Halcrow

SunWater - Biloela Water Supply Schemes ("Cluster 3")
Review of Price Paths 2011 - 2016

Final

Prepared for:

Queensland Competition Authority

Halcrow

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Halcrow
Level 22, 68 Pitt Street, Sydney, NSW 2000 Australia
PO Box R1573 Royal Exchange, NSW 1225
Tel +61 2 9250 9900 Fax +61 2 9241 2228
www.halcrow.com/australasia

Contents

Executive Summary

Halcrow has been commissioned by the Queensland Competition Authority (the Authority) to assist with a review of SunWater's Network Service Plans (Capex & Opex) for the Queensland Competition Authority's (QCA's) forthcoming 2011-2016 price path determination of SunWater's Water Supply Schemes.

Halcrow has been commissioned to undertake a review of SunWater's Biloela schemes:

- Nogoa Mackenzie Water Supply Scheme;
- Emerald Distribution Scheme;
- Lower Fitzroy Water Supply Scheme;
- Dawson Valley Water Supply Scheme
- Theodore Distribution Scheme;
- Callide Valley Water Supply Scheme; and
- Three Moon Creek Water Supply Scheme.

The scope of the review has included provision of advice in respect of the prudence and efficiency of SunWater's proposed operating expenditure (excluding indirect and overhead costs) and the renewals and rehabilitation capital expenditure.

The review has involved a desktop review of information provided by SunWater in support of its NSPs; meetings with SunWater staff; site visits to Nogoa Mackenzie Water Supply Scheme, Emerald Distribution Scheme and the Callide Valley Water Supply Scheme; meetings with irrigator representatives; and the detailed review of a selection of renewals and rehabilitation projects from each scheme in the Biloela cluster.

While SunWater has sought to provide information in response to the requests made as part of this review process, the information has been insufficiently disaggregated to enable a detailed review of cost information. This has hindered the ability of Halcrow to adequately assess the prudence and efficiency of the proposed expenditure.

For renewals projects planned for 2013 and beyond, very little detailed information on the scope, drivers, options assessed or cost estimates for the projects is available. This is because detailed planning is not currently undertaken until 12 months prior to the scheduled renewals date.

In the absence of this information, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure.

This report sets out details of Halcrow's assessment and its findings.

In respect of forecast Operating expenditure, Halcrow is generally satisfied that the proposed expenditure is prudent and efficient, however, recommends adjustments across the price path period amounting to $1,350,000 (direct) across the cluster. The proposed adjustments reflect:

- the rate of inflation in excess of CPI that has been applied in respect of expenditure on materials and contractors;

- preventative maintenance costs for which adequate justification has not yet been provided by SunWater;
- specific forecasts in respect of Acrolein purchase and electricity costs that have been assessed as being excessive; and
- one case where a minor amount of expenditure has been identified as not being related to the irrigation service.

In respect of the forecast Renewals and Rehabilitation expenditure, Halcrow is again generally satisfied that the proposed expenditure is prudent and efficient. However, Halcrow has made recommendations in respect of a number of projects reviewed, including:

- reductions where the expenditure forecasts appear excessive;
- removal of the forecast expenditure where the proposed work has not been adequately justified; and
- rescheduling of periodic work.

It should be noted, however, that extrapolation of the proposed adjustments across the whole of the Renewals and Rehabilitation program is not considered appropriate. Such adjustments will, however, impact calculation of the proposed annuity.

1 Introduction

1.1 Background

Halcrow has been commissioned by the Queensland Competition Authority (the Authority) to assist with a review of *SunWater's Network Service Plans (Capex & Opex)* for the Authority's 2011-2016 price path determination of SunWater's Water Supply Schemes.

The Authority is an independent pricing and access regulator responsible for ensuring that specified monopoly infrastructure-based services in Queensland comply with the principles of national competition policy.[1]

SunWater is a bulk water infrastructure developer and manager, responsible for managing approximately $7 billion in water infrastructure assets. It supplies approximately 40 percent of all water used commercially in Queensland, including water for mining, power generation, industry, urban development and irrigated agriculture throughout Queensland.

The Premier and the Treasurer (the Ministers) directed the Authority to develop irrigation prices to apply to twenty two (22) SunWater Water Supply Schemes from 1 July 2011 to 30 June 2016. An Amended Ministers' Referral Notice (the Notice) now directs the Authority to recommend irrigation prices to apply to SunWater water supply schemes from 1 October 2011 to 30 June 2016.

The Ministers' Referral Notice requires, among other things, that bulk water supply and channel prices/tariff structures are set so as to provide a revenue stream that allows SunWater to recover the prudent and efficient costs associated with:

(a) its operational, maintenance and administrative activities; and

(b) renewing and rehabilitating existing assets using a renewals annuity methodology.

In January 2011, the Authority received Network Service Plans (NSPs) for the SunWater Schemes. The NSPs present SunWater's forecast of efficient costs, including operating costs and a renewals annuity, for each of the twenty two (22) bulk water supply schemes and eight (8) distribution systems relevant to the Ministers' amended referral notice[2].

[1] Queensland Competition Authority (2010), Terms of Reference: *SunWater Water Supply Schemes 2011-2016 Price Paths: Review of SunWater's Network Service Plans (Capex & Opex)* amended 9 November 2010, page 1.
[2] Queensland Competition Authority (2011), *Irrigation Prices for SunWater Schemes: 2011-2016*, http://www.qca.org.au/water/Sun-irrig-price/NSP.php, accessed 31/01/2011.

Halcrow is one of four independent consultants, each of which have been designated a 'cluster' of bulk water schemes to review.[3] The scope of the review includes provision of advice in respect of the prudence and efficiency of SunWater's proposed operating expenditures (excluding indirect and overhead costs) and the renewals and rehabilitation capital expenditure.

Halcrow has been commissioned to undertake a review of Biloela ('Cluster 3') Schemes, including the Nogoa Mackenzie, Lower Fitzroy, Dawson Valley, Callide Valley and Three Moon Creek Bulk Water Supply Schemes and the Emerald and Theodore Distribution Systems. The NSPs, together with additional supporting information provided by SunWater, form the basis of Halcrow's review.

1.2 Structure of this Report

This report discusses and presents Halcrow's key findings and recommendations from the review of the Biloela schemes.

Section 1 provides background on the Authority, SunWater and the scope of this review.

Section 2 provides an overview of the approach adopted by Halcrow in reviewing operating expenditure and renewals and rehabilitation expenditure.

Section 3 provides an overview of SunWater's NSPs for the Biloela ('Cluster 3') schemes, its approach to planning, its asset management framework, and an overview of elements common to each scheme including methods used to forecast operating and renewals and rehabilitation expenditure.

Section 4 to **Section 10** includes Halcrow's assessment of the operating expenditure and the renewals and rehabilitation expenditure for the Biloela schemes, as detailed in the NSPs and additional supporting information.

Section 11 includes a summary or Halcrow's assessment together with conclusions drawn from the review.

1.3 Price Base

Unless stated otherwise, all of the expenditure reported throughout this report is reported in real dollars ($ July 2011).

Where SunWater has provided forecast expenditure in a nominal price base, the expenditure has been deflated to real dollars ($ July 2011) using SunWater's inflation assumption of 2.5 percent per annum.

Where SunWater has provided historical data in a nominal price base, this has been inflated to real dollars ($ July 2011) using CPI (Brisbane – All groups).

[3] Queensland Competition Authority (2010), Terms of Reference: *SunWater Water Supply Schemes 2011-2016 Price Paths: Review of SunWater's Network Service Plans (Capex & Opex)* amended 9 November 2010, page 3.

1.4 Limitations

This report has been prepared for the Authority by Halcrow for the sole purpose of providing an assessment as to the prudence and efficiency of SunWater's proposed operating expenditures (excluding indirect and overhead costs) and its proposed renewals and rehabilitation capital expenditure in the period 2012 to 2016. This report cannot be relied upon by any other party or for any other purpose.

Halcrow's assessment has been undertaken on the basis of information and material provided by SunWater, from meetings and discussions held with SunWater representatives, and on information provided by SunWater subsequent to those discussions.

Importantly, Halcrow has not undertaken any independent verification of the reliability, accuracy or completeness of the source data and information provided. Therefore, it should not be construed that Halcrow has carried out any form of audit or other verification of the adequacy, completeness, or accuracy of the specific information provided by SunWater.

1.5 Acknowledgements

Halcrow's Review Team acknowledges the contribution of SunWater staff who provided significant information and support to assist the completion of this review, and guided Halcrow staff during site visits to the Nogoa Mackenzie, Emerald and Callide Valley Schemes.

2 Scope and Methodology

2.1 Scope of Review

2.1.1 Terms of reference

The *Terms of Reference (9th November 2010)* for this review comprise the provision of expert advice in the establishment of:

- the prudence and efficiency of SunWater's proposed operating expenditures (excluding indirect and overhead costs); and
- the prudence and efficiency of SunWater's renewals and rehabilitation capital expenditure.

The Authority identified three "components" of the consultancy assignment as follows (in summary):

Component 1 has involved the review of SunWater's operations and renewals and rehabilitation expenditures for prudency and efficiency, as follows:

- The assessment as to whether SunWater's proposed operating expenditure (except indirect and overhead costs) is prudent and efficient has involved:
  - an assessment of SunWater's policies and procedures for the incurrence and attribution of operating expenditure against good industry practice;
  - consideration of prevailing market conditions, historical trends in operating expenditure, and the potential for efficiency gains, taking into account relevant state and international benchmarks;
  - a review of cost escalation methods and factors to determine whether they are appropriate;
  - an assessment of the bases for assigning operating expenditure to schemes, scheme segments, and customers as appropriate; and
  - consideration of the required or agreed service standards and SunWater's compliance requirements.
- The assessment as to whether SunWater's proposed renewals and rehabilitation capital expenditure is prudent and efficient has taken into account the classification of bulk and channel assets as approved by Treasury; the condition of bulk and distribution assets; the renewals methodology; and the appropriateness of the renewals annuity balances through time. It has included:
  - an assessment of SunWater's policies and procedures for the incurrence of renewals and rehabilitation expenditure against good industry practice;
  - a review of drivers to assess whether there is a demonstrated need for the expenditure; and
  - an assessment of efficiency, considering the scope of works, desired outcomes, the standard of work, the cost of undertaking works including an assessment against known benchmarks, and cost escalation methods and factors used by SunWater.

Component 2 involved presentation of the findings from Component 1 to stakeholders during consultation meetings. **Component 3** has involved the preparation of a final report to the Authority taking into account comments on the draft report as agreed with the Authority and stakeholders.

This purpose of this final report is to detail Halcrow's findings in relation to each of the components.

2.1.2 Exclusions

The Authority has specifically excluded from the scope of this review, the assessment of indirect and overhead costs including their allocation; the allocation of renewals costs; the review of insurance costs; and the return on capital. These items are the subject of separate reviews by the Authority.

2.2 Review Methodology

2.2.1 Overview

The review of SunWater's NSPs has comprised a number of elements including:

- A desktop review of information provided by SunWater in support of its NSPs, including background papers and details of its policies and procedures relating to operations and renewals and rehabilitation expenditure. A number of additional requests for data were made by Halcrow to obtain further information in support of the data included in the NSPs.
- Meetings with SunWater staff in its Brisbane offices to obtain more detailed information from SunWater in relation to its NSPs, its asset management framework, and its business systems. Meetings with SunWater staff were held on 2 February 2011, and 28 February 2011 to 1 March 2011.
- Site visits to Nogoa Mackenzie Water Supply Scheme, Emerald Distribution System, and the Callide Valley Water Supply Scheme over the week 7 March 2011 to 11 March 2011. The principal focus of the visits was to meet with SunWater Operations staff and inspect key elements of each scheme with a view to gaining an understanding of:
  - the nature and extent of the scheme and its key components;
  - the nature and extent of operations and maintenance activities undertaken in respect of the scheme; and
  - the nature and extent of proposed and recently completed (ie. during the previous price path period) renewals projects; and where possible to assess the need for the proposed renewals projects.
- Meeting with irrigator representatives from Nogoa Mackenzie Water Supply Scheme and the Emerald Distribution System on 8 March 2011.
- The detailed review of a selection of renewals and rehabilitation projects from each scheme in Cluster 3. Selections were made to cover approximately fifty percent of renewals and rehabilitation expenditure in each scheme. Additional information was sought from SunWater to substantiate the driver for each project and the basis of the expenditure forecast.

- Synthesis of data obtained from the above evaluation to determine the efficiency and prudence of the expenditure.
- Presentation of draft findings to irrigators in the Biloela cluster on the 31 March, 11 April and 12 April 2011.

The following sections provide details of the review of prudence and efficiency.

2.2.2 Review of prudence

The assessment of whether operating expenditure and renewals and rehabilitation expenditure is *prudent* has been split into a number of key tasks.

The first key task has involved the review and assessment of whether SunWater has in place an effective and robust planning framework. Effective and robust planning frameworks provide the context and strategic direction for capital and operational planning, and enable an organisation to demonstrate that its investment decisions have been prudent and appropriately targeted.

An effective planning framework typically includes the following key elements:

- provides detail on how an organisation aims to achieve its strategic, legislative or regulatory objectives and manage its key risks (ie. transparent and robust principles that ensure alignment between strategic objectives and investment priorities);
- identifies drivers for investment, including trigger points;
- defines the process, principles and accountabilities for developing the capital and operating plans, and provides transparent and robust principles to ensure alignment between strategic objectives and investment priorities, incorporating customer and stakeholder requirements;
- provides a reasoned method of allocating expenditure and prioritising programs/projects, thereby optimising the selection and delivery of the capital and operating expenditure programs;
- incorporates approval processes and allows for sufficient monitoring and reporting against budget/implementation plans; and
- reflects operating environment and service requirements.

Halcrow's review of SunWater's planning framework has involved assessing whether the above key elements can be identified.

The second key task in the assessment of prudence has involved testing whether SunWater has been able to demonstrate the rigour with which the framework is applied throughout the organisation. This has involved a more detailed review of a selection of historical and proposed expenditure and renewals and rehabilitation projects.

The prudence test has considered the following:

- the basis (driver) for the investment;
- the outputs (and benefits) associated with each project or expenditure program;

- the methods by which projects and initiatives were identified and developed including the application of any risk based processes used to prioritise projects or initiatives; and
- the planning and design processes used to develop projects, and evidence of options considered and design development.

2.2.3 Review of efficiency

In undertaking the review of efficiency, Halcrow has sought to determine whether the costs in the NSP reflect those that would normally be expected to occur in a competitive environment.

In undertaking the assessment of efficiency expenditure, Halcrow has sought to determine the following:

- the current stage of the design development (as this will provide an indication of the likely accuracy of any cost estimates);
- the cost estimation methodology, including the estimating process, key cost components, assumptions and unit rates; and
- assumptions surrounding the application of contingencies and escalation factors.

The findings of Halcrow's review are contained within the following chapters of this report.

3 Overview of SunWater's NSPs

3.1 Overview

This section of the report provides a discussion of elements of Halcrow's assessment which are common to each of the Biloela schemes. It includes an overview of the Biloela schemes and SunWater's Service Framework and Obligations. A discussion on the adequacy of information provided to this review is also included.

In addition, this section includes:

- a discussion on SunWater's business systems and processes, and of the methodology adopted by SunWater in order to forecast its operating expenditure and renewals and rehabilitation expenditure requirements;
- a discussion on SunWater's proposed cost escalation factors; and
- a discussion of its renewals annuity methodology.

A high level benchmarking review of SunWater's expenditure with a selection of comparators is also included.

3.2 Biloela Schemes

The Biloela schemes are located in the Central and Northern Regions of SunWater's Network. They consist of the following bulk schemes:

- Nogoa Mackenzie Water Supply Scheme;
- Lower Fitzroy Water Supply Scheme;
- Dawson Valley Water Supply Scheme;
- Callide Valley Water Supply Scheme; and
- Three Moon Creek Water Supply Scheme.

In addition to the bulk water supply schemes, there are two distribution systems:

- Emerald Distribution System (part of the Nogoa Mackenzie scheme); and
- Theodore Distribution System (part of the Dawson Valley scheme).

3.3 Service Framework and Obligations

3.3.1 Overview

SunWater operates a decentralised service regime. Under this regime:

- SunWater's customers must manage their own demand-supply balance;
- SunWater does not undertake water supply planning; and
- SunWater is not responsible for drought management and does not incur drought management costs.

Customer rights for the location of taking water and the priority of their allocation is overseen by resource regulator, the Department of Environment and Resource Management (DERM). Customer Water Access Entitlements (WAEs) must be managed by SunWater in accordance with the relevant Resource Operating Plan (ROP) which provides the overarching regulatory framework for services provided by SunWater.

A Resource Operating Licence (ROL) specifies the scheme specific obligations SunWater has as a bulk water supplier. A ROL also provides an authority to operate storage and interfere in the flow of water (essentially via storage and release).[4]

The key aspects of a ROL and related conditions set out in the associated ROPs include:[5]

- operational conditions for storages, such as minimum storage levels, environmental release rules and constraints on changes in the rates of release;
- water sharing rules (such as announced allocation or continuous sharing rules);
- environmental monitoring and reporting requirements; and
- recording and reporting water use by entitlement holders.

The rules of resource sharing during times of drought are set by the resource regulator and it is the responsibility of SunWater to implement those rules only.

For its 'Biloela' schemes, SunWater provides bulk water, channel (network services) and drainage services. The Fitzroy Basin ROP[6] applies to infrastructure in the Dawson Valley Water Supply Scheme, the Nogoa Mackenzie Water Supply Scheme, and the Lower Fitzroy Water Supply Scheme. Emerald and Theodore Distribution Systems have additional ROP conditions related to water accounting and distribution losses.

SunWater has ROLs for Nogoa Mackenzie, Lower Fitzroy and Dawson Valley. An Interim ROL (IROL) is held for both Callide Valley and Three Moon Creek.

Table 3-1 summarises SunWater's obligations within regulated and non-regulated business environments.

[4] SunWater, *Background paper QCA review of irrigation prices Service framework*, undated.
[5] Ibid.
[6] Department of Environment and Resource Management, *Fitzroy Basin resource operations plan*, as Amended July 2009.

Table 3-1 SunWater's obligations within regulated and non-regulated business environments

Business	Schemes	Regulated	Non-regulated
Bulk water	Nogoa Mackenzie, Lower Fitzroy, Dawson Valley, Callide Valley and Three Moon Creek.	SunWater is obliged to store and deliver water to a customer, in accordance with customer rights to take water. SunWater only supplies water to water entitlement holders. Supply of water to non-entitled holders would breach SunWater's license obligations. The Water Act 2000 effectively requires that a water entitlement holder must have a contract with the asset owner.	
Channel (network services)	Nogoa Mackenzie and Dawson Valley	SunWater is obliged to divert and deliver water available to the customer (under their water entitlement) on their behalf. Customer water entitlements exist at rivers. Channel networks are used to deliver available water from the river segment where that water entitlement exists to the location where customers have installed offtakes. Distribution losses may occur within channel networks and it is SunWater's responsibility for managing these losses. SunWater is responsible for managing any additional water that is required to be diverted to ensure customers receive their entire water entitlement. SunWater holds its own water entitlements for these losses; *"entitlements to manage losses were initially established through water planning and in interim Resource Operations Licenses. In theory, SunWater could purchase additional water to meet any shortfall, at its cost."* Regulatory obligations related to supply of channel (network services) are for the use of chemicals for weed control and discharge of water to the environment.	SunWater holds separate additional contracts with customers taking water from channels. There is no statutory requirement for this.
Drainage Services	Nogoa Mackenzie and Dawson Valley	Drainage Services are provided in the same areas as channel (network services) and are set under regulation.	

3.3.2 Customer service

SunWater has implemented service standards for water delivery which are described in clause 3 of its standard contracts. SunWater has summarised its service standards in section 3 of each NSP; a summary of these is provided in **Table 3-2**.

SunWater is not proposing any changes to its customer service standards in the coming price path.

Table 3-2 SunWater's customer service standards

Scheme	Planned Shutdowns – Notification			Unplanned Shutdown - Duration		Unplanned Shutdown - Notification			Meter Repairs	Max No of Interruptions	Complaints & Enquiries	
	For shutdowns planned to exceed 2 weeks	For shutdowns planned to exceed 3 days	For shutdowns planned to be less than 3 days	During Peak Demand Period	Outside Peak Demand Period	SunWater will notify affected customers requiring water verbally or by telephone, radio announcement, or fax within	SunWater will notify customers in writing before the scheduled release	When the timing of the release varies from the notice, SunWater will notify customer council members within	Faults causing restrictions to supply will be repaired within	Planned or Unplanned interruptions per water year	Initial Response	Written Response
Nogoa Mackenzie	8 wks	2 wks	5 days	48 hrs	5 wk days	24 hrs			1 wk day	6	5 wk days	21 days
Emerald Distribution	8 wks	2 wks	5 days	48 hrs	5 wk days	24 hrs			1 wk day	6	5 wk days	21 days
Lower Fitzroy	8 wks	2 wks	5 days	48 hrs	48 hrs	24 hrs			1 wk day	6	5 wk days	21 days
Dawson Valley	8 wks	2 wks	5 days	48 hrs	5 wk days	24 hrs			1 wk day	6	5 wk days	21 days
Theodore Distribution	8 wks	2 wks	5 days	48 hrs	5 wk days	24 hrs			1 wk day	6	5 wk days	21 days
Callide Valley	8 wks	2 wks	5 days	48 hrs	5 wk days	24 hrs			1 wk day	6	5 wk days	21 days
Three Moon Creek							2 wks	2 wk days	1 wk day	6	5 wk days	21 days

Source: SunWater, *Water Supply Arrangements and Service Targets* (for each scheme); also reported in each NSP. wk day = working day; wks = weeks

3.4 Adequacy of Information

SunWater's NSP's provide a high level overview of its proposed operating and renewals and rehabilitation expenditure for the period 2012 to 2016. In order to undertake a more detailed assessment of SunWater's forecast expenditure, Halcrow made a number of information requests (collectively with the other consultant teams as well as directly to SunWater). The information requests sought to obtain sufficiently detailed information to facilitate the assessment of prudence and efficiency. In particular, Halcrow sought to understand the basis for SunWater's expenditure forecasts, together with the key assumptions used in their development.

While SunWater has sought to provide information in response to the requests made, the information has been insufficiently disaggregated to enable a detailed review of cost information. This has limited the ability of Halcrow to adequately assess the prudence and efficiency of the proposed expenditure.

