined project scope has not been provided, nor were any alternatives identified. The cost estimate was very high level and the basis for its estimation could not be determined. That said, the \$160,000 replacement cost appears to be close to replacement costs for similar assets.

Efficient

YES

Documentation Quality

Low

Project Name	Meter Replacement (8 per year) - Three Moon Creek (P2)
Project Number	N/A - 0000065102 (Maintenance Key)
Project Description	
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$82,339 (FY19 actuals: \$41,951) FY21:24: \$161,371 FY25-53: \$1,178,780

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed		
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are replaced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency		Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.					

Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are non-capex options considered (such as operational solutions)?	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Not Applicable	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20 estimate of \$82,339 was made up of FY19: \$42,512 and FY20: \$39,827. Actual FY19 spend was reported to be at \$41,951. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Were options considered in determining the least cost or preferred option?	NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No option assessment has been undertaken.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Meter Replacement
Project Number	N/A - 0000065103 (Maintenance Key)
Project Description	Meter Replacement (7 per year) - Dawsons Valley (P2)
Asset Type	Water Meters
Year(s) to be Delivered	2019, 2021, and annually thereafter
Cost	FY19-20: \$85,257 (FY19 actuals: \$0) FY21-24: \$327,074 FY25-53: \$2,449,500

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
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Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are replaced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Prudency	Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.
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Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Were/are non-capex options considered (such as operational solutions)?	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Not Applicable	None		

	<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	NO	<p>The annual capex budget is allocated based on a formula of the total number of meters in the service contract divided by the nominal asset life of 20 years, then multiplied by the cost of a meter replacement considered to be "representative of the type and size of water meter in the service contract". While the specific cost basis (i.e., selecting a representative meter) was not provided, the average annual budget is \$89,100 (\$FY19). The QCA Information Request A40_meter replacement supporting information.xlsx included two spreadsheets relevant for estimating costs. The Dawsons River Customer Offtake Assets spreadsheet provided a list of all meters (taken from the asset register), their type, and size in the service contract (i.e. scheme). The Meter Replacement Cost Estimate Summary spreadsheet provides the historical cost for replacing the various types and sizes of meters. It is assumed this data is in \$FY19. With this information, it is possible to calculate the actual total replacement cost of the service contract as opposed to a "representative meter" approach as used by Sunwater. The approximate value of all water meters within the Dawsons River Scheme is \$1,040,000. Across a nominal asset life of 20 years, the annual budget would be \$52,000. Initial FY19-20 estimate of \$85,267 was made up of FY19: \$85,267 and FY20: \$0. Actual FY19 spend was reported to be at \$0. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.</p>	Medium	<p>FY19-20: \$33,257 FY21:24: \$119,074 FY25-53: \$941,500</p>	<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.</p>	N/A	See above	None		<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>If not, why?</p>					
	<p>Was/is the allowance for indirect costs reasonable for the scope of the project?</p>	Insufficient information	<p>No detailed cost estimate as been provided to determine whether indirect costs have been considered.</p>	None		<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	Insufficient information	<p>No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.</p>	None		<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	NO	<p>No information on escalation has been provided. It does not appear to have been considered.</p>	Minor	Unknown	<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>Were options considered in determining the least cost or preferred option?</p>	NO	<p>See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.</p>	None		<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?</p>	NO	<p>No option assessment has been undertaken.</p>	None		<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>Did the project consider whole of life costs, including future maintenance and operating costs?</p>	NO	<p>No option assessment has been undertaken.</p>	None		<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>
	<p>Have any potential efficiency gains been identified?</p>	NO	<p>None identified</p>	None		<p>Text information in QCA Information Request A40_Meter replacement supporting information</p>

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method has overstated costs compared to the cost of summing the replacement costs for each meter in the scheme. As such, adjustments are proposed to lower the annual budget to \$52,000 (\$FY19).

Efficient

NO

Documentation Quality

Low

Project Name	Meter Replacement
Project Number	N/A - 0000065104 (Maintenance Key)
Project Description	Meter Replacement (12 per year) - Callide Valley (P2)
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$124,207 (FY19 actuals: \$13,245) FY21:24: \$244,339 FY25-53: \$1,828,236

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are repalced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency		Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.				

Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are non-capex options considered (such as operational solutions)?	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Not Applicable	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20 estimate of \$124,207 was made up of FY19: \$63,839 and FY20: \$60,368. Actual FY19 spend was reported to be at \$13,245. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Were options considered in determining the least cost or preferred option?	NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No option assessment has been undertaken.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Meter Replacement
Project Number	N/A - 0000065145 (Maintenance Key)
Project Description	Replace Meter Program (8 per year) - Proserpine River (P2)
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$63,602 (FY19 actuals: \$46,405) FY21:24: \$125,205 FY25-53: \$941,532

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are repalced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency	Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.				

Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are non-capex options considered (such as operational solutions)?	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Not Applicable		None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20 estimate of \$63,602 was made up of FY19: \$32,516 and FY20: \$31,086. Actual FY19 spend was reported to be at \$46,405. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Were options considered in determining the least cost or preferred option?	NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No option assessment has been undertaken.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Meter Replacement
Project Number	N/A - 0000065147 (Maintenance Key)
Project Description	Replacement Meter strategy for IBT as developed in 2015 (\$24,052/yr) (P2)
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$45,527 (FY19 actuals: \$18,567) FY21:24: \$89,730 FY25-53: \$655,387

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed		
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are repalced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency		Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.					

Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
	Not Applicable	None		
YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20 estimate of \$45,527 was made up of FY19: \$23,000 and FY20: \$22,000. Actual FY19 spend was reported to be at \$18,567. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information
NO	No option assessment has been undertaken.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Meter Replacement
Project Number	N/A - 0000065148 (Maintenance Key)
Project Description	Replacement of Chinchilla Meter Outlets - 2015 IBHStrategy
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$22,914 (FY19 actuals: \$1,360) FY21:24: \$45,148 FY25-53: \$329,751

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are repalced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency	Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.				
Prudent	YES				
Documentation Quality	Low				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are non-capex options considered (such as operational solutions)?	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Not Applicable	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20 estimate of \$22,914 was made up of FY19: \$11,764 and FY20: \$11,150. Actual FY19 spend was reported to be at \$1,360. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Were options considered in determining the least cost or preferred option?	NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No option assessment has been undertaken.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Meter Replacement
Project Number	N/A - 0000076150 (Maintenance Key)
Project Description	Replace Meter Program (10 per year) - Burnett River (P2)
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$102,830 (FY19 actuals: \$48,863) FY21:24: \$201,268 FY25-53: \$1,469,049

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency	Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are repalced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
	Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency	Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.					

Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are non-capex options considered (such as operational solutions)?	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Not Applicable		None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20 estimate of \$102,830 was made up of FY19: \$53,000 and FY20: \$50,000. Actual FY19 spend was reported to be at \$48,863. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Were options considered in determining the least cost or preferred option?	NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No option assessment has been undertaken.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Meter Replacement
Project Number	N/A - 0000076154 (Maintenance Key)
Project Description	Replace Meter Program (11 per year) - Upper Burnett (P2)
Asset Type	Water Meters
Year(s) to be Delivered	2019, and annually thereafter
Cost	FY19-20: \$113,280 (FY19 actuals: \$90,402) FY21-24: \$221,808 FY25-53: \$1,619,532

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic - Sunwater provided FY19 actual costs in December 2019 in response to QCA Information for Request FR42 and this review form has been updated with actual FY19 costs accordingly.

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	YES	The project is the refurbishment/replacement of low risk water meters on as needed basis (i.e. once meter fails). Sunwater requires working and accurate meters to correctly invoice their customers.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Water meters are to be working and accurate, according to NMI requirements.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Working/accurate water meters are a requirement of the Resource Operations Plan for each of the systems.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The expenditure is for an adhoc program of water meter replacement as they fail. As they are considered low risk assets, this is considered appropriate; however, an alternative would be to implement a rolling program of water meter replacement based on age, condition and importance. A comparison of strategy options was not completed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Meters are repalced only if failed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	N/A	No condition assessment has been undertaken as the water meters are considered low risk.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Comment on Prudency	Sunwater requires working and accurate meters to correctly invoice their customers. The meters are repaired or, if necessary, replaced on a 'run-to-fail' approach. Formal periodic condition assessments are not completed. Considering that Sunwater has assessed the meters as a low risk asset, this approach is considered reasonable. That said, the overall documentation quality of this project is low. No information was provided to confirm this is the most prudent approach. Consequences of extended periods of failed meters have not been defined.				

Prudent	YES
Documentation Quality	Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	There appears to be no comparison of the replacement program strategy (i.e. the adhoc replacement upon failure) compared to a rolling program of replacement. In other words, there is insufficient information to determine the rationale for replacement method has been considered in a robust manner.	Medium	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are non-capex options considered (such as operational solutions)?	N/A	There are no other options presented for the replacement of failed water meters	None		Text information in QCA Information Request A40_Meter replacement supporting information
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The replacement water meters are stated to meet the requirements of the National Measurement Institute as nominated in the Sunwater AM14 Standard	None		AM14 - Non-Urban Water Meter
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The water meters will need to meet the requirements of the NMI (as stated in the Sunwater AM14 Document). This will mean that any innovative approaches will be catered for as long as they are accepted by NMI.	None		AM14 - Non-Urban Water Meter
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	Not Applicable		None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	It is generally based on previous annualised replacement costs for water meters for the region. Initial FY19-20: \$113,280 estimate was made up of FY19: \$59,000 and FY20: \$54,000. Actual FY19 spend was reported to be at \$90,402. Since this is a multi-year, long-term rolling program, individual differences in budgeted versus actuals are accepted.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	See above	None		Text information in QCA Information Request A40_Meter replacement supporting information
If not, why?					
Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate as been provided to determine whether indirect costs have been considered.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No project management, risk assessment, or scoping documents have been prepared hence risk allocation has not been assessed.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	NO	No information on escalation has been provided. It does not appear to have been considered.	Minor	Unknown	Text information in QCA Information Request A40_Meter replacement supporting information
Were options considered in determining the least cost or preferred option?	NO	See above, no options assessment has been undertaken to determine whether the replacement approach is valid and acceptable.	None		Text information in QCA Information Request A40_Meter replacement supporting information
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No option assessment has been undertaken.	None		Text information in QCA Information Request A40_Meter replacement supporting information

Did the project consider whole of life costs, including future maintenance and operating costs?

NO

No option assessment has been undertaken.

None

Text information in QCA Information Request A40_Meter replacement supporting information

Have any potential efficiency gains been identified?

NO

None identified

None

Text information in QCA Information Request A40_Meter replacement supporting information

Comment on Efficiency

The replacement water meters will meet the requirements of the National Measurement Institute and AS4747 as specified in the Sunwater Non-Urban Water Meter Standard. The proposed delivery of the water meter replacement program appears to be consistent with the asset management strategy; although, no documentation was provided to show the asset strategy is the most cost efficient approach compared to a rolling program based on age/condition/risk. The cost profile used for establishing forward budgets is based on a representative cost of a meter replacement. While no information was provided to confirm how a 'representative meter' is established, it appears that this cost estimation method is less than the cost of summing the replacement costs for each meter in the scheme. As such, it has been assumed as efficient.

Efficient

YES

Documentation Quality

Low

Project Name	Stabilise bed and banks of the spillway discharge channel subject to dam safety review
Project Number	N/A - Maintenance Key_0000072774
Project Description	Stabilise bed and banks of the spillway discharge channel subject to dam safety review
Asset Type	Spillway
Year(s) to be Delivered	2024
Cost	FY21-24: \$350,900 FY25:53: \$292,708

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
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	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency	NO	Teemburra Dam supplies water to the Pioneer Valley irrigation system and for urban and industrial purposes in the region. It is proposed that the bed and banks of the spillway discharge channel are stabilised (per the recommendations of the dam safety review) with costs in 2024 and 2049. The January 2018 Dam Safety Review did not include a recommendation for this project.	Major	\$643,680	QCA Information Request A40_Remaining projects supporting information.xlsx
	NO	The Teemburra Dam is assessed as having an Incremental Flood Consequence Category (IFCC) rating of extreme based on major damage. The January 2018 Dam Safety Review did not include a recommendation for this project.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	NO	Refer above.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	NO	End of life for concrete channel expected near 2077. No condition inspection information to support earlier refurbishment/replacement.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	NO	Construction of Teemburra Dam was finished in 1997. The typical service life of concrete is 80-100 years.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	NO	A high-level condition assessment was completed in 2003. The condition was documented as level 2, which indicates it is in good condition with minor defects only.	Major	As above	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	The January 2018 20-Yr Dam Safety Review report does not make any conclusions or recommendations regarding the stabilisation of the spillway discharge channel. Furthermore, the dam was installed in 1997. With an asset life of 80 years for a concrete channel, the replacement would not be due until 2077. The project has, therefore, not been considered prudent.
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Prudent	NO
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Documentation Quality	Medium
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Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process, given the project is not proposed to be implemented until 2024. The appropriateness cannot be commented on at this stage, based on the information provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	Insufficient information	Refer above.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	No works completed or proposed to assess standard conforms with industry best practice.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	Refer above.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.	No information				QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	Unable to assess proposed cost as it is a high level estimate. There is no defined project scope to make an informed assessment.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	If not, why?					QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