For renewals projects planned for 2013 and beyond, very little detailed information on the scope, drivers, options assessed or cost estimates for the projects is available. This is because detailed planning is not currently undertaken until 12 months prior to the scheduled renewals date.

In the absence of this information, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure.

3.5 SunWater Business Systems and Processes

3.5.1 General

This section provides a brief overview of SunWater's:

- Operation and Maintenance Plans; and
- Asset Management Framework for Renewals Program Planning.

The primary objective of reviewing SunWater's systems and processes has been to determine whether they are consistent with good industry practice, and likely to result in prudent and efficient investment decisions.

3.5.2 Operation and maintenance plans

Operation and Maintenance (O&M) Manuals are important scheme management tools in which essential information about the operation and maintenance of a facility is documented. The manuals convey the practices and policies of SunWater to the people responsible for operation and maintenance.

Each Scheme owned by SunWater has an O&M Manual. The Scheme O&M Manual may be divided into several volumes; for example, a there may be an O&M Manual for an overall Scheme, as well as one for each major facility within that Scheme (dam, weir, distribution system, etc).

O&M Manuals contain (or refer to) all the information and procedures needed to operate and maintain a scheme from system level down to component level. This includes:

- operational rules and procedures;
- maintenance (both annual maintenance and renewals);
- requirements from Standard Operating Procedures;
- operational requirements from Resource Operation Licences (ROLs);
- operation, maintenance and reading of meters;
- operation and maintenance of facilities (eg. pump stations, water treatment plants and sewage treatment plants);
- monitoring and reporting procedures;
- workplace health and safety procedures;
- environmental procedures; and
- water ordering systems.

SunWater provided copies of O&M Manuals for each Water Supply Scheme in the Biloela cluster. In addition, facilities manuals were also provided for a number of assets (eg. Fairbairn Dam).

In reviewing SunWater's proposed operating expenditures, Halcrow has sought to verify that the nature and scope of proposed activities are in line with operation and maintenance activities documented in the O&M Manuals.

3.5.3 Review of Asset Management Framework for renewals program planning

3.5.3.1 Asset Management Regime

SunWater has indicated that its renewals program has been developed in accordance with the asset management regime outlined in its submission to the QCA, '*Asset Management Planning Methodology Paper*.'[7] In this submission, SunWater has noted that there are three facets to its asset management approach; namely:

- replace assets as required to maintain overall system service standards;
- refurbish assets through their service lives as necessary to maintain service potential; and
- service, monitor and maintain the ongoing operational performance and service capability of assets as close as possible to the design standard.

SunWater's asset management approach is documented in a series of policies, standards, guidelines and manuals, which together make up its asset management framework. SunWater's SAP system is used to support the implementation of this framework. SAP Work Management System (SAP-WMS) is used to capture asset risk and condition assessments, and to schedule renewals and replacements for each asset. It is also used to capture cost data for planned projects.

[7] SunWater, Asset Management Planning Methodology Paper, October 2010.

In its *Asset Refurbishment Planning Guideline*,[8] SunWater has identified criteria for including projects within its renewals plan. These criteria are:

- assess the decline in condition of an asset that is beyond acceptable risk;
- mitigate unacceptable risk; and
- realise a commercial investment, ie. to reduce costs or increase revenue with an NPV.

3.5.3.2 Asset Risk Assessment

SunWater Standard No AM.20 *Methodology for Assessments of Infrastructure Assets*[9] outlines a methodology for undertaking risk assessments in respect of its assets, which is then used to set priorities for expenditure for the SunWater Refurbishment Program, and to categorise assets into maintenance types (ie. run to failure, condition monitor, etc).[10]

Asset risk assessment is based on an assessment of the risk of functional failure, ie. failure of an asset to fulfil its defined functional requirements. An assessment is made of the consequence and likelihood of failure using clearly defined Risk Consequence Definitions and likelihood rating. The assessed risk score is determined for the worst reasonably foreseeable consequence, with consideration being given to:

- Workplace Health and Safety;
- Environment;
- Financial;
- Production/operations; and
- Stakeholder Relations.

Risk assessment inputs and the risk score for each asset are recorded in the SAP Work Management System (WMS).

3.5.3.3 Asset Refurbishment Planning – Asset Condition Assessment

SunWater uses asset condition assessments to adjust the frequency of replacement and refurbishment of assets.[11] SunWater's *Asset Condition Assessment Users Manual*[12] provides information and guidelines on carrying out the condition assessment process on SunWater's mechanical, electrical, civil assets and headworks assets. In this manual, SunWater states that "*the asset knowledge acquired through condition monitoring, condition assessment and risk assessments combine to provide a powerful tool for a formal means of prioritising expenditure that is consistent and transparent*".

Condition assessments are recorded within SAP-WMS. Condition ratings range from 1 to 6, with rating 1 being "as new" and rating 6 being "failed". Depending on the type of asset, the asset may have separate condition ratings for different aspects such as safety, structural condition, performance (function) and fitness

[8] SunWater, *Asset Refurbishment Planning Guideline, Issue 2*, December 2009.
[9] SunWater, Standard No AM.20 *Methodology for Assessments of Infrastructure Assets*, 9 October 2008.
[10] Ibid, pg1.
[11] SunWater, *Review of Irrigation Prices: Asset Management Planning Methodology Paper*, October 2010.
[12] SunWater, *Asset Condition Assessment Users Manual, version 5.2,* 5 January 2009.

for purpose. SunWater's guides on mechanical, electrical, civil and headworks assets define assessment criteria and ratings for each asset. **Table 3-3** provides a generic description of what these ratings mean with respect to the broad life cycle of an asset.

Table 3-3 Condition Assessment Ratings

Rating	Description of Condition
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.

SunWater's SAP-WMS enables risk and condition reports to be prepared based on a range of different criteria including functional location, condition scores, risk category and risk category score. These reports are used as a basis for forecast expenditure planning.

3.5.3.4 *Renewals Planning*

SunWater has noted that knowledge of its assets, as acquired through condition monitoring, condition assessment and risk assessments, is used to prioritise expenditure in a manner that is consistent and transparent.[13] The renewals expenditure forecasts presented in the NSPs are generated from SAP-WMS, and reflect a prediction of required refurbishment and renewals, which is based asset age, adjusted to reflect asset condition and risk assessments. It also includes allowances for studies to investigate problems and improve operations, or to ensure compliance with legislative requirements (such as dam safety studies).

Based on discussions with SunWater, where renewals expenditure exceeds $50,000 and is scheduled to occur within the first year of the forecast price path period (ie. in 2012), detailed cost appraisals have been undertaken.

For projects less than $50,000, or those scheduled to occur beyond the first year of the forecast price path period (ie. year 2013 to 2016), detailed assessments have not been undertaken (refer to **Section 3.8.3** for more detail).

[13] SunWater, *Asset Condition Assessment Users Manual, version 5.2,* 5 January 2009.

In the background paper, *Customer involvement in renewals expenditure*,[14] SunWater has outlined its decision making process for renewals expenditure and the provision of information to customers. Customer involvement in renewals planning is primarily via the consultation undertaken by the QCA as part of the pricing process, although SunWater has also noted that its customers are able to offer suggestions via its irrigator advisory committees.

3.5.4 Procurement policies and procedures

SunWater has a lead procurement group which is responsible for setting its strategic policies and procedures for procurement.

As SunWater is a Government Owned Corporation, its purchasing activities are bound by the requirements of the State Procurement Policy. SunWater provided copies of policies and procedures related to procurement and purchasing including the *SunWater Delegations Policy and Delegations Matrixes*, the *SunWater Purchasing Policy* and the *SunWater Purchasing Guide*. These documents provide the necessary instruction and framework to ensure that SunWater meets the requirements of the State Procurement Policy.

Procurement by SunWater is primarily undertaken by the regions. However, SunWater has indicated that "*in order to get better value for money and to take advantage of bulk purchase discounts, SunWater purchases common goods used across the state in bulk.*"[15] Examples of bulk purchased goods include but are not limited to chemicals (including Acrolein), meters, fuel, staff uniforms, plant hire and services such as slashing.

SunWater has noted that it actively pursues outsourcing of non-core support functions and services requiring specialist skills and equipment. Outsourced services include painting and maintenance of houses, maintenance of lifts and gantry cranes, and testing and tagging of electrical equipment. In addition, large capital works are procured externally via tender.[16]

Halcrow notes that outsourcing is an appropriate and effective means of delivering activities associated with non-core support functions and specialist services. SunWater indicated that it regularly tests the market to ensure that it secures value for money in procurement and outsourced activities. As part of this review, SunWater provided Halcrow with evidence to demonstrate that weed control contracts for its Biloela schemes are market tested at three yearly intervals.

Based on discussions with SunWater staff, and on the information provided to this review, Halcrow is satisfied that SunWater actively seeks to externally procure services where it is deemed more efficient to do so.

[14] SunWater, Supplementary background paper QCA review of irrigation prices Customer involvement in renewals expenditure February 2010.
[15] SunWater, Background paper - *Service Delivery Strategies*, undated page 4.
[16] SunWater, S*ervice Delivery Paper.doc*, undated, page 4

3.6 Development of Operating Expenditure Forecasts

3.6.1 Overview

SunWater has indicated that operating expenditure forecasts have been developed using a bottom-up approach, by assessing the tasks required and the most efficient method of delivering the required work.[17] Although the NSPs contain little detail on how SunWater has built up its operating expenditure forecasts, SunWater provided a copy of a background paper, "*Service Delivery Paper*" (undated), which provides an overview of its approach to developing its operating expenditure budgets for the NSPs, and its resourcing strategy.

SunWater's budget is built up from four activity types. Namely:

- Operations - customer management, workplace health and safety, environmental management, water management, scheme management, dam safety, scheduling and delivery, metering, facilities management (recreational costs);
- Preventative Maintenance - condition monitoring, servicing, weed control;
- Corrective Maintenance - scheduled and emergency; and
- Electricity - energy costs.

With the exception of Electricity, each activity is made up of expenditure associated with labour, materials, contractors, other, indirects and overheads.[18]

SunWater has noted that its annual operating expenditure can vary significantly from year to year and that annual variations in work also result in movements in expenditure between activity types (for example, labour expenditure between Operations and Corrective Maintenance). It has identified factors contributing to the annual variation in operating expenditure including:[19]

- Climatic and seasonal conditions - impacting conditions for aquatic weed in channels and weed control costs; the frequency of slashing of access roads, channels and drain berms;
- Volume of water in storages and customer demand - driving the workload for scheduling and delivery of water;
- Maintenance activities undertaken when the opportunity is provided - for example, when the storages are low and equipment normally under water can be accessed; and
- Maintenance not required on an annual basis.

SunWater indicated that the significant variability in operating conditions from year to year means that it does not use zero based budgeting when developing annual budgets. It noted that it has previously attempted to implement zero based budgeting, but had found that the resulting budgets were inflated and unrealistic.[20]

[17] SunWater NSP's for cluster 3 schemes, Section 4.2 of each respective scheme.
[18] As noted in **Section 2.1.2**, the review of indirects and overheads is the subject of a separate review.
[19] SunWater, *Service Delivery Paper*, undated, page 3.
[20] SunWater email, dated 9 March 2011.

Consequently, SunWater's annual budgets and its NSPs have been developed on what it has termed, an 'average year'. The exception to this is preventative maintenance expenditure (condition monitoring and servicing), which has been developed using a bottom up approach (discussed in **Section 3.6.3.2**).

While use of an average year to develop annual budgets appears reasonable, SunWater has not defined what it considers to be an 'average year'. Consequently, any assessment of prudence and efficiency is difficult as it is unclear what planning parameters (cost drivers) have been used to develop the budget. Without a clearly defined and documented definition of the planning parameters assumed for an 'average year', it is difficult to validate the basis of the assumptions made by SunWater in preparing its forecasts.

The starting point for the development of the NSPs is SunWater's 2011 budget. SunWater's 2011 budget was developed by reviewing the costs over the past four years and making adjustments for "*spurious costs, plus or minus any other known changes in costs (eg. increases in the cost of Acrolein)*".[21] SunWater indicated that its 2011 budget represented the best quality information available. In forecasting operating expenditure over the period 2012 to 2016, SunWater then added or subtracted known changes going forward, including savings identified in the SLFI review.[22,23]

Halcrow understands that SunWater's budgeting process involved a workshop with SunWater's area managers, during which the expenditure for each scheme was reviewed in detail, including adjustments made to exclude the impact of 'spurious data' and to account for known changes. It also made adjustments to remove the impact of incorrect time bookings by staff. Examples included instances where its Storage Operators booked time spent on condition monitoring to Operations instead of Preventative Maintenance (this is discussed in more detail in **Section 3.6.3.2**).

While this approach to forecasting expenditure appears reasonable, SunWater did not prepare any documentation to detail the outcomes of this workshop, or the basis for the adjustments made when forecasting expenditure from 2012 to 2016. Consequently, it has been difficult to verify the basis/justification of the adjustments made to the four year average by SunWater when developing forecast expenditures. This has been compounded by the lack of a clear definition of what constitutes an 'average' year.

Halcrow also notes that while forecasts based on historical averages may be appropriate, there is a risk that inefficiencies are carried forward from year to year. Without being able to verify that appropriate adjustments have been made to historical expenditures, it is not possible to make any judgements in relation to the efficiency of the expenditure.

In addition, Halcrow notes that SunWater has not adopted a four year average in preparing its budgets in all cases. For example, the forecast of electricity usage at

[21] SunWater, *Service Delivery Paper*, undated, page 2.
[22] SunWater email, dated 9 March 2011.
[23] Refer Section 3.6.6 for further detail on respect of the SLFI Review.

Theodore is based on 2009/10 data only, as SunWater considered that this was representative of an 'average year'. However, this assumption (ie. that 2009/10 represents an 'average year') does not appear to have been applied when forecasting operating expenditure for other activities within Theodore. While there may be strong justification for adopting different approaches, without documentation to substantiate the assumptions adopted, the ability to assess the prudence and efficiency of the forecast expenditure is reduced.

Halcrow would typically expect to see documentation in place detailing all assumptions used in the development of expenditure forecasts. This would enable a detailed review of key assumptions, including sensitivity checks of the assumptions adopted by SunWater.

Despite the absence of documentation surrounding the development of operating cost forecasts for each scheme, Halcrow has sought to identify the factors driving changes in the operating expenditure.

The following sections detail SunWater's approach to forecasting preventative maintenance, corrective maintenance, operations and electricity. In addition, a specific section on labour expenditure is included (although labour expenditure is allocated across each activity). A review of the forecast expenditure at a scheme level is included within **Section 4** to **Section 10**.

3.6.2 Operations

As discussed in **Section 3.6.1**, SunWater's general approach to forecasting expenditure has been to use an 'average year', which has been calculated from an average of historical expenditure with adjustments for spurious costs or known changes. While SunWater has not provided a specific background paper detailing its methodology for forecasting operations expenditure, it has provided significant information on its obligations, and its operations, as well as a breakdown of its historical operations expenditure by sub-activity. These documents, together with the requirements detailed in the Resource Operation Plan (ROP), Resource Operating Licences (ROLs) and Interim Resource Operating Licences (IROLs) have been used to guide Halcrow in its assessment of operations expenditure.

3.6.3 Preventative maintenance

3.6.3.1 Overview

Preventative maintenance relates to ongoing activities undertaken to maintain the performance of assets at their designed standards. The activities are cyclical in nature with an interval of less than 12 months. SunWater has a program of preventive maintenance strategies for its facilities consisting of inspections, surveillance, condition monitoring and servicing of assets. SunWater has noted that, "*the purpose of the program is to monitor the performance and condition of assets to ensure that they continue to meet the agreed service standards and to detect when assets are operating outside of acceptable parameters so that corrective action can be taken or scheduled*".[24]

[24] SunWater, *Review of Irrigation Prices – Asset Management Planning Methodology Paper*, October 2010, page 18.

In SunWater's reporting system, preventative maintenance consists of three activity types; namely condition monitoring, servicing, and weed control.[25] The following section provides an outline of SunWater's approach to forecasting expenditure associated with condition monitoring and servicing. Details of forecasts associated with weed control are included in **Section 3.6.3.3**.

3.6.3.2 Condition Monitoring and Servicing

Preventative maintenance forecasts for condition monitoring and servicing are primarily based on costing prepared by Parsons Brinkerhoff as part of a review of SunWater's preventative maintenance activities (excluding weed control), undertaken as part of SunWater's preparation of the NSPs.

SunWater provided Halcrow with a copy of a report by Parsons Brinckerhoff, together with SunWater's preventative maintenance work instructions.[26]

The objectives of the Parsons Brinkerhoff review included identifying all preventative maintenance work instructions currently in use, and the associated costs for plant, labour, materials and subcontractors to enable a calculation of the total cost for each in use work instruction.[27] In addition, it sought to establish a level of confidence of the planned preventative maintenance baseline costs for the service contracts.

The scope of the review by Parsons Brinkerhoff did not include an audit of SunWater's maintenance plans and work instructions to improve and optimise the preventative maintenance activities.[28] Consequently, the expenditure forecasts developed as part of the review reflect SunWater's current approach to preventative maintenance planning, rather than an improved and optimised program of work.

In undertaking the review, Parsons Brinkerhoff undertook detailed discussions with SunWater staff at each regional office to confirm details of the preventative maintenance activities undertaken, including the time required, the number of staff, frequency, opportunities to bundle work, and spare parts used. It also identified activities being undertaken for which work instructions did not exist.

Having identified all the servicing and condition monitoring activities undertaken at each scheme (together with frequencies), Parsons Brinkerhoff then forecast the expenditure required to undertake the required activities (broken down into labour, materials and contractors). It is these forecasts that SunWater has used as the basis for its forecast expenditure for servicing and condition monitoring. The forecast expenditure for the Biloela region represents a significant increase over SunWater's historical expenditure on preventative maintenance. In part, this is due to inaccuracies in recording of historical data.

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[25] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 4
[26] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010.
[27] Ibid, page 4.
[27] Ibid, page 1.
[28] In its report, Parsons Brinkerhoff has actually made a series of recommendations to improve the effectiveness of SunWater's current preventative maintenance practices.

The detailed review of the activities performed under each service contract identified a number of issues with historical cost data. These issues were identified by Parsons Brinkerhoff in its report, and include (but are not limited to) the following:[29]

- Incorrect booking of hours, or coding of work by maintenance and field staff, creating inaccuracies in the SAP PM information and historical costs;
- Operational work incorrectly coded to maintenance activities;
- Examples of information within SAP difficult to interpret and not reflecting actual activities taking place in the field;
- Many planned maintenance activities currently undertaken (approximately 60 percent) have no supporting work instructions. It was, however, noted that SunWater was taking steps to address the issue; and
- Inconsistencies between Hummingbird (SunWater's document management system) and SAP.

When questioned by Halcrow in relation to the above, SunWater indicated that these issues occurred due to a lack of discipline in interpreting the activity definitions correctly. SunWater sought to identify the errors via a review of the data sought, and it noted that adjustments have been made to scheme costs in the NSPs (ie. to remove the impact of incorrect bookings).

The above errors have meant that it is not easily possible to compare historical expenditure to SunWater's planned expenditure on servicing and condition monitoring, as the historical expenditure information does not accurately reflect the nature and volume of work undertaken.

Other issues raised by Parsons Brinkerhoff include the inconsistency in maintenance frequencies across regions for the same type of assets. In addition, it was noted that resource constraints may lead to significant portions of preventative maintenance work being delayed, deferred or not undertaken. It noted that, in some schemes, this helps to explain why the planned preventative maintenance activities exceed historical averages by region. In addition, it noted that, "*increases in planned maintenance expenditures both in condition monitoring and servicing activities can be related to the combined effects of the age and performance of SunWater's assets, incomplete preventative maintenance activities being undertaken and inaccurate preventative maintenance cost capture due to historical booking practices. This can reflect a view that historic* [sic] *preventative maintenance costs has been lower than would be required to complete the preventative maintenance program going forward to enable the entire preventative maintenance program to be completed.*"

Following its review, Parsons Brinkerhoff made a suite of recommendations to SunWater to improve the effectiveness of its preventative maintenance practices. These included (but are not limited to) a recommendation that SunWater undertake a detailed audit of its maintenance plans and work instructions, and associated labour activities and unit costs, including sub-contracted maintenance activities, to improve the rigour of the confidence assessment of the costing process. In addition, it recommended that SunWater undertake a review of maintenance activities undertaken by sub-contractors to improve efficiencies and

[29] Parsons Brinckerhoff, *Provision of services for costing SunWater's work instructions*, October 2010, page 11.

cost effectiveness, and that it bring forward its Reliability Centred Maintenance initiative to optimise preventative maintenance activities. While it is understood that SunWater intends to act on these recommendations, Halcrow notes that the forecast expenditure in the NSPs do not reflect any savings that might be achieved as a result of their implementation.

As part of this review, Halcrow undertook a review of a selection of the work orders, together with the cost estimates prepared by Parsons Brinkerhoff. Halcrow is generally satisfied that the expenditure forecast has been developed appropriately, taking into account the frequency and nature of the activities to be undertaken. The allowances for labour to undertake the activities appear appropriate, although it is noted that the labour rates used appear slightly lower than the wage rates agreed as part of SunWater's Enterprise Agreement.[30]

Halcrow has also sought to confirm that the maintenance activities costed by Parsons Brinkerhoff were consistent with the maintenance activities and frequencies identified in SunWater's facility Operation and Maintenance Manuals. For Fairbairn Dam, the maintenance activities costed were generally consistent with the maintenance schedules in the Operation and Maintenance Manual (dated 1 March 2006), although the Parsons Brinkerhoff review includes maintenance activities additional to those included in the Fairbairn Dam Operation and Maintenance Manual. This was also the case for the Kroombit Dam Operations and Maintenance Manual (draft, undated). Other facility Operation and Maintenance Manuals do not list the preventative maintenance schedules and work instructions to enable these to be cross checked against the work instructions costed by Parsons Brinkerhoff.

Halcrow is generally satisfied that the expenditure forecasts developed by Parsons Brinkerhoff are based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken. However, Halcrow notes that the forecast expenditure in the NSPs reflects SunWater's current approach to maintenance, which is yet to be optimised. Consequently, there is likely to be scope to achieve efficiency savings in the delivery of servicing and condition monitoring activities.