	Were options considered in determining the least cost or preferred option?	Insufficient information	No options assessment has been undertaken.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	Insufficient information	No options assessment has been undertaken.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Did the project consider whole of life costs, including future maintenance and operating costs?	Insufficient information	No options assessment has been undertaken.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Have any potential efficiency gains been identified?	Insufficient information	A detailed cost estimate with breakdown has not been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Efficiency	The project did not form part of the recommendation from the January 2018 Dam Safety Review. As such, there has been definition of scope, standard, or cost. There is insufficient information provided to comment on project efficiency. The full amount of the project should be adjusted due to lack of project prudence.
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Efficient	Insufficient information
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Documentation Quality	Low
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Project Name	Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake
Project Number	N/A - Maintenance Key_0000073006
Project Description	Carry out site works to major refurbishment/strengthen (post tensioning) tall slender tower against damage from earthquake
Asset Type	Building
Year(s) to be Delivered	2022
Cost	FY21-24: \$285,450

Assessment Notes
<ul style="list-style-type: none"> - Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels?	NO	It is proposed that refurbishment works to the Kinchant Dam inlet tower be done in 2022 for an estimated cost of \$285,450 (\$FY19). The works involve a major refurbishment to strengthen (post tensioning) the structure against damage from an earthquake. This was recommended from the 2000 dam safety review. The inlet tower is critical to the operation of the Dam and the ability to meet service levels; however, it is also unclear why the project won't be actioned until 22 years since the issue was identified. For this reason, it is assumed as a low risk to affecting service levels.	None		QCA Information Request A40_Remaining projects supporting information.xlsx
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	Insufficient information	It is assumed, but not confirmed, that the project is as a result of changes to seismic design standards in 1993 from when the tower was constructed in 1986. It was stated to be identified in a 2000 Dam Safety Review but this documented was not provided. Australian seismic standards (AS1170.4) was revised again in 2018, which effectively reduced seismic design requirements. This may have affected the original 2000 recommendation for structural improvements. Until a new seismic design review is completed, the project should not be considered prudent.	Major	\$285,450	QCA Information Request A40_Remaining projects supporting information.xlsx
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	Insufficient information	Refer above	Medium		QCA Information Request A40_Remaining projects supporting information.xlsx
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	Insufficient information	It is also unclear why the project won't be actioned until 22 years since the issue was identified. Structural integrity of a critical structure should theoretically have been a higher priority.	Medium		QCA Information Request A40_Remaining projects supporting information.xlsx
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	The asset is not near the end of life. This project appears to be related to modernisation of the structure to meet current codes.	None		QCA Information Request A40_Remaining projects supporting information.xlsx

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

N/A

The asset is in good condition. This project appears to be related to modernisation of the structure to meet a revised code, but this could be outdated yet again.

None

QCA Information Request A40_Remaining projects supporting information.xlsx

Comment on Prudence

While the tower appears to be in good condition, it appears that the 2000 Dam Safety Review identified unacceptable structural integrity for seismic resistance of the structure. It is assumed that this in response to the updated seismic codes in 1993. The delay in project implementation of 22 years suggest the project was of low priority and did not affect overall risk of the dam. Furthermore, the seismic standards have been updated in 2018 and what may have been prudent in 2000 could have changed. The project has not been considered prudent until an appropriate review of current standards is done.

Prudent

NO

Documentation Quality

Low

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	No alternatives or scope of work was identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	Insufficient information	No alternatives or scope of work was identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	Insufficient information	No alternatives or scope of work was identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		The project appears to be proposed to modernise the structure to meet current seismic codes.	None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	It is assumed the cost was derived from the 2000 Dam Safety Review, but this document was not provided to confirm.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	Insufficient information	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	NO	No detailed cost estimate has been provided to determine whether indirect costs have been considered. An options study was proposed for FY20 (i.e. indirect costs) but no funding has been allocated in that year.	Minor		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided. The project appears to have been postponed as it was originally identified 22 years prior to its planned implementation.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
	Did the project consider whole of life costs, including future maintenance and operating costs?	Insufficient information	No alternatives were identified. An options study is proposed for FY20 (but no funding has been allocated for that year).	None		
Have any potential efficiency gains been identified?	Insufficient information	None identified	None			

Comment on Efficiency

For the proposed tower refurbishment/strengthening, there is insufficient information provided to commentary on project efficiency as no supporting documentation was provided and no data from the asset register is applicable. It is unclear whether the allocated funds were for a design study or for construction.

Efficient

Insufficient information

Documentation Quality

Low

Project Name	Refurbish Silverleaf Weir
Project Number	0000076200 & 0000076201 Maintenance Keys
Project Description	Refurbish Silverleaf Weir pending outcome of 2018 options study - stage 1
Asset Type	Weir
Year(s) to be Delivered	2020 & 2021
Cost	FY20: \$939,980 FY21: \$1,861,760

Assessment Notes
- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency					
Were/are the works reasonably required to continue to deliver agreed service levels?	Insufficient information	While there is nothing documented on the service levels that the nominated infrastructure supports, it is reasonably implied that there remains a business need for the weir, however this should be documented in the project justification.	None		Non Routine Work Initiation Justification Document Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Based on the condition and risk assessment and the remaining life, it is reasonably implied that there is a safety risk attached to the project.	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	As above, it is reasonably implied but project justification should specifically cover this.	None		Non Routine Work Initiation Justification Document
Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Based on the results of the condition assessment, the weir requires urgent restoration. While, due to the phase of the project, the proposed option has not been selected, the timing of the expenditure based on the remaining life (2-4 years from 2018) is prudent.	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	The asset life remaining assessed in the condition assessment (2-4 years) which would bring the total asset life to approximately 75 years. Based on the materials of construction (timber etc), this would be considered to be consistent with typical asset life expectancy.	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018
Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	As above	None		Silverleaf Weir Condition Assessment Report and Refurb Plan, Wood Research, 2018

Comment on Prudency	The project is deemed prudent as it can be reasonably implied there is a safety risk attached to the failure of the Silverleaf Weir and a business need for the safe functioning of the weir. The option has not been chosen yet and the scope of works is to be defined by the 2018 Options Study. It is reasonably implied the scope of works will fulfil regulatory obligations.
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Prudent	YES
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the the allowance for indirect costs reasonable for the scope of the project?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
YES	The condition assessment completed in 2018 included various restoration recommendations. A proposed FY18 Options analysis will explore higher level options of: 1. Do nothing 2. Upgrade the weir 3. Rebuild the weir 4. Refurbish and replace certain components 5. Decommission the weir Documentation of the Options Analysis was not provided to show what options were actually considered.	None		
Insufficient information	Options not assessed yet.	None		
N/A	Options not assessed yet.	None		
Insufficient information	Options not assessed yet.	None		
Insufficient information	Options not assessed yet.	None		
	N/A	None		
Insufficient information	The design and construction phase has been scheduled for FY20 and FY21 with costs of \$939,980 and \$1,862,000 respectively. The total combined cost is \$2,802,000. The QCA Information Request A40_refurbish Silverleaf Weir supporting information document states that the cost estimate was based on a similar restoration to Whetstone Weir in FY10 and was scaled up in consideration of size, level of decay, locality, and inflation/escalation. The asset register replacement value for the weir and all its components is \$2,523,227 using a 2015 valuation. In \$FY19, this is \$2,698,692. However, it is noted that not all of the weir components were populated with replacement values.	None		Asset Register
Insufficient information	Scope not yet determined	None		
Insufficient information	The cost estimate is based on previously project cost, so it should cover the allowance for indirect costs, but there is no supporting information.	None		

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	YES	The project is in initiation stages and risk management generally minimal from a project perspective during initiation. Based on the most recent condition assessment noting that the timber elements are at failure stage, there would be a potential risk of failure prior to execution of the work which would need to be assessed / monitored.	None		
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	Sunwater has stated that they have applied a cost index to the scaled cost estimate, but no supporting information was provided.	None		
Were options considered in determining the least cost or preferred option?	Insufficient information	Options not assessed yet.	None		
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	Insufficient information	As above	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	Insufficient information	As above	None		
Have any potential efficiency gains been identified?	Insufficient information	None yet identified	None		

Comment on Efficiency	Based on the early phase of the project, and prior to options being assessed, there is insufficient information to comment fully on the efficiency of the project. However, the proposed project process indicates the project should result in overall efficiency being delivered on the project. The cost estimate was established by scaling costs from a previous similar weir restoration project. The costs appear to be reasonable in comparison to available replacement values in the asset register.
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Efficient	YES
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Documentation Quality	Low
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Project Name	Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)
Project Number	N/A - Maintenance Key_0000076580
Project Description	Study: Bathymetric survey of Fairbairn Dam (ELT directive - see notes)
Asset Type	Dam
Year(s) to be Delivered	2020
Cost	FY20: \$286,547

Assessment Notes
- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Prudency Were/are the works reasonably required to continue to deliver agreed service levels? Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements? Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence? Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward? Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations. Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	NO	The Sunwater Executive Leadership Team (ELT) has identified Fairbairn Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to Survey (not necessarily limited to bathymetric) required to determine accurate depths, features and hazards in the lake for the various recreational users at its varying water levels. Identified features within the pondage storage area subsequently required to be addressed accordingly in the interest of public safety on the lake. It doesn't appear to be directly related to delivery of agreed service levels. It is related to public safety. As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.	Major	\$286,547	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx Non Routine Work Initiation Justification Document
	YES	Refer above.	None		
	YES	Refer above.	None		
	YES	Immediate works are justified as public safety and business reputation is a risk factor.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	N/A	This project does not propose changes based on asset life.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	N/A	This project is unrelated to asset condition.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Comment on Prudency		As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.			

Prudent

NO

Documentation Quality

Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?

Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?

Were/are non-capex options considered (such as operational solutions)?

Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?

Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?

Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.

Was/is the incurred/proposed cost reasonable for the scope of the project?

Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.

If not, why?

Was/is the allowance for indirect costs reasonable for the scope of the project?

Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?

Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)

Were options considered in determining the least cost or preferred option?

Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?

Did the project consider whole of life costs, including future maintenance and operating costs?

Have any potential efficiency gains been identified?

Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
NO	No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Insufficient information	There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
N/A	Refer above.	None		
N/A	No works completed or proposed to assess standard conforms with industry best practice. The proposed method for survey appears reasonable for the scope of works.	None		
N/A	Refer above.	None		
		None		
YES	The cost estimate for this project was based on an estimate from a Sunwater project manager. The initial estimate was \$317,500, with an estimate confidence of +/-15%. The cost claim is \$292,280 (nominal \$) is within this confidence range and is therefore considered reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
NO	No options assessment has been undertaken.	None		
NO	No options assessment has been undertaken.	None		
N/A	The project is for a survey. No O&M involved.	None		
N/A	None identified	None		

Comment on Efficiency

For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency.

Efficient

NO

Documentation Quality

Low

Project Name	Study: Bathymetric survey of Bjelke Petersen Dam (ELT directive - see notes)
Project Number	N/A - Maintenance Key_0000076581
Project Description	Study: Bathymetric survey of Bjelke Petersen Dam (ELT directive - see notes)
Asset Type	Dam
Year(s) to be Delivered	2021
Cost	FY21-24: \$46,840

Assessment Notes
- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon. - Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed		
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	NO	The Executive Leadership Team has identified Bjelke-Petersen Dam as one of the storages that was agreed to be surveyed for public safety. The primary purpose of this project is to Survey (not necessarily limited to bathymetric) required to determine accurate depths, features and hazards in the lake for the various recreational users at its varying water levels. Identified features within the pondage storage area subsequently required to be addressed accordingly in the interest of public safety on the lake. As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.	Major	\$46,480	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None		
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.	None		
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Immediate works are justified as public safety is a risk factor.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	N/A	This project does not propose changes based on asset life.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	The project is unrelated to condition.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx

Comment on Prudency	As per direction from the QCA, recreational assets do not form part of this pricing review and therefore must be excluded.
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Prudent	NO
Documentation Quality	Medium