As part of this review, Halcrow sought to verify that the forecast condition monitoring and servicing costs in the NSPs reflected the detailed cost estimates prepared by Parsons Brinkerhoff. However, the forecast expenditure included within the NSPs is greater than that forecast by Parsons Brinkerhoff. SunWater indicated that "*the cost of condition monitoring and servicing includes more than what PB identified as additional activities are costed to these sub-activities. This can include additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves.*"[31] Halcrow notes that the forecast by Parsons Brinkerhoff includes activities associated with meter maintenance, mechanical inspections and pump maintenance. It is therefore unclear what the additional servicing and

[30] The rates appear between three to four percent lower than the average labour rates agreed as part of SunWater's Enterprise Agreement.
[31] SunWater email, *RE Preventative Maintenance*, 9 March 2011.

calibration activities relate to, or why they were excluded from the Parsons Brinkerhoff review.[32] As SunWater has not provided an explanation for how the expenditure forecast for these additional activities has been developed, Halcrow has been unable to make an assessment of the prudence and efficiency of this additional expenditure. It is recommended that expenditure forecasts be adjusted accordingly, unless SunWater can demonstrate the need for the additional activities.

While the breakdown of forecast preventative maintenance expenditure provided by SunWater is broken down by item (ie. into labour, materials, etc), it does not separately identify expenditure relating to servicing, condition monitoring and weed control; nor does it separately identify the expenditure forecast by Parsons Brinkerhoff. This has limited that ability of Halcrow to verify that the preventative maintenance forecasts included in the NSPs are based on the cost estimates prepared by Parsons Brinkerhoff, as these costs have been rolled up.

Additional discussion on the preventative maintenance activities on each scheme is included in **Section 4** to **Section 10**.

3.6.3.3 *Weed Control*

Weed control activities include chemical spraying and Acrolein injections undertaken to control weed growth, slashing, brush cutting and other mechanical means to remove weeds and algae. SunWater undertakes weed control activities on its channels and drains to ensure that it is able to deliver water orders and meet its customer service standards.

Historically, weed control has formed a significant element of preventative maintenance expenditure on SunWater's distribution schemes (ie. Theodore and Emerald), accounting for between 60 and 90 percent of annual expenditure on preventative maintenance. Expenditure on weed control activities at SunWater's bulk supply schemes has typically been lower, accounting for up to 34 percent of annual expenditure on preventative maintenance.

Weed control activities are performed in-house and via outsourced contracts. Outsourced activities typically include contract slashing, whereas specialist activities such as Acrolein injections and burning of drains are undertaken by SunWater staff.

During interviews with SunWater, it noted that expenditure forecasts of 'contractors weed control' are based on existing slashing contracts, or if subject to renewal, on expectations of what the likely contract rates will be. Contracts typically run for three years and they are market tested when due for renewal. SunWater provided copies of weed control contracts to Halcrow, demonstrating that market testing is undertaken.

SunWater currently uses the aquatic herbicide Acrolein for weed control in its channels, which it purchases from a supplier in the United States. It provided a

[32] The Parsons Brinkerhoff report only states that weed control activities were excluded from the scope of the review of preventative maintenance.

copy of an *Internal Position Paper - Acrolein*, dated 30 July 2010, which details its approach to forecasting Acrolein usage in its channel systems for the coming price path period.

In its position paper, SunWater has noted that the risk of withdrawal of this aquatic herbicide from the Australian market is considerable. However, investigations (coordinated by Irrigation Australia Limited) are currently underway to identify whether an alternative supplier can be found in China. SunWater has noted that the price is likely to be lower than that currently paid.

SunWater noted that for its last order in 2010, it paid approximately $6,000 for a 200L cylinder of Acrolein. It provided documentation from its US supplier indicating that the cost of the product is to reduce by approximately 15 percent.[33] However, this reduction is not reflected in SunWater's forecast of chemicals.

SunWater has noted that the cost of Acrolein has been volatile over the period 2005 to 2009. While it expects variation in the price of the chemical to be considerable, in the absence of justification it has noted that only CPI should be used.[34] Halcrow supports this approach but notes that in its NSPs, SunWater has proposed that materials should be escalated by four percent per annum in nominal terms (refer to **Section 3.9.3**). This approach is contrary to that adopted its *Internal Position Paper – Acrolein*; adjustments to the forecast expenditure are proposed accordingly.

Specific detail in relation to the forecast of preventive maintenance for each of the Biloela schemes is included in **Section 4** to **Section 10**.

3.6.4 Corrective maintenance

SunWater defines corrective maintenance as, "*unplanned maintenance work that arises from either a failure of infrastructure assets or an incident associated with infrastructure assets*". Emergency breakdown maintenance "*refers to critical maintenance activities that are unplanned and have to be carried out immediately on a failed asset to restore normal operating of the asset or to rectify a safety hazard*".[35]

Expenditure on corrective maintenance included within the NSPs relates to unplanned maintenance work, including emergency breakdowns maintenance.

SunWater has not prepared a background paper detailing its methodology for forecasting corrective maintenance, however, during interviews SunWater explained that forecasts of corrective maintenance were developed by reviewing the last four years of data (including 2011) and excluding the impact of what it has termed 'outlier years'. As noted in **Section 3.6.1**, SunWater has not documented the key assumptions made when excluding 'outliers'. This has made the review of expenditure difficult, as Halcrow has been unable to verify SunWater's calculations.

[33] Letter from US supplier dated 10 May, 2010.
[34] Halcrow has verified that the forecast expenditure on Acrolein does not include an increase beyond inflation over the period 2012 to 2016 (note, only verified for distribution schemes).
[35] SunWater, *Asset Refurbishment Planning: Methodology for Condition Assessments of Assets,* page 5.

Halcrow notes that it is very difficult to accurately forecast corrective maintenance expenditure. SunWater's approach, which uses historical expenditure to forecast expenditure, is commonly adopted by water utilities. This is an appropriate methodology for forecasting expenditure, however, it is noted that SunWater has proposed a significant increase in preventative maintenance expenditure over the coming price path period. Halcrow notes that increases in preventative maintenance activities should ultimately result in a reduction in corrective maintenance, as asset reliability increases. In general, SunWater has forecast a reduction in corrective maintenance expenditure as compared to current levels. However, from the information available to this review, it has to been possible to determine whether the proposed expenditure is efficient.

It is commonly accepted that there is an optimum mix of preventative and corrective maintenance. The optimum mix represents the most economical combination of preventative and corrective maintenance activities to achieve a desired set of outcomes. Halcrow notes that the scope of the review undertaken by Parsons Brinckerhoff excluded the review of corrective maintenance practices and associated costs to ascertain whether the balance of preventative and corrective maintenance is at an optimum level.[36]

During discussions with SunWater, it indicated its intentions to move to a Reliability Centred Maintenance approach (RCM). RCM is a risk based process that can assist in providing the optimal mix of preventative and corrective maintenance. While Halcrow notes SunWater's intentions to move to a RCM approach, its forecast expenditures do not reflect this approach; an overall reduction in maintenance costs would be expected. Consequently, there is likely to be some scope for SunWater to optimise its proposed corrective and preventative maintenance programs, although the extent of these savings is currently unclear.

3.6.5 Electricity

SunWater's background paper on *Electricity costs*[37] provides an overview of its methodology for forecasting electricity expenditure over the coming price path. It outlines the approach for forecasting electricity expenditure for bulk water supply schemes with off-lines storages and for distribution systems.

SunWater's approach to forecasting electricity differs between schemes, and the base data used to develop forecasts also varies. For some schemes (such as Dawson Valley Bulk Water Supply Scheme), the forecast expenditure has been calculated from historical (actual) expenditure reported within SAP, SunWater's financial system. For other schemes (such as the Emerald and Theodore Distribution Systems), forecasts are based on data directly extracted from invoices from SunWater's electricity supplier. It is noted that the two data sets are slightly different, primarily due to the impact of accrual, credit notes, and timing in the SAP data. However, a review of the two data sets indicates that these differences are not material for the Cluster 3 schemes.

[36] Parsons Brinkerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 6.
[37] SunWater, *Background paper QCA review of irrigation prices – Electricity costs*, February 2010.

For its distribution systems (including Emerald and Theodore) forecasts of electricity have been estimated from historical data, using an average cost per volume of water delivered to customers. The average cost is derived from historical electricity costs (taken from electricity invoices) for all pumping stations in the scheme divided by historical metered deliveries (sourced from SunWater's SWIMS billing database). The period over which historical data has been used to develop an average cost varies depending on the scheme. The average cost has been inflated by 13.29 percent, which is the increase in Franchise Tariffs between 2009/10 to 2010/11. SunWater has not included any increases in tariffs above inflation beyond 2011/12.

Based on the information provided to this review, Halcrow is satisfied that the use of a flow driver to forecast electricity expenditure in distribution schemes is appropriate where electricity usage is driven by the requirement to pump when delivering water. Using volume of water delivered to customers (as opposed to pumped volume) automatically takes into account the impact of losses within distribution channels, pumping efficiency, and flow and electricity metering accuracy, thereby eliminating the need to make assumptions about these into the future.

Specific detail in relation to the forecast of electricity for the Emerald and Theodore distribution schemes is provided in **Section 5.2.5** and **Section 8.2.5**.

For bulk water supply schemes with off-line storages (such as the Dawson Valley), SunWater has noted that electricity costs are not driven by customer demand. For schemes with off-stream storages, water is pumped during defined streamflow events, with the rules for pumping and releasing water contained in ROPs. SunWater has based its forecast on the expected 'average' expenditure in the period. This has been calculated as the average of three years of historical data, inflated by 13.29 percent to account for the increase in Franchise Tariffs.

Specific detail in relation to the forecast of electricity for Dawson Valley Water Supply Scheme schemes is provided in **Section 7.2.5**.

For bulk water supply schemes without off-line storages (such as Callide, Lower Fitzroy, Nogoa Mackenzie and Three Moon Creek), SunWater has based its forecast on actual expenditure in 2010, inflated by 13.29 percent to account for the increase in Franchise Tariffs between 2009/10 to 2010/11. This method assumes that electricity usage will remain in line with that of 2010. Electricity use in these schemes is typically stable year on year, and not material when compared to other elements of operating expenditure.

During interviews with SunWater, Halcrow sought to understand the means by which SunWater has sought to optimise electricity expenditure. As evident in the above paragraphs, SunWater's forecasts of electricity have been developed on the basis that it will continue to procure energy from the Franchise market.

SunWater indicated that Franchise Tariffs are reviewed on an annual basis to ensure that individual sites are on the most appropriate tariff. In addition, in the

Background paper QCA review of irrigation prices – electricity costs, SunWater has noted that it periodically assesses the merits of moving from the franchise tariffs to the contestable electricity market to ensure the costs of electricity are minimised. SunWater has argued that the variable nature of power usage associated with the supply of irrigation water means that it is not feasible to purchase electricity from the contestable market. While Halcrow accepts that this is likely to be the case, these periodic assessments do not appear to be documented.

In terms of reducing electricity usage, SunWater noted that its ability to control pumping during peak and off-peak periods is limited. This is primarily due to limited storage volumes, and the requirement to provide water to irrigators irrespective of whether it is during peak or off-peak periods. Halcrow notes, however, that SunWater has not historically sought to optimise pumping regimes, which indicates that there may be scope to reduce electricity costs in the future. This is likely to have an impact on distribution schemes (Emerald and Theodore), which typically incur greater expenditure on electricity than the bulk supply schemes. Halcrow is aware that SunWater has recently gone to market to identify a consultant to advise it on optimising its pumping regime.[38]

In addition to the above, SunWater provided a copy of its *Energy Management Program Plan* (dated October 2010). The document notes that SunWater is seeking to increase its pumping energy efficiency through development and implementation of a portfolio energy management plan. The document identifies 107 specific opportunities for energy savings to be achieved covering individual schemes as well as organisation wide initiatives. A review of the Energy Management Program Plan does not reveal specific initiatives for the Biloela schemes.

The document also notes that SunWater's Board has set a target to improve energy efficiency by one percent per annum for each of the next five years. However, during interviews with SunWater, it agreed that it would be very difficult to measure savings of one percent given the relative accuracy of electricity and flow meters. Halcrow understands that the savings have not been incorporated into forecast expenditures.

3.6.6 Labour

Labour is budgeted on an Activity Basis (ie. Operations, Preventative Maintenance, Corrective Maintenance, and Renewals and Rehabilitations).

In the paper, *Service Delivery Strategies,* SunWater has provided an overview of its workforce strategy, which includes:

- a base workload of core activities carried out by permanent staff, supplemented with temporary casual and contracted staff to meet peak workloads;
- multi-skilling of staff in key field positions (operators are trained to carry out operational activities as well as a range of maintenance activities);

[38] SunWater, *Tender No. 10SW3795 Consultancy Services for the Provision of Energy Efficiency Opportunities Assessments for SunWater's Pump Stations.* Closing date 18 January 2011.

- outsourcing of non-core activities (slashing and mowing, weed and pest control etc); and
- external procurement of large capital works.

Halcrow notes that the use of outsourcing and short term contracts is an appropriate and cost effective means of dealing with short term shortfalls in resources.

Labour expenditure is charged to distribution and bulk supply schemes either directly or indirectly. Direct labour is provided by both regional resource pools, and centralised resource pools (such as Asset Management), and time is charged directly to each scheme via a 'service contract'. Indirect labour is allocated as part of the indirect allocation, and is the subject of a separate review.

There are two regions that provide direct labour to the Biloela schemes. They are the Central Resource Region (servicing Theodore Distribution System, and the Dawson, Callide Valley, Three Moon Creek and Lower Fitzroy Bulk Water Supply Schemes), and the North Resource Region (servicing Nogoa Mackenzie Bulk Water Supply Scheme and Emerald Distribution System).

All staff within SunWater complete timesheets, and all direct labour is charged via the timesheet system. Staff working on a particular asset are able to book time to that asset, or if working within a specific channel, time can be booked to that channel. In this way, labour expenditure is directly attributed to the relevant bulk supply or distribution scheme (service contract).

SunWater noted that historically there have been issues with incorrect timesheet bookings (ie. miscoding of work). This issue was also identified by Parsons Brinkerhoff in its review of preventative maintenance activities (refer **Section 3.6.3.2**). As historical expenditure has been used as the basis for forecast labour expenditure into the future, it is likely that incorrect booking of time will have had an impact on the accuracy of SunWater's forecasts. However, without undertaking a detailed review of historical time bookings, it is not possible to say what the impact of this might be on forecasts of expenditure.

In reviewing forecasts of labour expenditure, Halcrow requested that SunWater provide details of how labour costs were built up, together with an overview of its budgeting/workforce planning processes. In addition, Halcrow requested that SunWater provide a breakdown of the labour expenditure budgets for each of the Biloela schemes, however, this was not provided. Consequently, it has not been possible to review the estimates of labour included in the NSPs in any detail. SunWater did, however, provide a high level overview of its forecasting method.

In estimating labour expenditure associated with maintenance activities, SunWater indicated that its forecast is based on the following key assumptions:[39]

- SunWater's existing FTE (full time equivalent) resource pool will remain unchanged over the price path period.

[39] Based on SunWater email 'Re: Labour Utilisation Rates', dated 5 April 2011.

- SunWater has assumed the 'available days' in any given year by excluding weekends, public holidays, annual leave and allowance for sick leave.
- 'Available hours' (or 'capacity') is calculated taking into account the hours worked each day (some staff work a 7.25 hours day, whereas others work a 7.6 hour day).
- SunWater applied a utilisation ratio to the estimate of 'available hours.' Applying a utilisation ratio excludes labour costs associated with training and administrative time. This is the time available to be billed directly to schemes or to indirect activities.
- SunWater then applied a ratio of 'billable hours', which excludes labour costs associated with indirect activities. This is the time available to be billed to specific schemes. The billing target for SunWater is 68 percent although this varies for different staff.[40] For example, for its Asset Management team, the ratio adopted was 80 percent; for operations staff, the ratio is well over 90 percent. Time is booked via 'service contracts' to each bulk water supply scheme and distribution scheme.
- SunWater has used the Enterprise Agreement (EA) rates for forecasting increases in labour expenditure. Where more than one rate for a position exists, SunWater indicated that it took the average wage rate. Halcrow has been provided with a copy of the EA and of the wage rates. While it has not been possible to confirm the calculations of average wage rates from the information provided to this review, Halcrow has reviewed extracts of SunWater's resource forecasting tool, and confirmed that it uses average wage rates to develop labour expenditure forecasts.
- Statutory on-costs covering leave loading, superannuation, long service levy, payroll tax and workers compensation have been applied at 22 percent.

SunWater noted that it charges a profit on labour expenditure for its commercial contracts, however, profit is not charged in irrigation areas. Halcrow has reviewed extracts of SunWater's resource planning tool, used to develop labour forecasts, and confirms that profit has not been charged to irrigation schemes.

Where work is undertaken on an asset that has a dual industrial/irrigation use, SunWater indicated that costs are split by its cost allocation method (refer **Section 3.6.8**).

SunWater noted that it is implementing KPIs for utilisation and billable hours to better track and optimise its productivity. This should enable it to achieve savings in labour expenditure in the future, by enabling it to better target areas of the organisation that are not fully utilised.

Halcrow notes that as part of the 2005/06 SunWater Irrigation Price Review, Indec Consulting undertook a review to identify efficiency savings. It identified potential savings of $32 million over the price path period (approximately $6.5 million per year). These savings were factored into SunWater's assessment of efficient lower bound costs.

[40] SunWater, *Service Delivery Paper (Production #1030213)*, undated.

Following on from the 2005/06 pricing review, SunWater undertook an organisational review (*Smarter Lighter Faster* review (SLFI))[41] with the aim of identifying and implementing efficiencies. SunWater noted that as part of the SLFI review it has identified $10 million in savings, primarily through the centralisation of services. As part of the review, SunWater consolidated its regions from six to four, and reorganised the delivery of work within the regions. In addition, it indicated that it has cut the number of staff undertaking administrative roles (eg. customer service) in the regions. It indicated that across the organisation, 102 positions (out of 600) have been made redundant, with the last six positions terminating in June 2011. SunWater has noted that the NSPs contain all of the savings identified as part of the SLFI review.

The next phase of the SLFI review will target travel time and staff absences in an attempt to optimise these expenditure items.

3.6.7 Drainage costs

Operating costs associated with drainage are captured within the distribution system operating expenditure. These costs are not forecast separately, but are captured within the forecasts of operations, preventative maintenance and corrective maintenance outlined in the above sections.

Historical and forecast drainage costs for the Emerald Distribution System have been identified in **Section 3.6.7** of this report. At the time of writing, information requested from SunWater in respect of drainage costs associated with the Theodore Distribution System remained outstanding.

3.6.8 Allocation of operating expenditure

3.6.8.1 Cost Allocation to Schemes and Scheme Segments

SunWater raises work orders in SAP Works Management System (WMS) for all work undertaken at a scheme level, including operational activities, preventative and corrective maintenance, and renewals activities.

Within SAP, each service contract (eg. Nogoa Mackenzie Bulk Water Supply Scheme), system and facility is divided into a structure of reference points (functional locations), each with a unique identifier or reference code.[42] SAP uses a hierarchy established within the functional location structure (parent - child) to sort and collate information and costs. These reference codes typically are used to identify assets (eg. an outlet to a dam) or groups of assets (eg. Fairbairn Dam) for the purposes of asset and maintenance management.

Work orders must be raised at functional locations, which ensures that all expenditure (labour, materials, plant etc) is directly allocated to the location in which it is incurred. In this way, the allocation of costs to schemes and scheme segments occurs automatically.

[41] The SLFI Review was an internal review conducted by SunWater during the period August to October 2009; the aim of the review was to develop business models/strategies (in support of the various elements of its business) which would enable it to meet the vision of becoming "*A modern, Customer focused water utility business providing outstanding solutions for our customers and the community*".
[42] SunWater, *A guide to SAP PM Asset Hierarchy Development*, 20 January 2009.

Functional locations are also used to allocate expenditure between bulk water and distribution schemes. Assets associated with distribution schemes are identifiable by their identifier/reference code.

As part of the second round of consultation, stakeholders queried whether compliance costs of distribution are recovered in the bulk charges and whether distribution customers are paying for compliance twice.[43]

SunWater has noted that compliance costs may be charged to a scheme either directly or indirectly. Direct compliance costs such as data collection, water sampling and notifications are charged against operations in each service contract. Compliance costs such as dam safety and water accounting are treated as indirect costs, the review and allocation of which do not form part of the scope of Halcrow's review. However, SunWater has explained that there is no double counting of compliance costs, stating that "*there are considerable indirect costs associated with compliance eg. water accounting and dam safety. Compliance costs like dam safety and water accounting are not assigned to distribution service contracts – they only hit bulk water service contracts. Thus water accounting compliance costs are not charged to distribution service contracts, but distribution customers will pay their share via their bulk water charge.*"[44]

3.6.8.2 Cost Allocation to Customers

In its NSP, SunWater has proposed that operating costs (net of revenue offsets) be allocated to medium priority water access entitlements (WAE) proportional to total WAE in the scheme.

Halcrow has examined the cost allocation methodology adopted by SunWater. This examination has considered both the methodology adopted by SunWater and the calculations to generate specific values for each scheme. In undertaking the review of cost allocation to schemes and customers, Halcrow considered information presented in the following submissions prepared by SunWater:

- *Review of irrigation prices. Pricing principles and tariff structures, SunWater submission* (January 2011);
- *QCA review of irrigation prices, Supplementary submission, Bulk water price differentiation* (February 2011); and
- *Background paper, QCA review of irrigation prices, Centralised costs* (January 2011).

The approach for the 2011 to 2016 regulatory period differs from the previous five-year period. In the earlier period, capital and operating costs were assigned on a medium priority-equivalent WAE for each scheme in its entirety. This meant that medium priority WAEs were assigned a lower proportion of both capital and operating costs than high priority using converted nominal allocation (CNA) factors.[45]

SunWater considered the CNA approach is overly simplistic and not reflective of cost differentials in servicing different priority level WAEs. Consequently this has

[43] C&R Consulting, *Summary of NSPs Sunwater Pricing*, 28 January 2011, page 1.
[44] SunWater, *Cost data*, email dated 27 May 2011.
[45] Halcrow understands that the Tier 1 Working Group recommended that the CNA approach be reviewed.

been reviewed by SunWater, and a revised approach has been proposed for the forward regulatory period.

SunWater has a defined methodology for allocating costs to assets and activities, which it considers important because its operations go beyond bulk water and distribution. Cost allocation is based on a three-tiered approach to causality. This is shown in **Table 3-4** together with Halcrow's comments.