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:		Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency	Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	NO	No alternatives were identified. A do-nothing option should still be considered as a non-capex consideration.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Insufficient information	There were no options scoped as part of the forward planning process. The appropriateness cannot be commented on at this stage, based on the information provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.	None		
	Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	No works completed or proposed to assess standard conforms with industry best practice.	None		
	Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.	None		
	Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.			None		
	Was/is the incurred/proposed cost reasonable for the scope of the project?	Insufficient information	There is no defined project scope to make an informed assessment. However, based on the cost estimate from a similar survey study at Fairbairn Dam, when scaled based on reservoir area, the proposed capital expenditure claim appears to be reasonable.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.	N/A	This project is in the forward planning phase and has not been released to the market for tendering. Therefore, there is no basis for comparison to the current market conditions.	None		
	If not, why?					
	Was/is the allowance for indirect costs reasonable for the scope of the project?	Insufficient information	No detailed cost estimate has been provided to determine whether indirect costs have been considered.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	Insufficient information	No scope of works document has been prepared hence risk management has not been assessed.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	Insufficient information	No information on cost escalation has been provided.	None		QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
	Were options considered in determining the least cost or preferred option?	NO	No options assessment has been undertaken.	None		
	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	No options assessment has been undertaken.	None		
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	The project is for a survey. No O&M involved.	None			
Have any potential efficiency gains been identified?	N/A	None identified	None			

Comment on Efficiency For the proposed bathymetric (or other) survey, there is insufficient information provided to comment on project efficiency. That said, the CAPEX claim, when scaled based on reservoir area, is within the range of a similar survey proposed at the Fairbairn Dam which had a cost estimated associated with it.

Efficient	NO
Documentation Quality	Low

Project Name	Testing of post tensioning permanent strand anchors
Project Number	N/A - Maintenance Key_0000077561
Project Description	Testing of post tensioning permanent strand anchors
Asset Type	Dam
Year(s) to be Delivered	2019
Cost	FY24-53: \$673,000

Assessment Notes
- Your assessment must take into account the project timing, specifically the uncertainty around projects within the longer term planning horizon.
- Consider if any issues you find are project specific or systemic

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	Tinaroo Dam forms part of the Mareeba-Dimbulah Bulk Scheme. Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003).	None	QCA Information Request A40_Attachment 1_Remaining projects supporting information.xlsx
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.		
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above.		
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	Five yearly testing is appropriate. However, more frequent tests should be undertaken if the permanent strand anchors show signs of deterioration.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.	YES	Tinaroo Dam was constructed in 1959. At the time of the testing, it will be 60 years old.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
		Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?	YES	A condition assessment of the spillway anchor prestress system was completed in 2015 in accordance with the five yearly inspection requirement (ANCOLD Guidelines, 2013). The system was rated as being in good to fair condition which supports the continuation of testing at its current schedule.	None	QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Comment on Prudency		Testing of post tensioning permanent strand anchors are a five yearly inspection requirement in accordance with the ANCOLD Guidelines on Dam Safety Management (ANCOLD, 2003). The previous condition assessment of the asset indicates that the existing inspection schedule is suitable. This project is considered prudent to meet Dam Safety Requirements.				
Prudent		YES				
Documentation Quality		Medium				

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Efficiency Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	N/A	Testing is required to meet Dam Safety Requirements. An options analysis is not applicable to this project.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	N/A	Refer above.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are non-capex options considered (such as operational solutions)?	N/A	Refer above.			
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	N/A	No works completed or proposed to assess standard conforms with industry best practice.			
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	N/A	Refer above.			
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.					
Was/is the incurred/proposed cost reasonable for the scope of the project?	N/A				QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources. If not, why?	N/A				
Was/is the allowance for indirect costs reasonable for the scope of the project?	N/A	No detailed cost estimate has been provided to determine whether indirect costs have been considered.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?	N/A	No scope of works document has been prepared hence risk management has not been assessed.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)	N/A	No information on cost escalation has been provided.			QCA Information Request A40_Attachment 1_Asset Register including Condition and Risk as at 5 June 2019.xlsx
Were options considered in determining the least cost or preferred option?	N/A				
Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	N/A	No options assessment has been undertaken.			
Did the project consider whole of life costs, including future maintenance and operating costs?	N/A	No options assessment has been undertaken.			
Have any potential efficiency gains been identified?	N/A	A detailed cost estimate with breakdown has not been provided.			

Comment on Efficiency

For the proposed testing of post tensioning strand anchors, there is insufficient information provided to comment on project efficiency but the costs appear to be reasonable. They range in value from \$105,000 to \$120,000 (in \$FY19) per test.

Efficient

YES

Documentation Quality

Low

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Appendix G

Assessment Forms for Dam Safety Upgrades

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Project Name	Burdekin Falls Dam - Dam Safety Improvement Project
Project Number	
Project Description	dam safety upgrade for Burdekin Falls Dam
Asset Type	Water supply dam for Townsville and other areas.
Year(s) to be Delivered	not provided
Cost	FY19-20: \$12.7M FY21-24: \$284M FY25: \$35.1M

Assessment Notes
<ul style="list-style-type: none"> - Currently in concept design phase. Sunwater developing a Preliminary Business Case. - Studies still in progress to inform the risk assessment, position of the F-N curve, investigations to further inform on the concept design options and costings - 2012 Risk assessment - dam safety risk plotted above the Limit of Tolerability for existing dams (as defined by ANCOLD 2003). The Risk assessment is presently being review based on recent (2019) studies. - Concept designs - these are also in review following recent studies. Previous designs "bookended" the flood estimates, but the flood hydrology and consequence assessment have been updated since the issue of the concept designs (including cost estimates).

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed	
Prudency		Were/are the works reasonably required to continue to deliver agreed service levels?	YES	As a result of revised rainfall and flood estimates by the Bureau of Meteorology, new rainfall projections show a large increase in extreme rainfall events in the BFD catchment compared to values used for the original design. The standard design requirement, the Probable Maximum Precipitation Design Flood (PMPDF) for the dam, has increased since it was initially designed and constructed and, consequently BFD does not currently comply with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity (AFC). Engineering works undertaken in 2017 shows the F-N of Burdekin Falls Dam is presently above the ANCOLD Limit of Tolerability for Existing Dams.	None	QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
		Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?	YES	Refer above.	None	QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
		Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?	YES	Refer above. Also, Sunwater also has obligations towards safety in accordance with the organisation's own Dam Safety Policy and prioritisation process.	None	QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
		Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?	YES	The timing of the expenditure is proposed to occur over 7 years. The annual expenditure profile from the RFI 58 appears to be reasonable for the described engineering and construction phases. The project should not be delayed as the consequence of failure is high. Sunwater has committed to completing the improvement works by October 2024.	None	QCA Information Request A56 (Attachments 1 and 3) QCA Information Request 58

Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.

N/A

Not applicable. The improvement is required in relation to new BOM rainfall projections and hydrology. Not related to asset life/condition.

None

QCA Information Request A56 (Attachments 1 and 3)

QCA Information Request 58

Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?

N/A

Not applicable. The improvement is required in relation to new BOM rainfall projections and hydrology. Not related to asset life/condition.