Table 3-4 Cost Allocation

Cost Tier	SunWater Description	Halcrow Comment
Direct costs	Direct time and expenses incurred in benefiting an asset or activity.	Approach considered appropriate provided financial management system can produce direct time and expense reporting.
Indirect costs	Attributable to an activity or asset but difficult to establish a direct causal link, allocated on the basis of total labour costs for each activity.	Cost allocation on the basis of labour implicitly assumes fixed factor proportions across the range of relevant activities. The allocation is subject to a separate review and is excluded from the scope of this review.
Overhead costs	No direct causal link with specific assets or activities. Allocated on the basis of total labour costs for each activity.	Using proportion of total labour costs as a basis for allocation of overhead costs assumes a fixed labour proportion of total costs attributable to each asset or activity. The allocation is subject to a separate review and is excluded from the scope of this review.

SunWater contends that operating costs for bulk water schemes are mainly driven by compliance and, to a lesser extent, service provision. In SunWater's view, overall there is no need for tariffs to assign a higher proportion of operating costs to high priority WAEs. The following examples highlight SunWater's view:

- Incremental cost of releasing water from storages is negligible (with the exception of some pumping costs that would otherwise be recovered).
- Customer water accounts are managed in the same way regardless of water priority.
- Resource Operational Licenses require water is accounted for quarterly regardless of availability or mix of priority WAEs in each scheme.
- Routine dam safety inspections are asset specific irrespective of the composition of priorities attached to WAEs.
- Environmental, land and workplace health and safety actions bear no relationship to the priority or type mix of WAEs.

- Corporate costs, including financial reporting and tax obligations, are unrelated to the type or mix of WAEs held at water supply schemes.

SunWater's summary of the relevant operating expenditure elements is reproduced in **Table 3-5** Halcrow's view on whether each individual element is likely to vary according to the mix or type of WAE is reflected in the final column.

Table 3-5 Cost Allocation of operating expenditure

Element	Item	Activity	Halcrow View
Service Provision	Water delivery	Releasing water to meet customer demand, and other license requirements, flow surveillance, metering etc.	Water release and licensing requirement costs not likely to vary according to WAE priority unless there are many releases that are specifically for high priority users. Agree on volume basis of apportioning this cost.
	Customer service and account management	Manage account transactions, billing, customer enquiries etc.	Overhead costs. The allocation is subject to a separate review and is excluded from the scope of this review.
Compliance	Resource operations licence (ROL)	Administer water sharing rules, water quality monitoring, flow and quality reporting, flow event management etc.	This is a compliance requirement independent of water priority. Agree on volume basis of apportioning this cost. In effect, customers using more of the resource pay a larger share of ROL cost pass through.
	Dam safety	Routine dam safety inspections and audits, regulatory reporting.	This is a compliance requirement independent of water priority. No cost differential discernable between priorities assigned to WAEs. Agree on volume basis of apportioning this cost. In effect, customers receiving more water from a dam pay a larger share of the dam safety cost pass through.
	Environmental management	Manage environmental risks, implement mitigation measures and reporting procedures (eg. fish death).	Environmental management issues independent of water priority in WAEs. Agree on volume basis of apportioning this cost.
	Land management	Weed and pest control, managing access and trespass, rates and land tax.	Land management independent of water priority in WAEs. Agree on volume basis of apportioning this cost.
	Workplace health and safety	Implement appropriate procedures / work practices. Conduct audits and reviews.	WHS issues relate to internal staff and operating processes. Unlikely to vary on the basis of different water priorities in WAEs. Agree on volume basis of apportioning this cost.
	Financial reporting and taxation	Comply with statutory reporting requirements, tax reporting, GST compliance, debt management etc.	Overhead costs. The allocation is subject to a separate review and is excluded from the scope of this review.
Other	Corporate	Human resource management, procurement, legal services, CEO and board, IT etc.	Overhead costs. The allocation is subject to a separate review and is excluded from the scope of this review.

While expenditure on electricity is not specifically identified in **Table 3-5**, it is likely to fall under 'Water delivery'. Usage of electricity is unlikely to vary on the basis of different water priorities in WAEs. Consequently, allocation of electricity

on the basis of WAE appears appropriate. The exception to this is where electricity is incurred as part of recreational costs.

Of the Biloela schemes, SunWater incurs expenditure associated with recreational facilities at Nogoa-Mackenzie and Callide Valley. This expenditure is allocated on the basis of WAE. Specific comments in relation to the allocation of recreational expenditure are included within **Section 4.2.6** and **Section 9.2.6**.

3.6.8.3 Use of Channel and Bulk Assets by Different Customer Groups

As part of the second round of customer consultation, clarification was sought as to whether any channel assets are being used by bulk customers. In addition clarification was sought as to whether any bulk assets are used only by bulk customers. In both cases, the QCA requested that the costs associated with these assets be identified.[46]

SunWater has confirmed that, "*for the Biloela schemes there are no circumstances where channel assets are used to supplement river deliveries. Such occurrences occur in Bundaberg, Lower Mary, Mareeba and Burdekin where channel pumps stations move water from one river to another, but this does not occur in the Dawson or Emerald channel systems.*

There are no commercial or industrial customers supplied for the channel assets in the Biloela schemes. All commercial and industrial customers are supplies from the bulk supply."[47]

A request to SunWater in respect of whether any bulk assets are used only by bulk customers remains outstanding at the time of writing.

3.7 Operating Expenditure and Water Usage

SunWater has stated in each of its NSPs for the Biloela schemes that "*all costs are fixed, regardless of the volume taken.*" While Halcrow accepts that some operating costs will remain fixed irrespective of water usage within a scheme, it is likely that some elements of operating expenditure will vary in accordance with water usage.

Halcrow notes that during periods of low usage, scheme management costs will be lower than during periods of high usage (ie. full allocation). During interviews with SunWater, it noted that during periods of lower allocation operations staff focus on delivering maintenance activities. In this way, it noted that its labour costs tend to be fixed, irrespective of water use.

For the purposes of assessing the impact of water use on operating expenditure, Halcrow has graphed operating expenditure against water usage (measured as the percentage of WAE used). Labour expenditure against water usage has also been graphed. The results of the analysis are presented in **Appendix B**.

Although the rates of change are not consistent from year to year, the analysis clearly indicates that there is a link between operating costs and scheme water

[46] QCA, *'Deep diving issues v2(380342_1)'*, 19 April 2011.
[47] SunWater, Request for Information by Halcrow 9 May 2011 (word document '*doc#1079292-Information Halcro.doc*'), 31 May 2011.

usage, and between labour expenditure and water usage. This is the case for each scheme in the Biloela cluster.

3.8 Development of Renewals Expenditure Forecasts

3.8.1 Overview

SunWater defines refurbishment (renewals) works as those:

(a) Intended to maintain the ongoing performance and service capacity of Physical assets as close as possible to the original design standards; and

(b) Cyclical in nature with a typical interval of greater than 12 months.[48]

A discussion of SunWater's approach to renewals planning is included in **Section 3.5.3**.

SunWater's forecast renewals expenditure has been derived in two ways.

For renewals projects scheduled for the next twelve months (ie. 2012), the forecast expenditure is based on planning estimates developed as part of the preparation of planning orders. Once these planning orders have been approved by the Board, they become part of the annual budget.

For renewals projects scheduled for beyond 2012, the forecast expenditure is based on replacement values of the assets. The replacement values for each asset are recorded in the 'bill of materials' for each facility (eg. dam, channel, etc) within SAP. The bill of materials breaks down each asset by material (or component) and unit rate. The bill of materials for each asset was created by consultants during a review undertaken in 1997. For assets acquired after 1997, the bill of materials is based on actual costs.

The replacement value of the assets (as recorded in the 'bill of materials') was last updated in 2008, when an asset revaluation was undertaken. As noted by SunWater in its paper, *Bulk water asset revaluation*,[49] as part of the asset revaluation it engaged consultants to update the schedule of rates and geographical load factors for Burdekin Falls and Fairbairn Dams, as it was thought that they provided a reasonably representative spread of materials across all storages. The rates were then applied across all relevant storages with adjustments for geographical factors.

It is noted that the forecast renewals and rehabilitation expenditure for projects estimated from the bill of materials is likely to change once more detailed planning has been undertaken. Also, the expenditure is likely to vary in cases where SunWater ultimately decides to defer or bring forward the expenditure (on the basis of condition or risk), or where it makes a change to the type or mix of assets. Consequently, SunWater's forecast of renewals and rehabilitation expenditure is indicative rather than a definitive estimate of what projects and expenditure are likely to be incurred.

[48] SunWater, *Asset Refurbishment Planning Methodology for Condition Assessments of Assets* (Revision 1), 7 February 2007, page 4.
[49] SunWater, *Review of Irrigation Prices- Bulk water asset valuation*, October 2010, page 10.

3.8.2 Review of historical renewals expenditure

As part of this review, Halcrow sought to undertake a review of SunWater's historical renewals expenditure. The aim of the review was to understand the reasons behind any variations in planned and actual renewals and rehabilitation expenditure. This information is useful in informing the assessment of SunWater's forecast renewals program in that it provides an insight into its ability to plan, manage and deliver work programs to time and budget.

During interviews with SunWater, Halcrow requested a breakdown of the renewal projects and budgets that were planned at the beginning of the current price period (ie. 2007 to 2011). However, SunWater indicated that it was unable to provide the requested information as an itemised list of renewals projects. It noted that its, "*25 year program is developed based on standard lives, and standard work programs. It is not, and never will be a capital works program. The actual refurbishment work undertaken each year is based solely on the parameters of condition, risk, and service delivery requirements of the assets. Accordingly, the database is updated daily to reflect to current condition of the assets and the actual work required.*"[50]

Consequently, it has not been possible for Halcrow to review in any detail SunWater's historical (actual) renewals expenditure against the expenditure approved as part of the previous pricing review.

SunWater did, however, provide the Lower Bound Cost (LBC) target renewals expenditure for each scheme (at a headline level), agreed as part of the Tier 1 pricing review in 2005/06. In addition, it also provided a breakdown of historical renewals expenditure for all projects above $10,000 for the period 2007 to 2011 (until 15 February 2011). Halcrow made a number of selections from this list, and sought to understand reasons for variances between approved and actual expenditure.

Specific detail in relation to the review of historical preventive maintenance expenditure for each of the Biloela schemes is included in **Section 4** to **Section 10**.

3.8.3 Review of forecast renewals expenditure

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow sought to undertake a detailed review of a selection of forecast renewals projects. Projects were selected from the period 2012 to 2016, as well as from the period 2017 to 2036.

Halcrow sought the following information from SunWater in relation to each renewals project selected for review:

- the project scope and the driver for each project;
- the basis for expenditure forecast (unit rates, quantities etc). Where based on bill of materials, information detailing the value of the relevant item/asset was requested; and
- condition reports/asset management plans demonstrating the need for the renewals expenditure.

[50] SunWater, email dated 18 March 2011.

While SunWater sought to provide Halcrow with the requested information, very little detailed information on the scope, drivers, options assessed or cost estimates for the projects has been provided. This is because detailed planning is not currently undertaken until 12 months prior to the scheduled renewals date. Information provided by SunWater included printouts from SAP-WMS showing the most recent condition reports and risk assessments.

In the absence of detailed information on the renewals projects, where possible Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure. This has not been possible in all cases, due to insufficient information being provided.

In reviewing renewals expenditure, Halcrow has based its assessment on *direct* costs. The review of indirect and overhead costs is subject to separate assessment, and is excluded from the scope of this review. Halcrow notes, however, that it would typically expect indirect and overhead costs on renewal and enhancement works to be in the order of 15-20 percent, and it is on this basis that the efficiency of the forecast expenditure has been assessed.

Details of the review of selected projects are contained within the respective sections on each of the Biloela schemes (refer to **Section 4** to **Section 10**).

3.9 Cost Escalation

3.9.1 Overview

Halcrow has examined the cost forecasting assumptions presented by SunWater. This examination has considered both the approach and final adopted cost escalation rates applied by SunWater for the five-year forecast period.

SunWater has adopted the following cost escalation factors:

- Labour – 4 percent per annum until 2012, and 2.5 percent for 2013 to 2016 (ie. in line with its general inflation assumption); and
- Materials and contractors – 4 percent per annum.

These escalation factors have been applied in the development of both operating expenditure and renewals expenditure forecasts.

SunWater has prepared a document titled *Background Paper – Cost Forecasting Assumptions* (January 2011) that outlines its approach to cost escalation for labour, electricity and 'materials and contractors'.

It is noted PricewaterhouseCoopers (PwC) has prepared a paper, *Pricing Principles and Tariff Structures for SunWater's Water Supply Schemes*, dated September 2010 for the QCA. PwC highlights common methods of price escalation including:

- Consumer Price Index (CPI);
- Labour Price Index (LPI) and Wage Price Index (WPI);
- Producer Price Index (PPI);
- Composite indices; and

- Industry or commodity-specific indices.

PwC notes that in NSW,[51] ACT[52] and VIC[53] regulatory bodies use the Australia wide CPI to index annual tariffs.

The following paragraphs include a review of SunWater's cost escalation methods and factors used to project operating costs into the future, and compares the factors with industry benchmarks.

3.9.2 Labour

Table 3-6 provides an overview of SunWater's approach to cost escalation of labour over the price path period.

Table 3-6 Labour cost escalation

Treatment by SunWater	Halcrow Comments
SunWater's EBA has an allowance for wages to increase in nominal terms of 4 percent per annum until the completion of SunWater's current EBA in June 2012. SunWater state "after 2012 salaries and wages will rise in line with inflation".	SunWater has an EBA in place and has applied an appropriate cost escalator factor for 2012. Halcrow observes that there is no real increase in labour expenditure recorded for the price path 2013 to 2016. Labour accounts for approximately 29.7 percent ($2,079,000) of SunWater's Biloela Scheme combined operating expenditure budget ($7,001,000) for 2011. Over the price path Labour will represent 30% of the total opex budget in 2012 when the current Enterprise Agreement Bargain (EBA) is set to end in June 2012. From 2012 to 2016 Labour will account for 28.6% to 29.2% of the opex budget. Labour represents only the direct labour costs associated with operations, corrective and preventative maintenance activities.

Figure 3-1 shows the annual changes in Labour Price Index and CPI since 1999. In general, the annual growth in the Labour Price Index for the Electricity, Gas, Water and Waste Services Industry has been greater than the annual growth in the Labour Price Index for Queensland (for all industries). The Labour Price Index for the Electricity, Gas, Water and Waste Services Industry has tracked above four percent from 2006 until 2010, while the Labour Price Index for Queensland (for all industries) has typically ranged between three to four percent.

[51] IPART, *Review of prices for the Sydney Catchment Authority,* June 2009 Pg 10, IPART, Measuring inflation for industry price determination – Charge in calculation method. July 2009.
[52] Independent Competition and Regulatory Commission, *Final Report & Price Determination – Water & Wastewater Price Review,* April 2008. Pg 157
[53] Essential Services Commission, *Metropolitan Melbourne Water Price Review,* June 2009. Pg 32

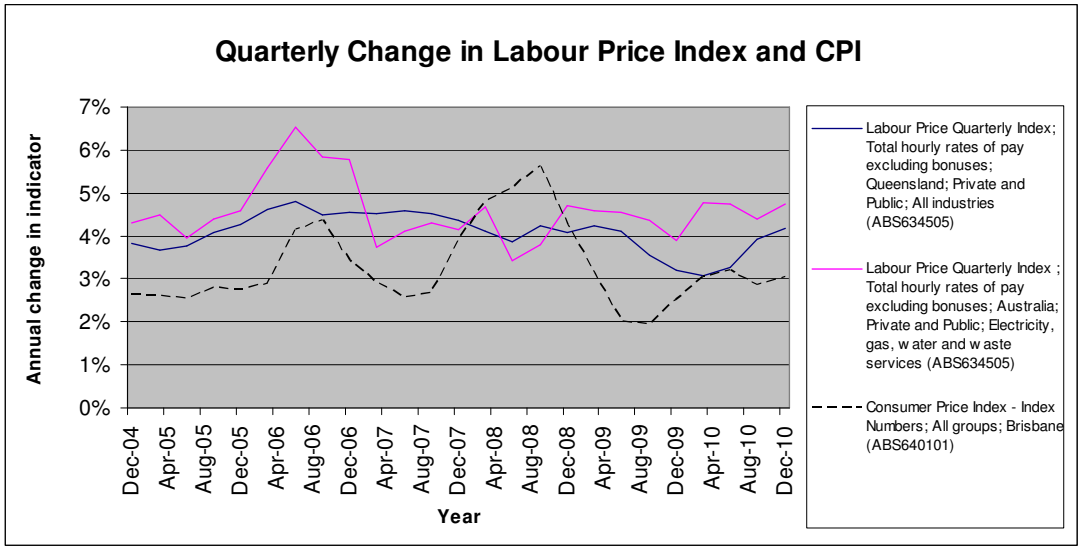


Figure 3-1 Annual Changes in Labour Price Index

Since 2007, the growth in the Labour Price Index for Queensland, and the growth in the Electricity, Gas, Water and Waste Services Industry Index have been trending downward. However, the annual changes in Labour Price Indices have remained above the 2.5 percent nominated by SunWater for the period 2013 to 2016. Furthermore, with the exception of 2008, the Labour Price Indices have typically trended above inflation (as measured by CPI). SunWater's assumption that labour rates will increase in line with inflation in the period 2013 to 2016 appears reasonable, and given historical trends, may actually understate actual movement in labour.

3.9.3 Materials and contractors

SunWater has prepared an attachment (Attachment 1) to its *Background Paper – Cost Forecasting Assumptions* that outlines its approach to justify a cost escalation of four percent per annum (nominal) for materials and contractors costs.

SunWater has drawn on two regulatory precedents to guide development of a rationale for a cost escalator other than the normally accepted CPI. **Table 3-7** provides an overview of SunWater's approach to cost escalation of materials and contractors over the price path period.

Table 3-7 Materials and Contractors cost escalation

SunWater Precedent Cited	Treatment by SunWater	Halcrow Comments
QR Network	SunWater states that "*the QCA has previously endorsed the application of a cost escalator other than the CPI*". In making this statement, SunWater has drawn on a decision made by the QCA for the QR Network: "*The Authority does not believe that the proposal to escalate costs by an index other than CPI is extraordinary*".	The QCA's decision for the QR Network is related to a cost escalation factor to be applied to rail infrastructure as opposed to a cost escalation factor for water infrastructure.
Gladstone Area Water Board (GAWB)	SunWater notes that the QCA rejected GAWB's proposal to use an alternate escalated operations maintenance and chemicals costs based on three year (2009-2009) historical averages. The QCA reasoned that "*more attention needed to be given to a more appropriate forward looking approach in determining the escalators for operations, maintenance and chemicals costs*".[54]	Halcrow recognises the difficulty in determining forward looking cost escalation factors as no price indexes directly relate to operations, maintenance and chemicals.

SunWater's justification of its adopted cost escalation factor for Contractors and Material is based on forecasts and historical data. In regard to forecast data, SunWater has drawn on cost forecasts for non-residential construction materials by CostWeb, which indicates that the downward trend in construction costs is coming to an end, but will continue for one to two more quarters.

SunWater has also provided annual compound growth rates for the indexes identified in **Table 3-8** in support of its proposal.

[54] Queensland Competition Authority, *Final Report: Gladstone Area Water Board – Investigation of Pricing Practices*, 2010, page 142.

Table 3-8 Indices for contractors and materials costs

SunWater Comparator Index	Australian and New Zealand Standard Industrial Classification (ANZSIC) Description
Building Construction	Not defined
Non-residential construction	This class consists of units mainly engaged in the construction of non-residential buildings such as hotels, motels, hostels, hospitals, prisons or other buildings, in carrying out alterations, additions or renovation to such buildings, or in organising or managing these activities.
Manufacturing Division	The Manufacturing Division includes units mainly engaged in the physical or chemical transformation of materials, substances or components into new products (except agriculture and construction). The materials, substances or components transformed by units in this division are raw materials that are products of agriculture, forestry, fishing and mining, or products of other manufacturing units.
Cement Products	Not defined
Machinery and equipment	Not defined

SunWater's justification for its adopted materials and contractor is primarily based on the Non-residential construction index. SunWater has also correlated construction indexes with the value of non-residential work approved but not yet commenced, and the value of non-residential work in the pipeline to find any correlation between datasets. SunWater states that, "*The strongest correlations are observed between the cost indexes and the value of non-residential work in the pipeline. The latter variable has demonstrated a continuing increasing trend over the past seven years and after a slowdown in 2009/10, it is anticipated that this will again occur from 2011 onwards, particularly in Queensland and Western Australia.*"[55]

Halcrow agrees there is some correlation, however, it is noted that there was a significant increase of non-residential work approved but not yet commenced and the value of non-residential work in the pipeline from 2008 to 2009 and this has since been trending downward. Growth in the non-residential construction index peaked in June 2004, one year before the value of non-residential work in the pipeline peaked in June 2005. Negative growth in the non-residential construction index peaked in June 2009, with growth of non-residential work in the pipeline becoming negative in June 2010.

[55] SunWater, *Background Paper – Cost Forecasting Assumptions*

As non-residential construction would typically involve unrelated activities to SunWater's normal operations, any correlation could therefore equally indicate continued negative growth.

Figure 3-2 is a five year historical plot of those Produce Price Indexes SunWater has quoted in its *Background Paper – Cost Forecasting Assumptions* (January 2011), which includes cement products (Brisbane), basic products, machinery and equipment, non-residential building construction in Queensland and manufacturing division.