None

QCA Information Request A25 (Attachments 3, 4 and 5)

QCA Information Request A56 (Attachments 1, 2 and 3)

Comment on Prudency

The project has a high level of documentation that justifies the prudency of the project. The Comprehensive Risk Assessment, Hydrology Reports, Concept Design Reports and Preliminary Business Case describe the project drivers. The dam does not currently comply with ANCOLD Guidelines nor the Queensland Dam Safety Regulator Guidelines for Acceptable Flood Capacity (AFC) and is above the ANCOLD Limit of Tolerability for Existing Dams.

Prudent

YES

Documentation Quality

High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	YES	10 options were considered and this has been shortlisted to 2 options. After updated hydrology, three additional options were developed and the Concept Design Report revised. One of the new options was selected as the preferred option.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	YES	The preferred option achieves technical requirements for the project using a risk-based approach, and is the least cost acceptable solution.	None		QCA Information Request A25 (Attachments 3, 4 and 5) QCA Information Request A56 (Attachments 1, 2 and 3)
Were/are non-capex options considered (such as operational solutions)?	YES	A do-nothing option was included but rejected.	None		
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The standard of works conforms with requirements for the level of design phase (concept). There are still significant studies and design phases to come. All works have been done in consideration of ANCOLD guidelines. Refer to Appendix B of the Concept Design Report for full list of standards and guidelines used in the options concept designs.	None		QCA Information Request A56 (Attachments 1, 2 and 3)
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	Refer to Appendix B of the Concept Design Report for full list of standards and guidelines used in the options concept designs.	None		QCA Information Request A56 (Attachments 1, 2 and 3)
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Flood and consequence studies are current best practice.	None		
Was/is the incurred/proposed cost reasonable for the scope of the project?	YES	Concept Design Report includes appropriate cost estimates, completed to an accuracy (-10%/+40%) higher than typically required for the concept phase (+/-75%). They are stated to be Class 5 estimates according to AACE guidelines. The costs have included all indirect and ownership costs. The Preliminary Business Case provides an annual expenditure profile for the project, and references the [REDACTED] Concept Design Report for cost data source. Total project cost in \$FY19 is \$346M. This is considered the cost estimate with the highest level of supporting information. The total project cost in \$FY19 in the QCA RFI 58 claim is \$15M lower at \$332M. While no explanation was included for the decrease, it is assumed that cost efficiency measures were applied.	None		QCA Information Request A56 (Attachments 1, 2 and 3) QCA Information Request 58

<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.</p>	<p>Insufficient information</p>	<p>Cost estimates are high level concept at this stage. Class 5 estimates according to AACE guidelines.</p> <p>No evidence was provided to show the Concept Design phase engineering consultants were competitively tendered, but this cost will be minor compared to total project.</p> <p>The PBC (Chapter 13) states that collaborative procurement strategies and project alliancing is the preferred strategy to mitigate time, cost and stockholder risks. Detailed assessment of procurement strategy was completed. The selection of the preferred procurement strategy will be revisited in the Detailed Business Case phase.</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3, 4 and 5)</p> <p>QCA Information Request A56 (Attachments 1, 2 and 3)</p>
<p>If not, why?</p>					
<p>Was/is the the allowance for indirect costs reasonable for the scope of the project?</p>	<p>YES</p>	<p>The cost estimates are reasonable for the current level of design. Specifically on indirect costs are inclusions for Contractor costs and insurance (21.5%), unlisted items (10%), owner costs and contingency and project risk (30%). A detailed breakdown of planned project development costs are also provided in the PBC.</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3, 4 and 5)</p> <p>QCA Information Request A56 (Attachments 1, 2 and 3)</p>
<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	<p>YES</p>	<p>The concept report includes assessment of risks and opportunities.</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3, 4 and 5)</p>
<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	<p>YES</p>	<p>Chapter 11 of the PBC includes whole of life costs including inflation and escalation.</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3, 4 and 5)</p> <p>QCA Information Request A56 (Attachments 1, 2 and 3)</p>
<p>Were options considered in determining the least cost or preferred option?</p>	<p>YES</p>	<p>10 options were considered, 3 additional options added. Revised preferred option was \$173M less than previous preferred option. It is the least cost option.</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3, 4 and 5)</p> <p>QCA Information Request A56 (Attachments 1, 2 and 3)</p>
<p>Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?</p>	<p>YES</p>	<p>A multi- criteria assessment was undertaken for shortlisting of options. NPV of whole of life costs was also completed.</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3, 4 and 5)</p> <p>QCA Information Request A56 (Attachments 1, 2 and 3)</p>
<p>Did the project consider whole of life costs, including future maintenance and operating costs?</p>	<p>YES</p>	<p>Refer above</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3, 4 and 5)</p> <p>QCA Information Request A56</p>
<p>Have any potential efficiency gains been identified?</p>	<p>N/A</p>	<p>Not relevant here for this concept level phase. Risks and opportunities were evaluated.</p>	<p>None</p>		

Comment on Efficiency

The level of documentation for the project is high. The Concept Design Report and Preliminary Business Case provide detailed assessment of options, scope, risk, cost, etc. The project is deemed as efficient in scope and standard. As the project is only at concept design stage, the cost estimates are high level concept and have been undertaken according to AACE guidelines and using information provided by Sunwater. The costs have been stated to be within an accuracy of -10%to +40%. This is more accurate than the level specified in Sunwater's cost estimate process for the preferred option concept design (+/-75%). The total project cost claim is lower than the cost estimate presented in the Preliminary Business Case and cost efficiency measure have been assumed to be applied to allow the decrease.

Efficient

Documentation Quality

YES

High

Project Name	Fairbairn Dam - Dam Safety Upgrade
Project Number	
Project Description	Spillway Improvements for Fairbairn Dam
Asset Type	Water supply dam
Year(s) to be Delivered	2016 (BC Phase 1) - 2021 (completion of stage 2/3)
Cost	FY16-20: \$147M FY21: \$21.0M

Assessment Notes

Prudency Assessment

For expenditure to be prudent, there must be an identified need or cost driver, e.g. if it:

- is required to deliver agreed service levels
- results from a legal or compliance obligation
- is required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence.