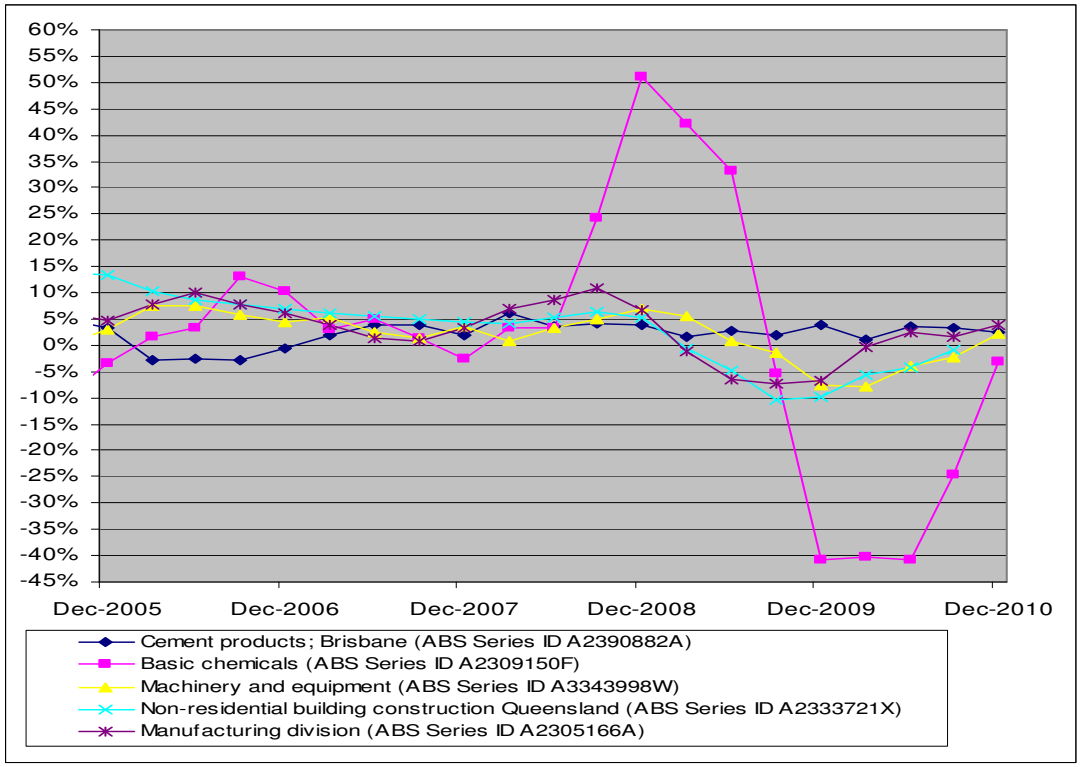


Figure 3-2 Five year historical plot of Produce Price Indexes

Assuming the QCA requires a more forward looking approach for determination of escalation factors for operations, maintenance and chemicals costs, based on the forecasting information presented alone, it is difficult to conclude that an escalation factor of greater than the normally accepted 2.5 percent should be applied.

3.10 Renewals Annuity Methodology

Halcrow has examined the renewals annuity figures presented by SunWater. This examination has considered both the methodology adopted by SunWater and the calculations to generate annual renewal annuity figures.

SunWater's methodology is set out in the document *QCA review of irrigation prices - Renewals annuity calculation – Internal Working Paper* (January 2011). SunWater

appears to have adopted a renewal annuity calculation methodology not dissimilar to that in SAHA's *Issues Paper on Renewals Annuity or a Regulatory Depreciation Allowance: SunWater's Water Supply Schemes, 2011-16 Price Paths* (September 2010).

Table 3-9 summarises the key elements in SunWater's methodology for calculating its renewals annuities. Halcrow's comments are set out against each element.

Table 3-9 Review of key elements of Renewals Methodology

Renewals Annuity Element	Treatment by SunWater	Halcrow comment
Renewals forecast period and period of renewals annuity	Forecast over a 25 year period to develop a 20-year annuity. SunWater previously used a 30-year renewals annuity period, applied through and beyond the regulatory period. Current renewal annuities are calculated on a rolling 20-year period, applied across the five-year regulatory period. Beyond 2016/17, real renewal annuities charges are the same as the year 5 regulatory calculation, but escalated by inflation.	Halcrow recognises the difficulty developing long term renewal expenditure forecasts. Shortening the renewals annuity calculation to a rolling 20-year period reduces risks associated with forecasting long-term renewal expenditure, where extreme out-year values may be very hard to estimate. Although not part of the five-year regulatory period, retention of the 2015/16 renewal annuity calculation for subsequent years does not actually calculate how the present value implications of large out-year expenditures affects the actual renewal annuity charge for those years.
Discount rate	A nominal Weighted Average Cost of Capital (WACC) of 12.11% was identified by SunWater. The corresponding real pre-tax WACC was 9.38%.	Correct application of the Fisher equation, given the assumption of the nominal pre-tax WACC and inflation assumption. The basis of the WACC calculation is not presented in either the Internal Working Paper or the Annual Financial Model. This could change depending on the inflation assumption.
Inflation assumption	2.5% per annum over the period of analysis.	SunWater's Financial Model has the flexibility to incorporate year-by-year inflation assumptions. It may be preferable to use forecasts released by RBA if available, then apply a 2.5% long-run inflation assumption for out-years. RBA has independently set interest rates to manage inflation since 1996. The average rate of inflation since then has been 2.5%.
Interest on balances	Applied at a pre-tax real rate of 9.38% in the model which is the real pre-tax WACC SunWater has calculated. However it is documented in the working paper as 9.689%.	The balance can either be positive or negative depending on the timing of actual renewal expenditures vis a vis annual annuity charges. The opportunity cost of positive balances should be reflected in the real, pre-tax WACC. Negative balances need to be financed external to external to the annuity charge. The cost of this may not necessarily be WACC unless SunWater receives additional financing. However, Halcrow considers this adds a level of financial complexity that would first require further detailed investigation.
Opening balances	The opening balances were not identified in the Internal Working Paper. Amounts were specified in the related Excel spreadsheet.	Opening balances were not justified in either the Internal Working Paper or the Excel spreadsheet. Opening balances have a critical influence on the level of renewal annuity charged during each year of the regulatory period. Positive balances tend to reduce the renewals amount sought, while negative balances increase the annuity requirement.

Halcrow also reviewed data provided by SunWater on the renewals schedule for the Biloela water supply schemes and distribution systems contained in the SunWater file '*Annuity charts - V610 03.xls*'. This spreadsheet also contains the remainder of the water supply and distribution systems operated by SunWater.

No dam safety upgrade expenditure is forecast to occur within the five year regulatory period for the Nogoa Mackenzie, Dawson Valley, Callide Valley, Three Moon Creek or Lower Fitzroy Water Supply Systems.

Halcrow notes that the opening balances set out in the Network Service Plans for these schemes differ from the opening balances from the financial model; **Table 3-10.** The following table highlights this.

Table 3-10 Comparison of NSP and Annual Financial Model Data

Scheme	Network Service Plan (NSP)	Annual Financial Model	Variance from NSP
Nogoa Mackenzie WSS	-$732,000	-$750,000	2.5%
Emerald DS	$466,000	$478,000	2.6%
Dawson Valley WSS	$1,582,000	$1,622,000	2.5%
Theodore DS	$2,340,000	$2,398,000	2.5%
Callide Valley WSS	-$561,000	-$575,000	2.5%
Three Moon Creek DS	-$289,000	-$296,000	2.4%
Lower Fitzroy WSS	$35,000	$36,000	2.9%
Total	**$2,841,000**	**$2,913,000**	**2.5%**

It appears that opening balances have been increased by approximately 2.5 percent between the NSP and the Annual Financial Model. It appears this has been escalated by the inflation assumption in SunWater's Annual Financial Model.

Halcrow notes that the financial model expresses opening balances in nominal terms in calculating the annuity. A 2.9 percent variance identified for Lower Fitzroy WSS may simply be due to rounding differences between the NSP and the financial model, as all numbers in the NSP are presented thousand dollars.

Halcrow also examined the present value of the closing balances of SunWater's notional annuity accounts for each of the above schemes, for each year in the regulatory period. These were expressed in nominal dollars by SunWater.

A present value calculation adopted the 12.113 percent nominal pre-tax WACC from the Annual Financial Model to discount a 20-year period from the start of each regulatory year in order to look at the closing balances through time. A zero balance typically indicates that the annual annuity charges over that period are sufficient to meet the renewal expenditures. A positive balance indicates potential

over recovery of renewal expenditure, while a negative balance indicates potential under recovery. This is based on a zero starting balance. Consequently, Halcrow also considered the opening annuity balances presented by SunWater in its Annual Financial Model.

The results of Halcrow's calculations, together with its comments regarding the appropriateness of the renewals annuity balance through time for each scheme is included in **Sections 4 to 10**.

3.11 Benchmarking

While it is noted that the effectiveness of benchmarking is often limited by the identification of suitable comparators, and the availability of sufficiently detailed and consistent data in the public domain, it is a tool which can be used to provide insight into the relative performance of an organisation.

Halcrow has undertaken a high level benchmarking analysis to compare SunWater's financial performance against a selection of comparator rural water service providers.

Identifying suitable comparators for the purposes of this review has been challenging due to the varying operating environments, regulatory approaches, history, geographies and climates, and water resource management issues in each jurisdiction. The benchmarking analysis has compared SunWater to State Water in NSW and Goulburn Murray Water and Southern Rural Water in Victoria.

The high-level benchmarking analysis has drawn upon the National Water Commission's *Performance Report for Rural Water Service Providers for 2008/09*. It is noted that the data provided by the rural water service providers is currently unaudited. Consequently, it is possible that costs have been treated differently by the different agencies. It for this reason that the benchmarking has been used for indicative purposes only, rather than in the assessment of efficiency.

The analysis was undertaken across the following performance indicators:

- Operating and maintenance expenditure as a percentage of current asset replacement cost; and
- Operating expenditure and maintenance expenditure as a percentage of long term annual supply expectation.

The findings of the benchmarking review are presented in **Appendix A**.

Halcrow notes that there are numerous factors which are likely to contribute to the performance of each utility in respect of each of the indictors. These include (but are not limited to) the nature, extent and age of the infrastructure, and differing levels of service standards.

The high-level benchmarking analysis undertaken has revealed the following:

- For the Bulk Water Supply (Regulated River) Schemes, the operations and maintenance costs per ML of water delivered in 2008/09 were broadly consistent with those of State Water, and less than those in other jurisdictions.
- For the Distribution (Gravity Irrigation) Systems, the operations and maintenance costs per ML delivered and kilometres of carrier were comparatively higher than other jurisdictions in 2008/09, particularly in the Dawson (Theodore) System.

To illustrate the limitation of these indicators, however, it is noted that the Dawson (Theodore) System incurs significant pumping (electricity) costs even though it is classified as a gravity irrigation system. This will distort its comparison with systems where no pumping is involved.

4 Nogoa Mackenzie

4.1 Scheme Description

4.1.1 Scheme overview

The Nogoa Mackenzie Bulk Water Supply Scheme (WSS) is located in the Fitzroy Basin, near the town of Emerald. It forms part of SunWater's Northern region.

The scheme has 351 bulk water customers of which 147 extract water from the distribution system. The scheme comprises 190,925 megalitres (ML) of medium priority Water Access Entitlement (WAE) and 44,398ML of high priority WAE.[56]

Water supplied by SunWater in the Nogoa Mackenzie WSS is used for:[57]

- agricultural irrigation of crops, primarily through the Emerald Distribution (Irrigation Supply) System;
- urban water supply to the towns of Emerald, Blackwater, Bluff, Tieri, Dysart and Middlemount;
- industrial mining operations; and
- customers holding irrigation or stock and domestic entitlements along the river system.

Key elements of the bulk supply scheme are:

- Fairbairn Dam;
- Selma Weir;
- Bedford Weir;
- Bingegang Weir; and
- Tartrus Weir.

The above infrastructure is regulated under SunWater's Resource Operating Licence (ROL) and is listed in the Fitzroy Basin Resource Operations Plan (ROP).

The Blackwater Pipeline services mining customers in the Blackwater area; this pipeline does not form part of the irrigation system.

A site visit was undertaken to the Nogoa/Mackenzie Bulk WSS and Emerald Distribution System on Tuesday and Wednesday, 8-9 March 2011. The principal focus of the visit was to meet with SunWater Operations staff and inspect key elements of the Scheme with a view to gaining an understanding of:

- the nature and extent of the scheme and its key components;
- the nature and extent of operations and maintenance activities undertaken in respect of the Scheme; and

[56] SunWater, *Nogoa Mackenzie Water Supply Scheme Network Service Plan,* page 14.
[57] SunWater (2011), Scheme Information http://sunwater.com.au/schemes accessed 24 February 2011.

- the nature and extent of proposed and recently completed (ie. during the previous price path period) renewals projects; and where possible to assess the need for the proposed renewals projects.

The following sections provide an overview of observations made and learning derived from the site visit to the Nogoa Mackenzie Bulk Supply Scheme.

4.1.2 Key scheme elements

4.1.2.1 Fairbairn Dam

Fairbairn Dam, originally known as Maraboon Dam, was constructed in 1972. It is of zoned earth and rockfill construction; it has a maximum height of approximately 46 metres and a length of approximately 820 metres.[58]

The impounded storage also has six (6) saddle dams having a combined length of 8.4 kilometres. The maximum length is approximately 6 kilometres (Saddle Dam 6) and heights vary up to a maximum of approximately 7 metres.

Fairbairn Dam has two separate outlets, one on each abutment. The Left Bank Outlet releases into the Selma Main Channel by means of an open channel system whilst the Right Bank Outlet releases into the Weemah Main Channel and the Nogoa River.

There is a recreational area at Fairbairn Dam which is operated and maintained by SunWater (refer **Section 4.2.6**).

SunWater has significant landholdings around the perimeter of the Fairbairn Dam storage. The majority of this land (some 14,700 hectares) is leased out to adjacent landholders, who are responsible for most maintenance activities (weed control, fence repair, etc). The additional cost associated with provision of security fencing (as opposed to normal farm fencing), where required, is borne by SunWater.

4.1.2.2 Weirs

As noted above, the Nogoa/Mackenzie WSS includes four (4) weir structures located at intervals along the Nogoa and Mackenzie Rivers.

Selma Weir

Constructed in 1952, Selma Weir is a mass concrete weir that stores 1180ML. It has an outlet with a 300mm valve which can discharge up to 35ML/day, however, this is too low to meet downstream demand. Consequently, the weir is kept full and supplies downstream requirements by overtopping.

Selma Weir was originally built to supply water for irrigation, but this function has been taken over by Fairbairn Dam. Selma Weir is now solely used as pump pool for the BMA owned Gregory Pipeline, which supplies the Gregory, Crinum, and Kestral coalmines.

[58] SunWater, *Nogoa-Mackenzie Water Supply Scheme; Fairbairn Dam – Operation and Maintenance Manual (Issue 2-1)*, November 2006.

Bedford Weir

Bedford Weir is a mass concrete weir of 22,900ML storage capacity; it was constructed in 1968 and augmented in 1997 with the installation of two Fabridams. The outlet consists of a 1200x1200mm conduit, controlled with a roller gate, which can discharge up to 890ML per day.

The weir's primary function is to provide water for the towns of Blackwater and Tieri as well as the Blackwater, Oakey Creek, South Blackwater and BMA pipelines; it also provides downstream river requirements down to the Bingegang Weir pond.

Bingegang Weir

Bingenang Weir is a mass concrete weir having a storage capacity of 8060ML; it was constructed in 1976 and subsequently raised in 1998. The weir outlet consists of a 1200x1200mm conduit, controlled by a roller gate, which can discharge 690ML per day.

The Weir provides water for the towns of Dysart and Middlemount, the Saraji pipeline and river requirements downstream to Tartrus Weir.

Tartrus Weir

Tartrus Weir is the most downstream structure in the Nogoa/Mackenzie WSS. It's primary function is to provide water for irrigation use. It is also used to control downstream releases; there is a regulated flow responsibility at Springton Creek.

4.1.3 Scheme management

The Nogoa/Mackenzie Bulk WSS and the Emerald (Irrigation) Distribution System are serviced by a team of 12 staff located at Emerald, as follows:

- Service Manager;
- 2No Supervisors;
- an Electrician; and
- 8No Operators.

Administrative support is provided by North Region staff, including:

- Area Operations Manager;
- 5No Technical Officers and Schedulers; and
- 2No Administration staff.

In addition to the Nogoa/Mackenzie (Bulk) and Emerald (Irrigation Distribution) Schemes, the North Region includes the Bowen River (Bulk), Pioneer (Bulk), Eton (Bulk) and Eton (Irrigation Distribution) Schemes. Other schemes are serviced from depots located in Moranbah, Collinsville and Mackay.

SunWater has advised (and shown on a diagram of the North Region Organisation Structure) that the operational staff identified above are not engaged on operation of the Blackwater Pipeline System.

SunWater also advised that the recent restructure had resulted in a reduction of 6No staff located at Emerald. This included the loss of 3No reception staff responsible for recording water orders and customer interfacing, a mechanical fitter and 2No operational staff.

4.2 Operating Expenditure

4.2.1 Overview

SunWater historical operating expenditure for the Nogoa Mackenzie Bulk WSS has significantly increased from $2,046,000 in 2007 to $2,773,000 in 2010. Expenditure in 2011 is budgeted at $2,103,000, and is forecast to remain relatively steady in the period to 2016. A breakdown of operating expenditure by Activity and Type is provided in **Figure 4-1** and **Figure 4-2**.

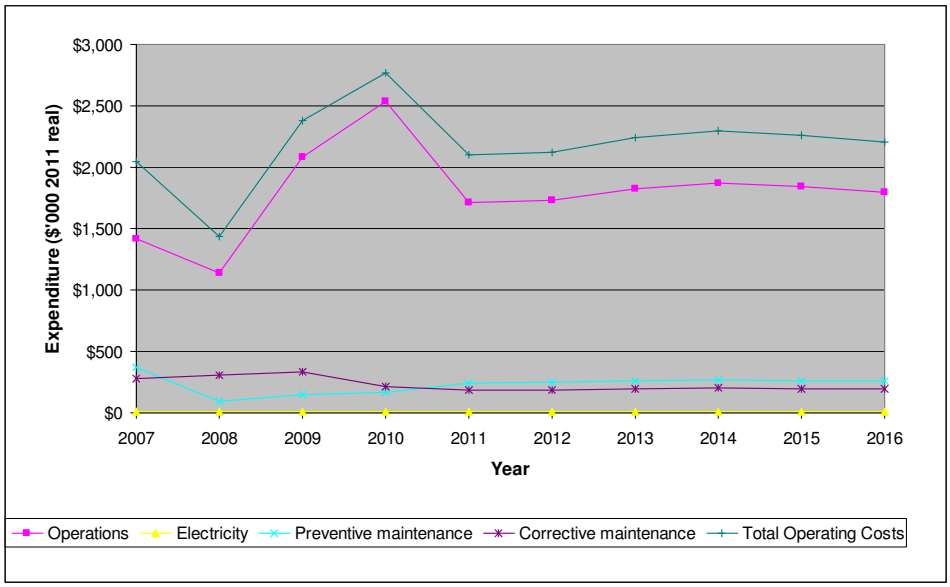


Figure 4-1 Operating Expenditure by Activity for Nogoa Mackenzie

As evident from **Figure 4-1**, expenditure on 'Operations' accounts for the majority of operating expenditure. In 2007 it accounted for approximately 69 percent of total operating costs, increasing to 92 percent in 2010. SunWater's forecast indicates that 'Operations' will account for between 81 and 82 percent of operating expenditure over the period 2012 to 2016.

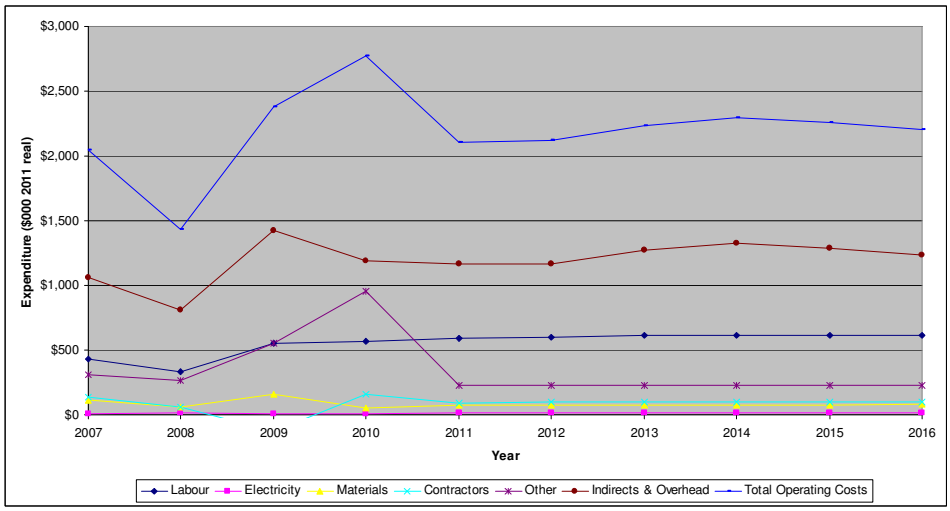


Figure 4-2 Operating Expenditure by Type for Nogoa Mackenzie

'Indirects & Overhead' expenditure, which is excluded from the scope of this review, represents the largest component of operating costs (by Type). Labour and 'Other' are the most significant components of direct expenditure. As evident from **Figure 4-2**, excluding the impact of 'Indirects & Overhead' expenditure, SunWater's forecast operating expenditure is relatively stable in the period to 2016, although it is greater than the expenditure in 2007.

Table 4-1 includes a breakdown of historical and proposed operating expenditure for the Nogoa Mackenzie Water Supply System by Activity, while **Table 4-2** includes a breakdown of historical and proposed operating expenditure by Type.

Table 4-1 Operating Expenditure by Activity for Nogoa Mackenzie

Item ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Operations	1,415	1,140	2,079	2,541	1,717	1,730	1,825	1,869	1,841	1,798
Electricity	7	12	8	11	12	12	12	12	12	12
Preventive maintenance	371	92	148	167	245	247	261	268	263	256
Corrective maintenance	274	305	333	215	184	186	195	200	198	194
Revenue offsets	-21	-114	-190	-161	-54	-54	-54	-54	-54	-54
Operating Costs	**2,046**	**1,434**	**2,379**	**2,773**	**2,103**	**2,120**	**2,238**	**2,294**	**2,259**	**2,206**

Source: Extracted from *SunWater Nogoa Mackenzie Water Supply Scheme NSP*, Table, page 6.

Table 4-2 SunWater Expenditure by Type for Nogoa Mackenzie

Activity ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	433	332	552	571	591	599	611	611	611	611
Electricity	7	12	8	11	12	12	12	12	12	12
Materials	114	63	158	56	75	76	77	78	79	80
Contractors	138	63	-130	157	94	95	97	98	100	101
Other	310	263	553	952	224	224	224	224	224	224
Indirects & Overhead	1,063	814	1,427	1,186	1,163	1,168	1,272	1,326	1,288	1,233
Revenue offsets	-21	-114	-190	-161	-54	-54	-54	-54	-54	-54
Total Operating Costs	**2,046**	**1,434**	**2,379**	**2,773**	**2,103**	**2,120**	**2,238**	**2,294**	**2,259**	**2,206**

Source: SunWater *Nogoa Mackenzie Water Supply Scheme NSP*, Table, page 7.

As evident in **Table 4-2**, 'Other' costs have risen over the historical period from $310,000 in 2007 to $952,000 in 2010, representing a three-fold increase. SunWater has forecast a significant reduction in 'Other' costs in 2011 and thereafter.

The historical expenditure is less than the Tier 1 lower bound costs identified as part of the 2005/06 Irrigation Price Review.[59] However, a direct comparison of actual expenditure and the Tier 1 lower bound costs is not possible as the previous price review did not unbundle the Emerald Distribution Scheme from the Nogoa Mackenzie WSS. In addition, the Tier 1 tables for 'scheme irrigation lower bound cost' include only the irrigation share of the costs, and SunWater has noted that grossing up the costs is problematic.[60] This is further compounded by the fact that SunWater has undergone an organisational restructure, which has resulted in significant changes to the split of direct and indirect expenditures (due to the centralisation of many functions previously undertaken in the regions).

The following sections provide a detailed review and discussion of the key elements of SunWater's proposed direct operating expenditure by Activity.

4.2.2 Operations

Operational activities for the scheme are identified in the *Nogoa Mackenzie Water Supply Scheme– Scheme Operation Manu*al[61] and the *Fairbairn Dam Operation and Maintenance Manual*.[62]

Operations expenditure reported for the Nogoa Mackenzie scheme includes expenditure incurred with the delivery of water, meter reading, serving gauging stations, sampling of headworks, environmental management and reporting activities. Expenditure associated with management of recreation facilities, and the

[59] Statewide Irrigation Pricing Working Group, *SunWater Irrigation Price Review 2005-2006 Tier 1 Report*, April 2006, Table 5.22 on page 54 refers.
[60] SunWater, email from SunWater to the QCA, dated 23rd February 2011.
[61] SunWater, *Nogoa Mackenzie Water Supply Scheme – Scheme Operation Manual*, document undated, page 30.
[62] SunWater, *Fairbairn Dam Operation and Maintenance Manual* Issue 2, November 2006.

operation of the sewerage treatment plant and water treatment plant at Fairbairn Dam are also included within Operations. The expenditure associated with recreation facilities is reviewed in more detail in **Section 4.2.6**.

A breakdown of historical expenditure into key operations sub-activities is shown in **Table 4-3**. Operations expenditure has varied significantly since 2007, increasing from approximately $1,415,000 in 2007 to $2,539,000 in 2010. A similar breakdown for forecast expenditure has not been provided.

SunWater has indicated that the historical data contains some incorrect codings to sub-activities; and that 2007 has the majority of anomalies because many expenses were retrospectively re-categorised to fit into the Business Operating Model structure (new organisational structure) and this was not a completely precise process. The table is shown here to provide a general outline of the expenditure associated with sub-activities.

Table 4-3 Nogoa Mackenzie – Breakdown of Historical Operations Expenditure

($ '000 2011 real)	Historical			
	2007	2008	2009	2010
Customer Management	42	-	-	87
Workplace H&S	-	11	1	23
Environmental Management	78	78	113	114
Water Management	248	5	130	63
Scheme Management	505	387	652	677
Dam Safety	62	131	891	1,026
Schedule/Deliver	244	122	142	143
Metering	-	44	33	34
Facility Management	256	360	391	374
Other	-20	-0	-276	0
Total	**1,415**	**1,139**	**2,078**	**2,539**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion down to sub activity.xls*'.

The significant increase in dam safety expenditure appears to correspond to the increase in water levels in the schemes dams and weirs. Scheme management costs have also increased; these costs relate to management time (Regional and scheme), supervisor time costs, and insurance costs and rates.

Facilities management expenditure includes costs associated with the recreation facilities at Fairbairn Dam, including the water and wastewater treatment plants.

Environmental management activities include development of weed control plan; assessing impacts downstream of drains; and activities associated with environmental permits (as required). These activities are undertaken by a regionally based environmental officer.

Water management relates to activities associated with announcement of water allocations.

Customer management expenditure is associated with customer interfacing and enquiries; billing and account management; and water trading activities. Halcrow understands that these activities are now predominantly captured as indirect and overhead costs.

Table 4-4 shows SunWater's historical and forecast expenditure on operations by Type. SunWater's 2011 operations budget is approximately $1,717,000. It has used the 2011 budget as the basis of its forecast expenditure for the price path period.

Table 4-4 Nogoa Mackenzie – Operations expenditure

Activity ($ '000 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	293	242	453	481	470	477	487	487	487	487
Materials	62	18	78	37	39	39	40	40	41	41
Contractors	91	41	-165	71	65	66	67	68	69	70
Other	301	241	540	949	217	217	217	217	217	217
Total Direct Costs	**746**	**543**	**905**	**1,537**	**791**	**799**	**810**	**812**	**814**	**815**
Indirects	291	306	649	438	498	450	521	563	527	496
Overheads	377	290	524	564	428	481	493	494	500	487
Total	**1,415**	**1,139**	**2,078**	**2,539**	**1,717**	**1,730**	**1,825**	**1,870**	**1,841**	**1,798**
Annual change (%)		-20%	82%	22%	-32%	1%	5%	2%	-2%	-2%
Change since 2007 (%)		-20%	47%	80%	21%	22%	29%	32%	30%	27%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'. Small differences between the data reported in the table and that reported in the NSP are due to rounding.

As evident from **Table 4-4**, the most significant elements of direct expenditure relate to labour and 'Other.'

In its NSP, SunWater has stated that it undertook a review of work practices in 2010 which resulted in revised work instructions upon which the cost forecasts are based. While SunWater has provided a high level breakdown of operations data, no detailed information relating to the basis of its expenditure forecasts, including the results of its review of work instructions, has been provided. However, SunWater has provided some explanations for key movements in the expenditure.

SunWater's expenditure on labour increased significantly between 2008 and 2009. SunWater has explained that the jump in labour in 2009 was due to increased Water Management and Scheme Management costs as a result of an increase in water storage following the drought. SunWater noted that minimum work was undertaken in 2007 and 2008 during the drought.

SunWater has provided an extract of its resource planning tool used to develop labour forecasts for 2012. Halcrow has been able to confirm that the forecast labour expenditure has been built up using the methodology outlined in **Section 3.6.6**. The extract provided indicates that the direct labour charge for operations to the Nogoa-Mackenzie Water Supply scheme in 2012 is based on approximately 8,620 hours per annum for operations staff from the North and Central resource centres and the Asset Management resource centre. This accounts for approximately $390,000 per annum of the labour expenditure. This is equivalent to approximately 5.5 to 6 FTE staff working on operations. This allowance appears on the upper limit of what might be expected on the bulk scheme, although more information on the review of work practices and how these have driven allowances for labour hours is required to enable the prudence and efficiency assessment to be undertaken.

Labour hours and charges for Corporate Council, Strategy, Health & Safety and Services Delivery resource centres are not shown on the extract of the resource planning tool provided, but account for approximately $82,000 per annum of direct labour expenditure.

During site visits to the Nogoa Mackenzie System, SunWater advised that the recent restructure had resulted in a reduction of 6No staff located at Emerald (encompassing the bulk and distribution systems). This included the loss of 3No reception staff responsible for recording water orders and customer interfacing, a mechanical fitter and 2No operational staff. From the information provided to this review, it has not been possible to confirm whether this has been reflected in SunWater's expenditure forecasts. While SunWater has provided a breakdown of labour expenditure showing labour from the different resource centres, a similar breakdown has not been provided for historical expenditure.

Forecast expenditure on 'Other' relates to insurance ($183,000 per annum),[63] Local Authority rates ($8,000 per annum), Land tax ($15,000 per annum) and telephone and leasehold fees ($10,000 per annum). SunWater is required by law to pay Local Authority rates and Land Tax. SunWater provided Halcrow with a download from SAP detailing payments made in 2010 of $5,919 for Local Authority rates and $14,670 for Land Tax. A review of the SAP downloads confirms that SunWater's forecast expenditure is in line with historical payments, and is therefore considered appropriate.

Forecast expenditure on contractors includes water monitoring (at $10,000 per annum) and general contract services (at $55,000 per annum). Materials expenditure includes chemicals of $12,000 per annum; a significant portion of these costs relate to the management of the recreation facilities (including the water and wastewater treatment plants).

The labour forecast includes real increases of 1.5 percent in 2012 and 2013, which is consistent with its Enterprise Agreement (of an increase of four percent nominal for 2012 and 2013). Labour is forecast to remain steady (in real terms) thereafter.

[63] The review of expenditure relating to insurance is excluded from the scope of this review.

Forecast expenditure for materials and contractors is based on the assumption that price will outstrip inflation by approximately 1.5 percent per annum. Halcrow's comments in relation to cost escalation of materials and contractors are included in **Section 3.9.3**; an adjustment is proposed accordingly.

Although Halcrow has been unable to undertake a detailed review of SunWater's operations expenditure, on the basis of the explanations provided by SunWater, Halcrow is generally satisfied that the expenditure appears to be reasonable. However, as previously noted, labour expenditure does appear to be on the upper limit of what might be expected on the bulk scheme.

A definitive assessment of prudence and efficiency has not been possible from the information provided. To effectively make this assessment, it would be necessary to see detailed activity based budgeting or at least the results of the review of work practices together with details of how this has informed assumptions in relation to forecast labour hours.

4.2.3 Preventative maintenance

In SunWater's reporting system, preventative maintenance consists of three activity types; namely condition monitoring, servicing, and weed control. This section provides an overview of SunWater's historical and forecast expenditure on preventative maintenance for the Nogoa Mackenzie Water Supply Scheme. Additional discussion of SunWater's approach to forecasting preventative maintenance expenditure is included in **Section 3.6.3**.

Table 4-5 provides a breakdown of historical and forecast expenditure on preventative maintenance.

Table 4-5 Nogoa Mackenzie – Preventative Maintenance Expenditure

Expenditure ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	93	24	37	49	76	77	78	78	78	78
Materials	25	3	7	6	9	9	9	9	10	10
Contractors	12	6	6	11	7	7	7	7	7	7
Other	9	3	6	3	5	5	5	5	5	5
Total Direct Costs	**139**	**35**	**56**	**69**	**97**	**98**	**99**	**99**	**100**	**100**
Indirects	119	30	52	45	73	73	84	90	85	80
Overheads	113	27	40	53	75	76	78	79	79	77
Total	**371**	**92**	**148**	**167**	**245**	**247**	**261**	**268**	**263**	**256**
Annual change (%)		-75%	62%	13%	46%	1%	6%	3%	-2%	-3%
Change since 2007 (%)		-75%	-60%	-55%	-34%	-33%	-30%	-28%	-29%	-31%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

As evident from the above table, SunWater is forecasting an increase in expenditure on preventative maintenance when compared to its historical expenditure. Of the direct costs, the most significant increase in expenditure is associated with labour.

The expenditure in 2007 is significantly greater than the expenditure in 2008 to 2010. Halcrow understands that the reason for this is the retrospective transfer of financial data into SunWater's revised Business Operating Model, which came into effect on 1 July 2008. This involved the reclassification of some activities, including some tasks previously coded as refurbishment projects, to preventative maintenance codes.[64]

As previously noted, SunWater's forecast expenditure includes increases on labour of 1.5 percent per annum (real) for labour in 2012 and 2013 in line with its Enterprise Agreement. Materials and contractors have been indexed at 1.5 percent per annum (real) for each year, 2012 to 2016. Halcrow's comments in relation to this indexation are included in **Section 3.9**.

SunWater has also provided a breakdown of historical expenditure into condition monitoring, servicing and weed control, shown in **Table 4-6**. While a similar breakdown has not been provided for forecast expenditure, the table shows the historical fluctuations in preventative maintenance activities.

Table 4-6 Nogoa Mackenzie – Preventative Maintenance Expenditure

Expenditure ($ '000 2011 real)	Historical			
	2007	2008	2009	2010
Condition Monitoring	231	64	74	103
Servicing	133	18	58	25
Weed control	7	9	17	39
Total	**371**	**92**	**148**	**167**

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

As shown in **Table 4-6**, SunWater's expenditure on condition monitoring and servicing was approximately $128,000 in 2010.

As noted in **Section 3.6.3.2**, SunWater's condition monitoring and servicing forecast expenditure is primarily based on forecasts developed by Parsons Brinkerhoff. It has forecast approximately $62,000 per annum ($2010 real) on condition monitoring and servicing, which is equivalent to approximately $64,000 per annum ($2011 real), excluding overhead and indirect costs.

As part of the review, Halcrow sought to confirm that the maintenance activities costed by Parsons Brinkerhoff were consistent with the maintenance activities and frequencies identified in SunWater's facility Operation and Maintenance Manuals.

[64] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 13.

For Fairbairn Dam the maintenance activities costed were generally consistent with the maintenance schedules in the Operation and Maintenance Manual (November 2006), although the Parsons Brinkerhoff review includes maintenance activities additional to those included in the Operation and Maintenance Manual. These additional activities include site inspections of Fairbairn Dam and Bedford Weir and servicing of piezometers, which are considered appropriate given the nature of the assets.

Halcrow is generally satisfied that the expenditure forecast developed by Parsons Brinkerhoff is based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken. However, Halcrow notes that this estimate is built up from SunWater's existing work instructions and its current approach to maintenance, which is yet to be optimised. Consequently, there is likely to be scope to achieve efficiency savings in the delivery of servicing and condition monitoring activities which are not currently reflected in the NSP (this is discussed in greater detail in **Section 4.2.4**).

Accounting for the forecast expenditure developed by Parsons Brinkerhoff, the remaining expenditure is approximately $33,000 per annum. As noted in **Section 3.6.3.2**, the forecast of preventative maintenance expenditure also includes expenditure related to weed control, and "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves*".[65]

As shown in **Table 4-6**, expenditure on weed control has varied significantly over the past four years. The average expenditure on weed control over the period 2007 to 2010 has been approximately $18,000 per annum. Noting that 2007 and 2008 were drought years, weed control costs were significantly lower than in 2009 and 2010. Average expenditure over 2009 and 2010 was approximately $28,000 per annum. While Halcrow notes the inherent uncertainty in forecasting weed control costs, recognising the high rainfall experienced within the past couple of years, an allowance of approximately $28,000 per annum on weed control activities does not appear unreasonable.

This leaves an amount in the order of $5,000 per annum that has not otherwise been justified. Whilst Halcrow is generally satisfied that the proposed (direct) expenditure on preventative maintenance activities is both prudent and efficient, an adjustment by this amount is proposed in the absence of supporting information.

4.2.4 Corrective maintenance

Table 4-7 shows a breakdown of historical and forecast expenditure on corrective maintenance. As evident from the table, expenditure on corrective maintenance increased in the period from 2007 to 2009. Expenditure then fell in 2010 and

[65] SunWater email, *RE Preventative Maintenance*, 9 March 2011.

2011. SunWater has forecast a small increase in expenditure over the price path, driven by increases in labour, materials and contractors.[66]

Table 4-7 Nogoa Mackenzie – Corrective Maintenance Expenditure

Expenditure ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	47	66	62	41	44	45	46	46	46	46
Materials	27	42	73	13	27	27	28	28	29	29
Contractors	36	17	29	76	23	23	23	24	24	24
Other	0	19	8	0	2	2	2	2	2	2
Total Direct Costs	**111**	**144**	**172**	**130**	**96**	**97**	**99**	**99**	**100**	**101**
Indirects	103	84	89	37	42	42	49	52	49	46
Overheads	60	78	73	49	46	46	47	48	48	47
Total Corrective Maintenance	**274**	**305**	**333**	**215**	**184**	**186**	**195**	**200**	**198**	**194**
Annual change (%)		11%	9%	-35%	-15%	1%	5%	2%	-1%	-2%
Change since 2007 (%)		11%	22%	-21%	-33%	-32%	-29%	-27%	-28%	-29%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

As noted in **Section 3.6.4**, SunWater's forecast expenditure is based on an average of the past four years (including 2011), excluding outliers. SunWater has not provided Halcrow with the calculations in support of its forecast of corrective maintenance, however, a breakdown of the expenditure indicates labour charges relate to SunWater staff from the Northern region. The materials expenditure includes $8,000 for heavy plant and $20,000 for construction materials. Other expenditure relates to freight charges.

As part of the review, Halcrow obtained a breakdown of corrective maintenance work orders for the period 2009 to 2011. A review of the work orders indicates that the corrective maintenance activities undertaken are typical of what might be reasonably expected in respect of the types of assets in the scheme. The corrective maintenance activities undertaken include repairs to pumps, pipes, meters, and gates.

Halcrow notes that it is difficult to accurately forecast corrective maintenance expenditure. SunWater's approach, which uses historical expenditure to forecast expenditure, is commonly adopted by water utilities. This is an appropriate methodology for forecasting expenditure, however, Halcrow notes that increases in preventative maintenance activities should ultimately result in a reduction in corrective maintenance as asset reliability increases. While it is noted that the effect will not be immediate, some reductions in corrective maintenance activities

[66] SunWater forecast expenditure includes increases on labour of 1.5 percent per annum (real) for labour in 2012 and 2013 in line with its Enterprise Agreement. Materials and contractors have been indexed at 1.5 percent per annum (real) for each year, 2012 to 2016. Halcrow's comments in relation to this indexation are included in **Section 3.9**.

should be evident towards the end of the price path. This is not readily apparent from SunWater's forecast (direct) expenditure on corrective maintenance.

Table 4-8 Nogoa Mackenzie – Maintenance Expenditure

Direct Expenditure ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Preventive maintenance	139	35	56	69	97	98	99	99	100	100
Corrective maintenance	111	144	172	130	96	97	99	99	100	101
Total Maintenance	**249**	**179**	**227**	**199**	**192**	**195**	**198**	**199**	**200**	**201**
Annual change (%)		-28%	27%	-13%	-3%	1%	1%	0%	0%	1%
Change since 2007 (%)		-28%	-9%	-20%	-23%	-22%	-21%	-20%	-20%	-19%
Preventative maintenance (%)	56%	20%	24%	35%	50%	50%	50%	50%	50%	50%
Corrective maintenance (%)	44%	80%	76%	65%	50%	50%	50%	50%	50%	50%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

Table 4-8 shows SunWater total (direct) expenditure on maintenance, both preventative and corrective. As evident from the table, the proposed mix of preventative to corrective maintenance is 50:50. Halcrow notes that SunWater is yet to undertake a review of the current mix of preventative and corrective maintenance to assess whether it is appropriately optimised.

During discussions with SunWater, it indicated its intentions to move to a reliability centred maintenance approach (RCM). RCM is a risk based process that can assist in providing the optimal mix of preventative and corrective maintenance. While Halcrow notes SunWater's intentions to move to a RCM approach, its forecast expenditures do not reflect this approach. In Halcrow's experience, for the type of assets in the Nogoa Mackenzie Water Supply Scheme, the optimum mix is more likely to be in order of 80:20 (preventative: corrective). Consequently, although difficult to quantify, there is likely to be some scope for SunWater to optimise its proposed corrective and preventative maintenance programs; an overall reduction in maintenance costs would be expected as a result.

4.2.5 Electricity

Expenditure on electricity in the Nogoa Mackenzie Water Supply Scheme is not material, accounting for less than one percent of operating expenditure. The Nogoa Mackenzie Water Supply Scheme is a gravity system, however, electricity is used for operation of inlet towers, headworks and fishways, and usage is generally stable from year to year. Electricity is also used in the operation of water and wastewater systems servicing the recreational area at Fairbairn Dam; these costs are again expected to be stable.

As shown in **Table 4-9**, SunWater has not included any real increase in electricity expenditure beyond 2011. SunWater's approach to forecasting electricity is discussed in more detail in **Section 3.6.5**.

Table 4-9 Nogoa Mackenzie – Electricity expenditure

Activity ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity	7	12	8	11	12	12	12	12	12	12
Annual change (%)		71.4%	-33.3%	37.5%	9.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Change since 2007 (%)		71.4%	14.3%	57.1%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet 'IM North -610.03.PSV'.

The 2011 budget ($11,658) is based on actual electricity expenditure in 2010 ($10,291 nominal), inflated by 13.29 per cent to account for the increase in franchise tariffs. Given that SunWater indicated that electricity usage is stable, it might have been more appropriate to calculate the forecast using average expenditure calculated over the period since 2007. However, Halcrow notes that an average may not sufficiently take into account rising tariffs over the period to 2010. In any case the impact is not material, in the order of approximately $2,000 per annum. On this basis, the method adopted to forecast electricity costs is considered to be appropriate.

Halcrow notes that a significant element of the electricity associated with the scheme is likely to be associated with the recreational area at Fairbairn Dam, particularly the water treatment plant. As part of the review, Halcrow requested the SunWater provide a breakdown of historical and proposed electricity costs associated with the recreational facilities. SunWater was unable to provide this breakdown, stating that it does not record electricity costs at a functional level.[67] Further discussion about the allocation of expenditure arising from the recreational facilities is included in **Section 4.2.6**.

4.2.6 Recreation costs

Within the Nogoa Mackenzie Water Supply Scheme there are two recreational facilities owned and operated by SunWater; these are located at Fairbairn Dam and Bedford Weir. SunWater has sought to transfer responsibility for the Fairbairn Dam recreational area to the local council (Central Highlands Regional Council) without success.

While Halcrow has included this separate discussion of recreational costs, it is noted that these costs are incorporated into the operating expenditure discussed in **Section 4.2.1** to **Section 4.2.4**.

Facilities within the Fairbairn Dam recreational area include:

- an extensive public recreational area, including toilet blocks and other facilities;
- three (3) SunWater houses, which are occupied by operators;

[67] SunWater, *Request for Information by Halcrow (*word document 'doc#1079292-Information request by Halcro.doc'), dated 31 May 2011.

- five (5) private houses;
- a number of allotments (subdivision) owned by community organisations;[68] and
- a privately operated caravan park, which can accommodate approximately 500-600 people.

SunWater maintains the recreational areas, as follows:

- mowing of the grounds, which is undertaken under contract;
- cleaning of toilet blocks and other facilities, which is undertaken under contract;
- rubbish collection, which is undertaken under contract;
- maintenance of barbeques (for which there is no usage charge); and
- general maintenance and refurbishment of assets, which is undertaken by SunWater.