Please complete the following	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
<p>Prudency</p> <p>Were/are the works reasonably required to continue to deliver agreed service levels?</p>	YES	In accordance with the Queensland Dam Safety Regulator's and ANCOLD's Guidelines (Limit of Tolerability), the societal risk posed by Fairbairn Dam in its pre-Project state is unacceptable. That is, due to the identified deficiencies to the spillway, Fairbairn Dam is exposed to a higher risk of dam failure (during a flood event) than desirable, an issue that requires addressing as soon as practicable. The follow on effects of a potential dam failure include significant loss of life and property damage to communities downstream of the dam; ongoing loss of regional water supply impacting commercial sustainability within the region, as well as the financial, reputational and legal implications to SunWater's business. Risk assessment shows the F-N is presently above ANCOLD Limit of Tolerability for Existing Dams and upgrade works are required to reduce this risk.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval
<p>Were/are the works reasonably required to address a legal or compliance obligation with safety, environmental or other legislative requirements?</p>	YES	On societal risk based assessment and flood requirements. The F-N assessment under the ANCOLD guidelines evidence the intolerable safety risk that the condition presented. The project has been split into stages to address (at least what was considered to be at the outset of the project) the highest risk elements prior to the imminent wet season (FY17)	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval

	<p>Were/are the works reasonably required to fulfil regulatory obligations such as those specified in a water management protocol, resource operation plan, resource operation licence or interim resource operations licence?</p>	YES	<p>Dam safety obligations fall under regulatory requirements. Under the Water Supply (Safety and Reliability) Act 2008, dams are required to be maintained to reduce risk of dam failure and consequential loss in line with Queensland's independent Dam Safety Regulator (DNRME), and relevant national (ANCOLD) and international guidelines.</p> <p>As the dam owner, SunWater has clear legal obligations to ensure the structural and operational integrity of its facilities and the safety of downstream communities. To ensure that this obligation is properly discharged, SunWater utilises and has in place a Comprehensive Dam Safety Management Program (CDSMP) which adopts the standards and guidelines as stipulated by the Queensland Dam Safety Regulator (the Regulator) and as recommended by ANCOLD.</p>	None		<p>QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul</p>
	<p>Is the proposed timing of the expenditure appropriate (i.e. based on lowest whole-of-life costs)? Should the expenditure be delayed or brought forward?</p>	YES	<p>There were / are three stages to the project. Stage 1 was the immediate works required to reduce risk for the FY17 wet season. Those works were completed in December 2016. The stage 2 and stage 3 works are ongoing to continue to reduce the risk to tolerable in accordance with the guidelines. The Portfolio Risk Assessment and other project risk assessments identify the intolerable risk that the current pre-project condition presents and the urgency in needing to carry out the work.</p>	None		<p>QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul QCA Information Request 5_Attachment 1_DIP Draft Portfolio Risk Assessment QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval</p>
	<p>Is the assessed (risk adjusted) asset life consistent with standard run-to-failure asset life expectancy? Explain any material variations.</p>	NO	<p>The dam was constructed between 1969-1972 putting it at 47 years and should have an asset life of 80-200 years. A condition inspection identified immediate need for repairs.</p>	None		<p>QCA Information Request A27_Attachment 8_Design Report - Report excl App A Dwgs</p>
	<p>Do the results of the most recent condition assessment support the proposed works? Is the frequency of condition assessment appropriate?</p>	YES	<p>Investigations into the condition of the spillway which initiated the project were carried out in 2014-15. Since the stage 1 project has commenced, additional investigations have been carried out into the substructure condition which has presented additional intolerable risk.</p>	None		<p>QCA Information Request A27_Attachment 8_Design Report - Report excl App A Dwgs</p>

Comment on Prudency	There is sufficient documentation on the risk assessments and regulatory requirements evidencing the need for this project. The project scope appears to have evolved over time. Some of this evolution was planned as part of the staged approach. Other parts were unplanned primarily as a result of unexpected sub-surface conditions. The risk assessments carried out on each project element demonstrate the prudence of the project.
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Prudent	YES
Documentation Quality	High

Efficiency Assessment

For expenditure to be efficient, it must represent the least-cost means of providing the requisite level of service within the relevant regulatory framework.

Please complete the following:

Efficiency

Please complete the following:	Response	Comment	Impact on Value	Recommended Adjustment	Information assessed
Were/are alternatives evaluated (including an option analysis undertaken) as part of the scoping process?	Yes	As the business cases demonstrate, the project was split into stages with options assessments generally for the discrete projects. The Stage 1 comprised four high level options (do nothing, construct a new spillway, carry out spillway improvement works, or drain dam). From there, 4 detailed options for improvement works ultimately recommended the staging option. At Stage 1, the scope of subsequent stages were not yet defined. Following additional investigations during Stage 1, additional options assessment were carried to select Stage 2 & 3 designs.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul QCA Information Request 5_Attachment 1_DIP Draft Portfolio Risk Assessment QCA Information Request A27_Supplementary response_Attachment 3_Proj Staging and Costs and Approval
Is the scope of the works the best means of achieving the desired outcomes after having regard to the options available?	Yes	The selected option allowed for the most flexibility in scope, budget, and schedule while still achieving the project technical requirements.	None		QCA Information Request A27_Attachment 1_Comprehensive Risk Assessment QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul
Were/are non-capex options considered (such as operational solutions)?	Yes	A "do nothing" base case and a drain/decommission the dam were part of the option evaluation for completeness. They were not shortlisted.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 3_Business Case - Stage 1&2 - 2016 Jul
Does the standard of the works conform with technical, design and construction requirements in legislation, industry and other standards, codes and manuals?	YES	The works are stated to comply with ANCOLD guidelines and relevant standards.	None		QCA Information Request A27_Attachment 2_Business Case - Stage 1 - 2016 Feb QCA Information Request A27_Attachment 8_Design Report - Report excl App A Dwgs
Is the standard of works compatible with existing and adjacent infrastructure or modern engineering equivalents?	YES	The design was completed to appropriate standards and included modern design techniques such as CFD and physical hydraulic modelling.	None		QCA Information Request A25 (Attachments 4 and 5) and A56 (Attachment 1)
Outline any considerations relating to technological change, process redundancy and/or cost associated with improving general business performance.		Flood and consequence studies are current best practice. Preferred option meets the ANCOLD guidelines for tolerable risk	None		