The larger recreational facility located at Fairbairn Dam also includes a Water Treatment Plant (WTP) and Waste Water Treatment Plant (WWTP) which SunWater owns and operates. SunWater does not own and maintain local roads and parking areas within the Fairbairn Dam recreation area apart from the boat ramp. These facilities are the responsibility of the local Council.

Halcrow understands that the dedicated WTP and WWTP at Fairbairn Dam supply potable water and provide wastewater collection and treatment services to three SunWater houses, two private houses, the nearby caravan park and several smaller parcels of land owned by sporting and community groups, as well as the recreation areas.[69]

The estimated capacity of the WTP is 750 kL per day, while demand on the WTP is estimated to be between 50 and 150 kL per day.[70] This implies that during peak demand, the WTP only operates at approximately twenty percent of capacity. Halcrow understands that the WTP was originally sized and built to cater for the construction workers responsible for building the dam. During a site visit of the facilities with SunWater staff, SunWater indicated that the WTP is typically operated for approximately eight hours every second day. The water treatment plant consists of a flash-mixer, two clarifiers, two sand filters, a set of pressure filters, and two low-level and a high-level treated water storage tanks.[71]

SunWater staff noted that the WTP was upgraded in 2007 to be automated to encourage potential handover of this asset to Council, however, the WTP has only ever been operated in a semi-automated mode. Halcrow expects that movement away from manual operation of the WTP would reduce operational expenditure.

[68] Allotments gifted to community organisations following completion of dam construction.
[69] SunWater confirmed that all users pay rates to SunWater for supply of these SunWater services. SunWater also confirmed that the caravan park contributed partial funding to the WWTP upgrade in 2008.
[70] SunWater (2011), Fairbairn Dam Water Treatment Plant, http://www.sunwater.com.au/future-developments/all-projects/fairbairn-water-treatment-plant, accessed 3/03/2011.
[71] SunWater, *Nogoa Mackenzie Water Supply Scheme – Scheme Operation Manual*, document undated, page 30.

Halcrow also notes that routine costs forecast for 2011 price path and beyond are approximately 1.7 times higher than in 2007 (ie. prior to automation of the WTP).

The original capacity of the WWTP is 60 kilolitres per day (240 EP).[72,73] However, during site inspections SunWater staff indicated that the treatment plant was recently upgraded (in 2008) to service additional load, including expansion of the Caravan Park. The WWTP consists of a series of earthen ponds for settling and evaporation.[74]

The historical and proposed expenditure on the recreation facilities that are included in the Nogoa Mackenzie Water Supply Scheme are summarised in **Table 4-10**. The expenditure in this table is included within the operations and maintenance expenditure reported in the NSP.

Table 4-10 Nogoa Mackenzie – Recreation Expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Direct Labour	66	105	65	93	95	95	95	95	95	95
Other Direct Costs	65	90	43	74	70	70	70	70	70	70
Total Direct costs	**131**	**195**	**108**	**167**	**165**	**165**	**165**	**165**	**165**	**165**
Indirect	0	0	0	86	81	70	82	94	82	87
Overheads	69	123	72	102	109	111	112	113	113	109
Total	**201**	**319**	**179**	**356**	**355**	**346**	**359**	**372**	**360**	**361**
Annual change (%)		49%	-45%	55%	-1%	0%	0%	0%	0%	0%
Change since 2007 (%)		49%	-18%	27%	26%	26%	26%	26%	26%	26%

Source: Breakdown of historical and forecast Operational Expenditure for Recreational Facilities received from SunWater on 2 March 2011, and NSP Projects North V4.xls

From 2007 to 2008, labour and direct expenditure increased by 59 percent and 38 percent respectively. Although the reason for this increase is not documented, it may be linked to the WTP and WWTP upgrades which occurred in 2008. While expenditure dropped in 2009, it increased again in 2010, and SunWater has forecast that the expenditure will remain in line with 2010 expenditure. It is also noted that during 2007 to 2009, an indirect cost component was not attributed to the recreation facilities costs.

SunWater has forecast expenditure on labour at the Fairbairn Dam Recreation Areas will be $95,000 per year from 2011. During site inspections SunWater noted that it has one operator who is responsible for operation of the WTP and WWTP, and other maintenance activities. SunWater maintains the toilet blocks, however, typically toilet cleaning, rubbish collection and mowing activities are outsourced.

[72] SunWater (2011), Fairbairn Dam Water Treatment Plant, http://www.sunwater.com.au/future-developments/all-projects/fairbairn-water-treatment-plant, accessed 3/03/2011.
[73] SunWater (2011), Fairbairn Dam Water Treatment Plant, http://www.sunwater.com.au/future-developments/all-projects/fairbairn-water-treatment-plant, accessed 3/03/2011.
[74] SunWater, *Nogoa Mackenzie Water Supply Scheme – Scheme Operation Manual*, document undated, page 30.

SunWater noted that it initially attempts to fix any broken recreation area assets unless specialist services are required. During site inspections, SunWater noted that calibration of WTP and WWTP instruments is conducted by external contractors on a six-monthly basis. Halcrow is satisfied that the expenditure on labour appears reasonable.

It is noted that forecasts for labour expenditure in other areas of the organisation include an allowance for increased labour costs as per the SunWater enterprise bargain agreement, which is in effect until the end of 2012. Expenditure on labour for the 2011 to 2016 period in the Nogoa Mackenzie scheme does account for increased labour costs scheduled to come into effect during the during the forecast period.

While SunWater has not provided a breakdown of Other Direct Costs, it appears to include expenditure on electricity, contractors, materials and other. Given the consistent nature of activities required at Fairbairn Dam, the significant variation in historical direct expenditure is surprising.

As part of the review, Halcrow requested the SunWater provide a breakdown of historical and proposed electricity costs associated with the recreational facilities. SunWater was unable to provide this breakdown, stating that, "*Electricity costs are recorded at the Service contract level and are not recorded at the facility level. Electricity costs* [as reviewed in **Section 4.2.6**] *include all electricity used at the dam and weir storages including dam/weir operations, water treatment, sewerage and recreation facilities*".[75]

Given the facilities in place, Halcrow is satisfied that the operations and maintenance expenditure forecasts for the recreational facilities are appropriate. Halcrow notes, however, that operation and maintenance expenditure associated with the WTP may be higher than normally required due to the plant being significantly oversized. This indicates that expenditure to operate and maintain the plant is likely to be greater than a smaller plant designed to meet current the demand. The question arises as to whether the water supply needs could be met with a small package plant or connection to the existing Emerald town potable water supply. A whole of life cost assessment, taking into account forecast renewals and operations and maintenance expenditure, may be appropriate.

Halcrow notes that PwC has prepared an issues paper for the QCA which discusses an approach to the recovery of recreational costs.[76] As part of its review, PwC identified the types of recreational facilities typically provided by dam owners, which can include:

- access roads and boat ramps for access to water based activities including water skiing;
- canoeing, sailing, swimming and fishing;
- picnic and barbeque areas;

[75] SunWater, *Request for Information by Halcrow* (word document '*Doc#1079202 – Information request by HALCRO*.doc'), email dated 27 May 2011.
[76] PricewaterhouseCoopers (2010), *Pricing Principles and Tariff Structures for SunWater's Supply Schemes, Issues Paper prepared for the Queensland Competition Authority by PricewaterhouseCoopers*, September 2010.

- playgrounds;
- disabled access;
- potable water and toilet amenities; and
- paths and walking trails.

While the recovery of costs associated with recreational facilities is outside the scope of this review, Halcrow understands that the caravan park and the owners of the private land serviced by the WTP and the WWTP do pay SunWater a service fee.

Halcrow notes, however, that the question arises as to whether the allocation of recreational costs on the basis of WAE is appropriate given that much of the expenditure incurred at the recreational facilities is related to the operation and maintenance of the WTP and the WWTP. Cost allocation that recovers costs from the broader population (eg through charges for high security town and industrial water supplies) may result in a fairer allocation of expenditure.

4.2.7 Summary of findings on operating expenditure

As highlighted in the preceding sections, insufficient detail on both historical and forecast expenditure has been provided to enable a detailed assessment of SunWater's proposed operating expenditure. In order to undertake the assessment of operating expenditure effectively, it would be necessary to have additional information to explain the significant movements in historical expenditure, as well as sight of key assumptions used to develop operating expenditure forecasts. SunWater has provided extracts of its resource planning tool, although more detail on how its review of work practices has informed its forecast of labour expenditure is required to undertake the prudence and efficiency assessment.

Notwithstanding the above, Halcrow has identified a number of areas where there is likely to be scope for SunWater to achieve efficiencies in its proposed operating expenditure. This includes the scope for efficiency via optimisation of its mix of preventative and corrective maintenance by moving towards an RCM approach. In addition, Halcrow notes that the WTP at Fairbairn Dam is significantly oversized. This indicates that expenditure to operate and maintain the plant is likely to be greater than a smaller package plant designed to meet current the demand. From the information provided to this review, it is not apparent that SunWater has assessed whether operating and maintaining the existing WTP is in fact the most economic approach.

In addition to the above, Halcrow notes that SunWater's forecast expenditure assumes inflation of four percent per annum (in nominal terms) for contractors and materials. As noted in **Section 3.9**, based on the information provided to this review, it is difficult to conclude that an escalation factor of greater than the normally accepted 2.5 percent for CPI should be applied. Halcrow recommends that SunWater's forecast of materials and contractors be adjusted to reflect increases of no greater than CPI.

In view of the preceding, Halcrow recommends adjustments to the forecast operating expenditure (direct costs) for the Nogoa Mackenzie Bulk WSS as shown in **Table 4-11**.

Table 4-11 Nogoa Mackenzie – Proposed Adjustments to Operating Expenditure (2012 – 2016)

Item ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
SunWater Proposed Total Direct Costs	**1006**	**1021**	**1023**	**1026**	**1028**
Adjustments:					
▪ less escalation on materials	-1	-2	-3	-4	-5
▪ less escalation on contractors	-1	-3	-4	-6	-7
▪ less unjustified Preventative Maintenance costs	-5	-5	-5	-5	-5
Total Reduction	-7	-10	-12	-15	-17
Halcrow Adjusted Direct Costs	**999**	**1011**	**1011**	**1011**	**1011**

4.3 Renewals Expenditure

4.3.1 Overview

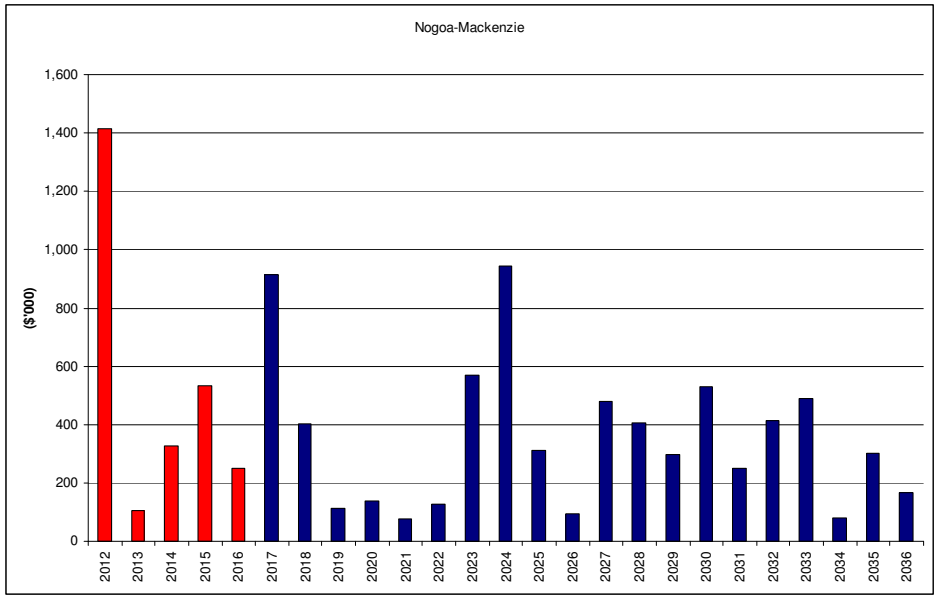
SunWater's has stated that its renewals program is based on detailed assessment of asset condition and risk of failure. **Table 4-12** summarises the renewals program for the five-year regulatory period. Renewals work at Fairbairn Dam will account for $2,280,000 ($2011 real), or 86 per cent of the renewals expenditure in the price path period.

Table 4-12 Nogoa Mackenzie – Proposed Renewals Program (2012 – 2016)

Facility ($ 000 2011 real)	Financial Year					5-yr Total
	2012	2013	2014	2015	2016	
Bedford Weir	75		10			85
Bingegang Weir			56		12	68
Fairbairn Dam	1,163	99	252	529	237	2,280
Fairbairn Dam Waste Water	68					68
Fairbairn Dam WTP	78	5		6		89
Tartrus Weir	33		10			43
Total	**1,417**	**104**	**328**	**535**	**250**	**2,634**

Source: SunWater Nogoa Mackenzie Water Supply Scheme NSP, Table 4-6, page 31.

In its NSP, SunWater has provided a forecast of expenditure beyond the price path. This is shown in **Figure 4-3**.



Source: SunWater Nogoa Mackenzie Water Supply Scheme NSP, Figure 4-1, page 32.

Figure 4-3 Nogoa Mackenzie - Forecast renewals expenditure

As part of this review, Halcrow undertook a review of a selection of historical and proposed renewals projects.

The review of historical renewals projects sought to understand the factors contributing to the forecast renewals annuity negative opening balance (of $732,000 in 2012). The review of forecast renewals has sought to assess the prudence and efficiency of SunWater's proposed renewals expenditure.

The following sections discuss the findings of Halcrow's review.

4.3.2 Review of historical renewals expenditure

Table 4-13 shows SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure determined during the previous pricing review.[77] As evident from the table, SunWater's actual expenditure has significantly exceeded the LBC target expenditure.

Table 4-13 Nogoa Mackenzie - Actual renewals expenditure versus LBC Target expenditure

$'000 nominal	Financial Year				
	2007	2008	2009	2010	2011
Actual renewals Expenditure	1,304	1,058	407	857	2,303
LBC Target Expenditure	77	399	362	569	170
Difference	1,227	658	46	288	2,133

Source: SunWater spreadsheet, *Compare R&E Spend to Annuity 2007_2011.xls.*

[77] It is noted that the Tier 1 review bundled the Emerald distribution system with the Nogoa Mackenzie system. The breakdown of LBC target expenditure has been provided by SunWater.

As noted in **Section 3.8.2,** SunWater has not been able to provide the list of renewals projects that it intended to deliver during the current price path; consequently, it has not been possible to undertake a detailed assessment of SunWater's historical renewals expenditure.

Halcrow did, however, obtain a breakdown of SunWater's historical expenditure on renewals expenditure for the period 2007 to 2011 (until 15 February) for projects greater than $10,000.[78] A review of budget and actual expenditure for the renewals projects undertaken indicates that a number of projects significantly exceeded the original budget, or were not originally budgeted.

Significant expenditure in the current price path has included:

- Fairbairn Dam RBO Upgrade river release capacity ($716,986 actual expenditure in 2007, $245,426 in 2008, and $368,146 in 2010). This project was required as part of the ROP to release the first post winter flow. SunWater indicated that this project was not included in the price path. The initial budget was $2,000,000 over a number of years. SunWater expects that the project will cost will be close to the $2,000,000 budget.
- Investigate Fabridam Post Deflation Incident 23Nov2008 – Bedford Weir ($557,204 in 2009 and $788,428 in 2010). A significant element of SunWater's expenditure in the 2007 to 2011 price path relates to investigations on the Bedford Weir incident of 2008. Clearly, this expenditure was unforseen at the time of the last pricing review. While Halcrow sought additional information on the nature of expenditure, SunWater indicated that for legal privilege reasons, it was unable to provide any information to this review.
- Fairbairn Dam Continuous monitoring water treatment ($97,242 vs budget $59, 400 in 2007). SunWater noted that the increase in cost was due to the need for new and upgraded drawings which were not included in the original estimate. Additional labour was also required to commission and calibrate instrumentation which was not included in the budget.
- Fairbairn Dam Spillway Refurb drain outlets ($107,039 vs budget of $120,000 in 2007).
- Undertake 5-yearly Dam Safety Inspection – Fairbairn Dam ($69,596 in 2008). Required for statutory compliance.
- Undertake Comprehensive Risk Assessment - Fairbairn Dam, start in 2008 ($59,499 in 2008, $30,152 in 2009, and $63,953 in 2010). Required for statutory compliance.
- Refurbish Perimeter Security Fence – Fairbairn Dam – Sew Treat Ponds 1 ($29,977 in 2009, on budget).
- Construct landing rear Acrolein Shed – Fairbairn Dam ($30,899 in 2009, original budget $15,489).

[78] The listing of actual expenditure on renewals and rehabilitation indicates expenditure significantly lower than that reported in the NSP. However, the listing of expenditure provided only included projects greater than $10,000 in value, which indicates that a significant element of renewals projects were lower than this threshold, or that the list provided to Halcrow was incomplete.

- Replace piezometer boards at Fairbairn Dam ($51,709 in 2010). Piezometers are key instrumentation for dam safety monitoring, and need to be maintained in good working order.
- Install Fall Arrest on Vertical Ladders and replace with ladders/stairs where required – Nogoa Mackenzie (WHS over 3 years) $56,792 in 2010. Fall arrest lines are required for OH&S compliance. It is noted that work will carry on into subsequent years.

SunWater's 2011 budget includes significant expenditure, including:

- Investigate Fabridam Post Deflation Incident 23Nov2008 – Bedford Weir ($1,507,025 budget). SunWater noted that the expenditure relates to legal costs associated with incident. Halcrow questions whether legal fees should be classified as renewals expenditure. Furthermore, it is unclear whether some of this expenditure could be recouped through insurance coverage. However, as no detailed information on this expenditure has been provided, Halcrow has been unable to review the prudence or efficiency of the expenditure.

  As part of the second round of the stakeholder consultation process,[79] stakeholders raised questions in relation to whether the costs associated with the Fabridam incident should be allocated between all schemes with Fabridam installations. Halcrow understands that Fabridam installations are also in place in the Upper Burnett Water Supply Scheme at Claude Wharton Weir, and in the Pioneer Bulk Water Supply Scheme, at Dumbleton and Mirani Weirs. SunWater has provided Halcrow with confirmation that the legal negotiations currently underway do not include damages/losses associated with Fabridams in these other schemes.[80] It is for this reason that the costs associated with the legal proceedings have not been allocated to any other schemes.
- Intersafe Gated – Fairbairn Dam – CCA ($144,440 budget). SunWater indicated that this project was not included in the price path, however, the SunWater Board decided to undertake the work following a report from Intersafe recommending that SunWater take action to reduce the safety risk to staff. The project was budgeted at a corporation level ($14.4 million) and costed at the scheme level on implementation. The project is expected to be completed on time (30 June 2011) and budget ($14.4 million). Additional discussion on the Intersafe project is provided in **Section 5.3.2**.

4.3.3 Review of forecast renewals expenditure

4.3.3.1 Overview

Halcrow selected 24 renewals projects to review in detail, of which five are forecast for the period 2017 to 2036. The projects selected for review are included in **Table 4-14**. They account for approximately 50 percent of the renewals expenditure in 2012 to 2016.

[79] Held over March and April 2011
[80] SunWater, *Doc#1079202 – Information request by HALCRO.doc*, email dated 27 May 2011

Table 4-14 Nogoa Mackenzie – Selections from Proposed Renewals Program

Halcrow Review ID	Year	SunWater Description	Project Cost		Total Cost 2012 to 2036 ($000)1
			Direct Cost ($000)	Total Cost ($000)	
Bedford Weir					
LBN/1	2012 and 10 yearly thereafter	12EIAXX Refurbish Bedford OWK2 Gate	28	39	120
LBN/2	2017	Replace Hydraulic System	180	276	276
Fairbairn Dam					
LBN/3	2012	10EIA05 Replace damaged concrete at R3P and R4P as well as minor spalls and other damage	231	357	357
LBN/4	2012	11EIAXX - Refurbish Right bank Outlet Works	486	749	749
LBN/5	2012 and 20 yearly thereafter	Refurbish Baulks - corrosion treatment, minor metalwork replacement as required	24	38	77
LBN/6	2013 and 5 yearly thereafter	Study: 5yr Dam Comprehensive Inspection (by 1 Dec 2012)	63	99	495
LBN/7	2014	Refurbish: Repair and armour lower downstream slope of embankment	40	63	63
LBN/8	2014 and 8 yearly thereafter	14EIA-Refurbish Hoists	20	25	75
LBN/9	2014 and 8 yearly thereafter 2015 and 8 yearly thereafter	Refurbish Hoist - Overhaul motor & electrics & replace ropes	16 and 32	25 and 50	223
LBN/10	2014 and 2027	Replace Level Transmitter & Rtu	52	83	163
LBN/11	2015	Replace Lh Lift Gate (Inlet)	27	43	43
LBN/12	2015	Replace Rh Lift Gate (Inlet)	27	43	43
LBN/13	2015	Replace Cen Lift Gate (Inlet)	27	43	43
LBN/14	2015 and 10 yearly thereafter	Refurbish gate - blast & paint, anodes, new seals, install SS bolts	80	126	371
LBN/15	2015 and 10 yearly thereafter	Refurbish Gate - blast, paint, anodes, new seals, install SS bolts	80	126	371
LBN/16	2015 and split between 2028 & 2030	Refurbish Metalwork - refurbish/replace ladders, covers & rails	52	82	161
LBN/17	2016	Replace Cables & Cableways	75	116	116
LBN/18	2016	Replace Switchboard-Gate House	27	41	41
LBN/19	2016	Replace Switchboard-Inlet Tower	41	63	63
LBN/20	2018	Study: 20yr Dam Safety Review (by 1 Dec 2017)	81	124	124

Halcrow Review ID	Year	SunWater Description	Project Cost		Total Cost 2012 to 2036 ($000)1
			Direct Cost ($000)	Total Cost ($000)	
LBN/21	2020 and 2033	Replace Selma Gatehouse Control Equip	75	115	229
Fairbairn Dam Wastewater Treatment Plant					
LBN/22	2012 and 15 yearly thereafter	Replace Control Equipment	35	53	109
Fairbairn Dam Water Treatment Plant					
LBN/23	2012 and 10 yearly thereafter	11EIAXX Sandblast and Recoat Clarifiers	21	24	74
LBN/24	2017 and 13 yearly thereafter 2018 and 15 yearly thereafter	Replace Control Equipment	137 and 8	211 and 12	444

Source: Halcrow - Cluster 3 - WMS.xls Note (1): Total cost includes the cost of each recurring project within the period 2012 to 2036.