	<p>Was/is the incurred/proposed cost reasonable for the scope of the project?</p>	<p>YES</p>	<p>According to the Updated Business Case, the budget for Stage 1 was \$35M, which included Stage 2 design. The actual expenditure, a historical cost, was \$38.3M. The funds approved for Stage 2 Spillway Improvements & Rectification were originally \$60M but were increased to \$85M (a combined \$120M for Stage 1 & 2). The Stage 3 Spillway Chute Gravity Side Walls (Stage 3) was originally costed at \$28M but was increased to \$45M.</p> <p>Across all three stages, the total incurred cost up to February 2019 was \$82.8M. Sunwater has projected the project to continue until late 2020 or mid 2022 with a total project cost of \$168M.</p> <p>While the project almost doubled in cost from the original budget, the changes in scope are well documented and justified.</p>	<p>None</p>		<p>Dam Safety Upgrade Forward Expenditure Conversion to FY19\$.xlsx</p> <p>QCA Information Request A27_Attachement 16_Project Costs - Stage 1&2 Mnthly Rep - 2019 Feb.xlsx</p> <p>QCA Information Request A27_Attachement 16_Project Costs - Stage 3 Mnthly Rep - 2019 Feb.xlsx</p>
	<p>Was/is the cost of the defined scope and standard of works consistent with conditions prevailing in the markets for engineering, equipment supply and construction? Nominate relevant interstate or international benchmarks, and other information sources.</p> <p>If not, why?</p>	<p>Insufficient information</p>	<p>The construction contract was awarded to [REDACTED] and were stated to be in accordance with the procurement strategy but there was no supporting documentation to show the results of the procurement process and whether the selected bid was within reasonable range of other offers. No procurement details for design consultants were provided either.</p>	<p>Medium</p>	<p>Unable to quantify</p>	
	<p>Was/is the allowance for indirect costs reasonable for the scope of the project?</p>	<p>YES</p>	<p>A summary showing a breakdown for indirect costs was not provided. Non-direct costs were budgeted at ~26%, which is reasonable for a civil type project.</p>	<p>None</p>		
	<p>Were/are suitable approaches taken for managing risk and uncertainty regarding projects at an early stage of development?</p>	<p>NO</p>	<p>While at a high level, the governance processes of the project appear to be suitable for managing the risks - assembling a Technical Review Panel, generally following the project management framework. However, in the urgency of commencement of stage 1 there appears to be two key risks/ assumptions that have not been given due attention, being the risk of latent conditions - different ground conditions, and the significant pressure fluctuations occurring under the side walls during significant flood events, that was not previously recognized. Both of these led to additional costs due to design rework, additional works, and/or aborted materials procurement due to the change. Based on the commentary in the Design Report, it also appeared that the project generally suffered from rework due to the necessity to fast track construction concurrently with design.</p>	<p>Medium</p>	<p>Cost of design rework, aborting materials for the anchorage of the spillway floor when the decision was made to change to gravity walls. The cost of this cannot be quantified on the available information, but could potentially be accounted for in project contingency. It is also noted that no costs were reported for the side walls in the Stage 1&2 monthly cost reports.</p>	<p>QCA Information Request A25 (Attachment 4), A56 (Attachment 1).</p> <p>QCA Information Request A27 (Attachement 8)</p>
	<p>Are the proposed cost escalation methods appropriate? (e.g. consistent with prevailing market conditions and historical trends)</p>	<p>N/A</p>	<p>Escalation was not applied as the works were planned to be commenced immediately and within 18 month period. Schedule overrun did, however, occur.</p>	<p>Minor</p>		<p>Stage 3 Indep Cost Estimate</p>
	<p>Were options considered in determining the least cost or preferred option?</p>	<p>YES</p>	<p>Yes, options were assessed at the outset, and then sub options were assessed for components as more information became available in the course of the project. The preferred option was selected based on an MCA criteria as well as using Industry guidelines on Risk Assessment.</p>	<p>None</p>		<p>QCA Information Request A25 (Attachments 3 and 4), A56 (Attachment 1).</p>

	Were the procedures/approach used for determining the preferred option appropriate in terms of determining efficient and least cost outcomes?	NO	A multi- criteria assessment was undertaken for shortlisting of options. Consideration was also given to the residual risks and achieving an ALARP condition (risks as-low-as-reasonably-practical) in accordance with industry guidelines. However, it would appear that there were too many large risks that led to changes subsequent to the business case that may have had a bearing on the original outcome of the BC. Although, the project final cost is still lower than the next most acceptable option in the original options assessment.	None		QCA Information Request A25 (Attachment 4), and A56 (Attachment 1)
	Did the project consider whole of life costs, including future maintenance and operating costs?	NO	The project financial analysis did not account for future maintenance and operation costs as they are likely negligible in comparison to CAPEX. Instead, the financial analysis focussed on risk and potential loss of life rather than commercial opportunity.	None		Stage 1 Business Case
	Have any potential efficiency gains been identified?	YES	It appears that in hindsight, the project would have benefitted in additional geotechnical and structural investigations which would have afforded a much better appreciation of the required scope of works, risks, etc. The need for the physical modelling which appears to have been raised as a key risk by the TRP in the early phase of the project may have been deferred excessively, creating rework and adding abortive costs.	Medium	Cost of design rework, aborting materials for the anchorage of the spillway floor when the decision was made to change to gravity walls. The cost of this cannot be quantified on the available information, but could potentially be accounted for in project contingency. It is also noted that no costs were reported for the side walls in the Stage 1&2 monthly cost reports.	QCA Information Request A25 (Attachment 4), A56 (Attachment 1). QCA Information Request A27 (Attachment 8)

Comment on Efficiency

While the general good project governance has been adopted at a high level, it appears that efficiency has suffered due to a lack of management of key project risks. It is evident from a number of the project documents, namely the Design Report and the Briefing note for shareholding ministers, that the project was beset by a number of challenges that affected scope, cost and schedule on the project. There appears to have been two key issues.

The first is associated with insufficient ground and condition assessments at the outset leading to addition risks being identified and subsequently managed as the project progressed in construction. The second relates to the consideration of pressure fluctuations that could occur under the side walls during significant flood events, which was not initially recognized and could lead to dam failure. Both of these issues appear to have been identified in the outset; in the case of the former identified as a low risk in the Business Case and in the latter, raised as an issue early on by the TRP, but not duly appreciated. They consequently caused issues in scope during the execution of the project.

The process of fast-tracking construction concurrently with design due to the assessed urgency of the project appears to have placed pressure on the design team to make design decisions / assumptions to allow construction to progress, which with the benefit of hindsight did not manage the associated risk appropriately and were to the detriment of efficiency. The substantial changes to the scope, budget and schedule post business case cast doubt on the initial options selection as the final cost and schedule approach that of the original Option 3 New Spillway.

Altogether, the project has a high level of documentation quality. The variations in the project are well documented although significant, they have been appropriately justified. The project cost claim matches the final approved budget/cost estimates. The overruns on the original budget are more likely related to original underestimating than poor project cost efficiency.

Efficient	YES
Documentation Quality	High

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