In order to assess whether the proposed expenditure is prudent and efficient, Halcrow sought:

- the project scope and the driver for each project;
- the basis for expenditure forecast (unit rates, quantities etc). Where based on bill of materials, information detailing the value of the relevant item/asset was requested; and
- condition reports, asset management plans, or options reports demonstrating the need for the renewals expenditure.

While SunWater provided extracts from SAP to substantiate the forecast renewals expenditure, very little detail on the nature and scope of the projects has been provided. Similarly, in most cases, a breakdown of the forecast expenditure has not been provided. Halcrow notes that this is because detailed planning on proposed projects (including options assessment) is only undertaken 12 months in advance of the planned project date. Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure. This has not been possible in all cases, due to limited available information.

The following paragraphs include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency. Halcrow's review of each project has only considered the direct costs. Indirect costs and overheads, which have been applied to all projects, are the subject of a separate review.

During the site visit to the Nogoa Mackenzie WSS, inspections were focussed (to the extent possible) on these selected projects. The following paragraphs include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency.

4.3.3.2 Bedford Weir

Some twenty five (25) renewal projects have been identified for implementation at Bedford Weir during the forecast period. Those assessed as part of Halcrow's review include the following:

LBN/1 Refurbish Bedford OWK2 Gate

Scheduled for 2012 and then at 10 yearly intervals, this work involves refurbishment of the outlet works gate. Expenditure of $39,000 is forecast in 2012, $41,000 in 2022 and $40,000 in 2032; in each case this equates to approximately $29,000 in direct costs.

It is understood that the works will involve removal of the gate from the 1200mm x 1200mm opening, blast preparation and recoating of the gate, servicing of bearings and replacement (as necessary) of seals.

Gate refurbishment at 10 year intervals is considered prudent for this type of installation. Based on the scope of work involved, and when compared to other installations (eg. gates at Fairbairn Dam outlet structures), the forecast expenditure is considered excessive; a direct cost allowance of $20,000 (direct) is considered more appropriate.

LBN/2 Replace Hydraulic System

This activity involves replacement of the hydraulic system for the regulating gate on the left bank outlet at Bedford Weir. Expenditure of $276,000 ($180,000 direct cost) is proposed in 2017.

The existing equipment was assessed as Condition 2, ie. having minor defects only, when an assessment was last undertaken in 2005. During interviews, SunWater noted that the condition will be re-assessed at the next 5 Yearly Comprehensive Dam Inspection, which is scheduled for 2014; the timing of the proposed works, which is currently scheduled on the basis of standard asset lives, may be adjusted as result of the assessed condition at that time.

It is noted from the SAP extracts provided by SunWater, that this item of equipment is scheduled for replacement, at a cost of approximately $115,000, in 2059, having been assigned an asset life of 60 years. Whilst the timing of the proposed replacement works is at variance to the assigned asset life, Halcrow considers replacement after approximately 20 years (18 years proposed) is more appropriate; accordingly, the proposed expenditure is considered prudent.

In the absence of specific details, the estimated cost of the proposed works ($180,000 direct) appears excessive; consequently, it is recommended that the nominated asset replacement value ($115,000) with escalation adjustment to 2011, ie. $130,000 (direct cost), be adopted as the efficient cost.

4.3.3.3 Fairbairn Dam

More than eighty (80) renewal projects have been identified for implementation at Fairbairn Dam during the forecast period. Those assessed as part of Halcrow's review include the following:

LBN/3 Replace Damaged Concrete on Spillway

This activity involves the repair/replacement of damaged concrete within the waterway of the spillway at Fairbairn Dam; expenditure of $357,000 ($231,000 direct cost) is forecast in 2012.

During interviews, SunWater advised there are pockets of damage (spalling and cracking) in parts of the spillway; these were identified in the 2009 Annual Dam Safety Inspection.[81] Presence of defects was confirmed at the 2009 Annual Dam Safety Inspection.

Photographs showing the damaged concrete were presented at interviews with SunWater and the impact of the damaged concrete on spillway flows was apparent during the site visit, at which time the dam was spilling. The damage will be exacerbated as a result of the spillway flows. The planned repair works are therefore considered prudent.

Works will involve removal of damaged concrete, and the reinstatement of subsoil drainage, subgrade and the concrete spillway structure. Access to undertake the works will require construction of an access road of sufficient standard (currently a 4WD track only; this was confirmed on site), and extensive use of cranes to move materials and equipment into the work site.

During interviews, SunWater indicated that the forecast expenditure, which allows for both a detailed investigation and assessment of all defects as well as implementation of repairs, should be considered an upper limit. The estimated cost has been determined by the SunWater Asset Planning staff on the basis of known historical costs.

On the basis of high level indicative quantities, Halcrow considers the estimated cost ($231,000 direct) of an appropriate order (approximately $2,000 per cubic metre placed), and therefore efficient.

LBN/4 Refurbish Right Bank Outlet Works

This activity involves a major refurbishment of the right bank outlet works at Fairbairn Dam. Expenditure of $749,000 ($486,000 direct cost) is proposed in 2012.

It is understood that an increase in the capacity of the existing outlet works to the Nogoa River and Weemah Channel (the "Bullring") is required to meet increased demands and satisfy the requirements of the Resource Operating Licence (ROL). Options have been under consideration for some time and an interim solution, comprising construction of a siphon on the left bank, was implemented in 2008.

SunWater provided three documents in relation to the proposed works, as follows:

[81] Reference made to SunWater, *Fairbairn Dam; Annual Inspection Report,* 15-16 July 2009.

- *Preliminary Design Report* (1998)[82] – which outlined the need for the works, discussed options and presented a recommendation for the works, including a preliminary (high level) cost estimate of $600,000;
- *Design Proposal* (2004)[83] – presented a brief proposal to undertake design and documentation (estimated cost $150,000) and subsequent construction site supervision ($99,400) for the proposed outlet upgrade works; and
- *Upgrade Options* (2004)[84] – presented an overview of three options for the conceptual arrangement of the outlet upgrade, together with design parameter and the identification of a preferred option; no costing was included.

Whilst the first of these documents supports the prudence, there is no clear definition of the final form or estimated cost of the proposed works. Consequently, it is difficult to assess the efficiency of the proposed expenditure. The forecast expenditure does, however, appear to in the order of the costs to be expected given that the preferred form is likely to involve significant excavation, penetration of an existing tunnel plug, construction of a new lower level outlet to the Nogoa River and new pipework to connect to the existing structure at the head of the Weemah Channel.

As noted above, an interim increase in outlet capacity to the Nogoa River, comprising a siphon at the left bank of the dam, was constructed in 2008. Details of the additional outlet capacity have not been provided, or the reason why an interim solution was adopted in advance of a permanent solution. It is noted, however, that the total cost of the works is in the order of $1.33 million ($717,000 in 2007, $245,500 in 2008 and $368,200 in 2010 ($nominal)) to date, and is expected to total $2.0 million.

It therefore appears that the required augmentation to river release capacity will have been provided by the siphon on the left bank. In the absence of further justification of the need to also augment the capacity of the Right Bank Outlet, the proposed expenditure to refurbish the "Bullring" is not justified.

LBN/5 Refurbish Baulks

This activity involves the refurbishment of baulks for outlet works (designed for use in both the right bank and Selma Channel Outlets). These bulkheads are installed in the trash rack slots to isolate the outlet works from the storage when required to inspect/undertake works within the outlet works waterway.

Expenditure of $38,000 ($24,000 direct cost) is forecast in 2012 and $39,000 ($26,000 direct cost) is forecast in 2032, ie. the refurbishment frequency is 20 years for these seldom used items of equipment. On this basis, the expenditure is considered prudent.

[82] Department of Natural Resources, Engineering Services, State Water Projects, *Preliminary Design Report on Augmentation of Fairbairn Dam River Outlet; Emerald Irrigation Area*, March 1998.
[83] SunWater, *Proposal; Fairbairn Dam Right Bank Outlet Upgrade*, Reference 05/BIL/WSS/R/388, October 2004.
[84] SunWater, *Fairbairn Dam Outlet Upgrade Options*, November 2004.

The forecast expenditure is consistent with other gate/baulk refurbishment costs and is considered efficient.

LBN/6 5 Year Dam Comprehensive Inspection

Scheduled for 2013 and then at 5 yearly intervals, this work is required for statutory compliance purposes in accordance the *Queensland Dam Safety Management Guidelines*.[85]

Expenditure of $99,000 ($63,000 direct cost) is forecast in 2013, and then remains consistent at $65,000 (direct) in future years (2018, 2023, 2028, and 2033). The cost of the last review, undertaken in 2008, was in the order of $69,600 ($2008), ie. $77,400 in real terms (which was approximately 10 percent greater than budgeted), however, the proportion of indirect and overhead costs is unknown. It is also understood that some additional funding was approved to complete a supplementary report in respect of the mechanical inspection.

In the absence of a breakdown of the historical costs and given the consistent nature of these programmed reviews, it is assumed that the direct cost has been and will remain relatively consistent in real terms and is deemed to be efficient. It is also noted that the variance in the cost of these reviews across other dams in the Biloela cluster of schemes is broadly consistent with the size of the dam and complexity of associated infrastructure at each site.

LBN/7 Refurbish: Repair and Armour Lower Downstream Slope of Embankment

This activity, which comprises remedial works to the downstream lower slope of the embankment, is scheduled to be undertaken in 2014 at an estimated cost of $63,000 ($40,000 direct cost).

During the site visit, it was noted that some general maintenance of the lower embankment may well be required by Year 2014. The lower embankment has recently been subjected to flooding; whilst in generally acceptable condition, some signs of deterioration were evident.

It is noted that in the *Fairbairn Dam Operations and Maintenance Manual*[86] that these refurbishment works are scheduled to be undertaken every 10 years. Provided the need for refurbishment is confirmed by a condition assessment undertaken prior to implementation, the proposed expenditure is considered prudent.

The nominal expenditure is considered efficient for the scope of works that can be reasonably expected to be required.

LBN/8 and LBN/9 Refurbish Hoists

Refurbishment of hoists for gates at both Outlet Works 1 (Selma Channel Gatehouse) and Outlet Works 2 (Right Bank Outlet) is programmed as two separate line items. Hoist refurbishment for two (2) guard gates and two (2) regulating gates is required at each outlet.

[85] Queensland Government, Department of Natural Resources and Mines, *Queensland Dam Safety Management Guidelines*, February 2002.
[86] SunWater, *Nogoa-MacKenzie Water Supply Scheme; Fairbairn Dam – Operation and Maintenance Manual (Issue 2-1)*, November 2006, page 124.

Expenditure forecasts are summarised as follows:

- Outlet Works 2 Guard Gates – $25,000 ($20,000 direct costs) in 2014, 2022, 2030 and 2038;
- Outlet Works 2 Regulating Gates – $25,000 ($16,000 direct costs) in 2014, 2022 and 2030;
- Outlet Works 1 Guard and Regulating Gates – $50,000 ($32,000 direct costs) in 2015, 2023 and 2031.

SAP extracts provided by SunWater indicate that hoist refurbishment comprises overhaul of the motor and electrical systems and replacement of the hoist ropes. It is noted, however, that the *Fairbairn Dam Operations and Maintenance Manual* [87] indicates that refurbishment should be undertaken every 10 years (compared to the forecast interval of 8 years); the 10 year frequency appears to be supported by reference to the *Asset Management Standard for Cranes, Hoists and Winches*.[88]

Given that the overall maintenance, including refurbishment, of the hoists is required for safety and compliance requirements, the expenditure is deemed prudent. At a direct cost of $8,000-$10,000 (direct), the expenditure is considered efficient, particularly considering the locations in which the hoists are installed. It would appear, however, that refurbishment would be more appropriately programmed to be undertaken every 10 years rather than every 8 years as currently programmed.

LBN/10 Replace Level Transmitter and RTU

This activity involves the replacement of the level transmitter and associated RTU at the Right Bank Inlet Works. Expenditure of $83,000 ($52,000 direct cost) and $81,000 ($53,000 direct) is proposed in 2014 and 2027 respectively.

It is noted from SAP extracts provided by SunWater that the proposed replacement frequency of 13 years is inconsistent with the nominated asset life of 15 years.

An allowance of $35,000 (direct) is considered more appropriate (and consistent with the Budget allowance nominated in the *Fairbairn Dam Operations and Maintenance Manual)*;[89] it is also considered appropriate that the subsequent replacement be deferred to 2029 to reflect the nominated asset life.

LBN/11 to LBN/13 Replace Inlet Lift Gates (3No)

This activity involves the replacement of the three (3) lift gates on the Selma Channel Intake regulating structure. Total expenditure of $129,000 ($81,000 direct cost) is forecast for 2015.

Review of SAP extracts provided by SunWater indicates that an asset life of 50 years is nominated, on which basis replacement would not be expected until

[87] SunWater, *Nogoa-MacKenzie Water Supply Scheme; Fairbairn Dam – Operation and Maintenance Manual (Issue 2-1)*, November 2006, page 124.
[88] SunWater, *Asset Management Standard for Cranes, Hoists and Winches (Version 34)*, January 2009.
[89] SunWater, *Nogoa-MacKenzie Water Supply Scheme; Fairbairn Dam – Operation and Maintenance Manual (Issue 2-1)*, November 2006, page 124.

2024. A condition assessment undertaken in June 2001 rates the gates as Condition 3, ie. moderate deterioration with minor refurbishment required. On this basis, it may have been prudent to undertake minor refurbishment works at an earlier time.

Given that the estimated replacement cost for each gate is in the order of $27,000 (direct), refurbishment at a cost in the order of $7,000-$10,000 (direct) would be a more prudent approach. Both annual inspections and 5 Year Dam Safety Inspections will have been undertaken subsequent to the recorded condition assessment; it might reasonably be assumed that any significant condition deterioration will have been noted and recorded in SAP.

On this basis, it is recommended that an allowance of $25,000 (direct) be provided for gate refurbishment in 2015 and $81,000 (direct) for gate replacement in 2025.

LBN/14 and LBN15 Refurbish Outlet Gates

This activity involves the refurbishment of all four (4) gates, ie 2No guard gates and 2No regulating gates, at each of Outlet Works 1 (Selma Channel Gatehouse) and Outlet Works 2 (Right Bank Outlet). Total expenditure for all eight (8) gates is programmed as two separate line items, as follows:

- $256,000 ($160,000 direct cost) in 2015;
- $244,000 ($162,000 direct cost) in 2025;and
- $246,000 ($162,000 direct cost) in 2035.

Refurbishment of the gates, comprising blast preparation and recoating and the replacement of anodes (corrosion protection), seals and stainless steel bolts, at 10 year intervals is considered prudent, and is consistent with other installations. It is noted from the SAP extracts provided by SunWater that the previous refurbishment was undertaken in 1999; gate and seal condition assessment undertaken in September 2005 (Condition 2 and Condition 3 respectively) supports refurbishment no later than 2015.

At a cost of $20,000 (direct) for each gate, the cost is deemed efficient considering the scope of work to be undertaken.

LBN/16 Refurbish Metalwork

This activity involves the refurbishment/replacement of ladders, covers and rails at:

- Outlet Works 1 – Selma Gatehouse (1), Selma Channel Intake Structure (2) and the Selma Channel Inlet Regulating Structure (3); and
- Outlets Works 2 – Right Bank Outlet Structure (4).

Expenditure is forecast as follows:

- $82,000 ($52,000 direct cost) in 2015 – structures (1), (2), (3) and (4);
- $49,000 ($32,000) direct cost in 2028 – structures (1) and (4); and
- $31,000 ($20,000) direct cost in 2030 – structures (2) and (3).

Assessment reveals that cost breakdown, ie:

- $16,000 (direct) for structures (1) and (4);
- $5,000 (direct) for structure (2); and
- $15,000 (direct) for structure (3)

is reflective of the extent of work required at each structure.

Maintenance of ladders, platforms and handrails can generally be considered prudent on the basis that they are required to maintain safe work environments. The variance in refurbishment timelines for the different structures is not, however, apparent. Expenditure forecasting on the basis of a consistent replacement timeline of 15 years is considered more appropriate.

In view of the scope of work required, the forecast expenditure is considered efficient.

LBN/17 Replace Cables and Cableways

This work is scheduled to be undertaken in 2016 at a cost of $116,000 ($75,000 direct cost). It appears by reference to SAP extracts provided by SunWater that the work involves replacement of power supply cabling and cableways to outlet works gate and pump motors; the extent of the work is not, however, apparent from the information available.

Review of the SAP extracts indicates that the replacement is scheduled on a nominal 35 year frequency, which is consistent with SunWater's adopted asset lives. The forecast expenditure is deemed prudent on this basis.

In the absence of more detailed information, however, it is not possible to assess whether the expenditure is efficient.

LBN/18 and LBN/19 Replace Switchboards – Gate House and Inlet Tower

These activities involve replacement of switchboards at both the Selma Gatehouse and the Right Bank Inlet Tower. Expenditure of $41,000 ($27,000 direct cost) and $63,000 ($41,000 direct cost) is forecast for the Gatehouse and Inlet Tower respectively in 2016.

Reference to SAP extracts provided by SunWater reveals that, with adopted asset lives of 35 years, these switchboards were originally scheduled for replacement in 2007. In the absence of relevant information, it is assumed that replacement has been deferred on the basis of condition assessment.

Whilst the scope of work is not definitive, replacement costs are considered to be of an appropriate order and are therefore deemed to be efficient.

LBN/20 20 Year Dam Safety Review

This activity involves undertaking a full dam safety review of Fairbairn Dam in accordance with the requirements of the *Queensland Dam Safety Management*

Guidelines.[90] In simple terms, it comprises a "*fresh engineering assessment of the integrity of all elements of a dam*",[91] which must be undertaken at intervals not exceeding 20 years.

Expenditure of $124,000 ($81,000 direct cost) is proposed in 2018. Whilst the timing of the previous review has not been confirmed, the need for a review may also be triggered by a change in design parameters (such as rainfall and runoff assumptions, or legislative changes).

Given the statutory driver, the expenditure is deemed prudent. On the basis of the scope of the required review, the proposed expenditure is not excessive and is therefore considered efficient.

LBN/21 Replace Selma Gatehouse Control Equipment

This activity involves the replacement of control equipment at the Selma Gatehouse. Expenditure of $115,000 ($75,000 direct cost) is proposed in 2020 and again in 2033.

It is again noted from SAP extracts provided by SunWater that the proposed replacement frequency of 13 years is inconsistent with the nominated asset life of 15 years.

Planning for replacement of control equipment at appropriate intervals is considered prudent in view of both asset life and technology changes.

Given that the control equipment relates to four (4) gates as well as other equipment located at the gatehouse, the forecast expenditure is deemed to be efficient. It is, however, considered appropriate to defer the subsequent replacement to 2035 to reflect the nominated asset life.

4.3.3.4 *Fairbairn Dam Wastewater Treatment Plant – Proposed Expenditure*

Five (5) renewal projects have been identified for implementation in respect of the Wastewater Treatment Plant at Fairbairn Dam during the forecast period. The following project was assessed as part of Halcrow's review:

LBN/22 Replace Control Equipment

This activity involves the replacement of pumping station control equipment at three sewage pumping stations that service toilet blocks within the recreation area at Fairbairn, ie. at the boat ramp, lookout and point. Expenditure of $53,000 ($35,000 direct cost) is proposed in 2012 and $55,000 ($36,000 direct cost) is proposed in 2027, ie. a 15 year asset life has been assumed.

Planning for replacement of control equipment at appropriate intervals is considered prudent in view of both asset life and technology changes.

Given that there are three pumping stations involved, the proposed expenditure amounts to approximately $12,000 (direct) per unit. Although the unit cost is

[90] Queensland Government, Department of Natural Resources and Mines, *Queensland Dam Safety Management Guidelines*, February 2002.
[91] Ibid, page 31.

50 percent higher than replacement of control equipment for the raw water pumps at the water treatment plant (refer **Section 4.3.3.5**), it is likely that the control systems for the sewage pumping stations will be more complex. The forecast expenditure is therefore considered efficient.

4.3.3.5 *Fairbairn Dam Water Treatment Plant – Proposed Expenditure*

Some thirty five (35) renewal projects have been identified for implementation in respect of the Water Treatment Plant at Fairbairn Dam during the forecast period. The following projects were assessed as part of Halcrow's review, however, it may be prudent to assess the feasibility of retaining the treatment plant in its current form (refer to **Section 4.2.6** for further discussions).

LBN/23 Sandblast and Recoat Clarifiers

This activity involves the sandblasting (preparation) and recoating of the two clarifier tanks at Fairbairn Water Treatment Plant. Expenditure of $24,000 ($21,000 direct costs) is forecast for 2010; a consistent direct cost allowance of $21,000 is forecast every 10 years, ie. in 2011 and 2032.

A condition assessment undertaken in February 2010 rated the tanks as Condition 4 overall, ie. significant deterioration with substantial refurbishment required. Details of the assessment reveal that the walls of both tanks were rated Condition 5, ie. major deterioration such that the asset is virtually inoperable, on the basis of severe corrosion pitting (2-3mm in places) on the internal surfaces.

Allowance for recoating of the clarifier tanks every 10 years is considered prudent, and the estimated cost is considered efficient (on the basis of the approximate size of the tanks).

LBN/24 Replace Control Equipment

This activity involves the replacement of control equipment related to the water treatment plant, as follows:

- Treatment plant control equipment:
  - expenditure of $211,000 ($137,000 direct cost) in 2017; and
  - expenditure of $208,000 ($137,000 direct cost) in 2030;
- Raw water pump control equipment:
  - expenditure of $12,000 ($8,000 direct cost) in 2018; and
  - expenditure of $12,000 ($8,000 direct cost) in 2033.

Planning for replacement of control equipment at appropriate intervals is considered prudent in view of both asset life and technology changes. It is noted, however, that the adopted replacement timelines for control equipment is not consistent; considering this and other projects assessed, it appears that replacement of control equipment for some equipment is scheduled on the basis of 15 years asset life, whilst control equipment for other facilities is based on 13 years asset life. The reason for this is not readily apparent; reprogramming of forecast expenditure may be appropriate.

In absence of detailed information, the forecast direct replacement costs are considered to be of an appropriate order and can be considered efficient.

4.3.4 Renewals annuity

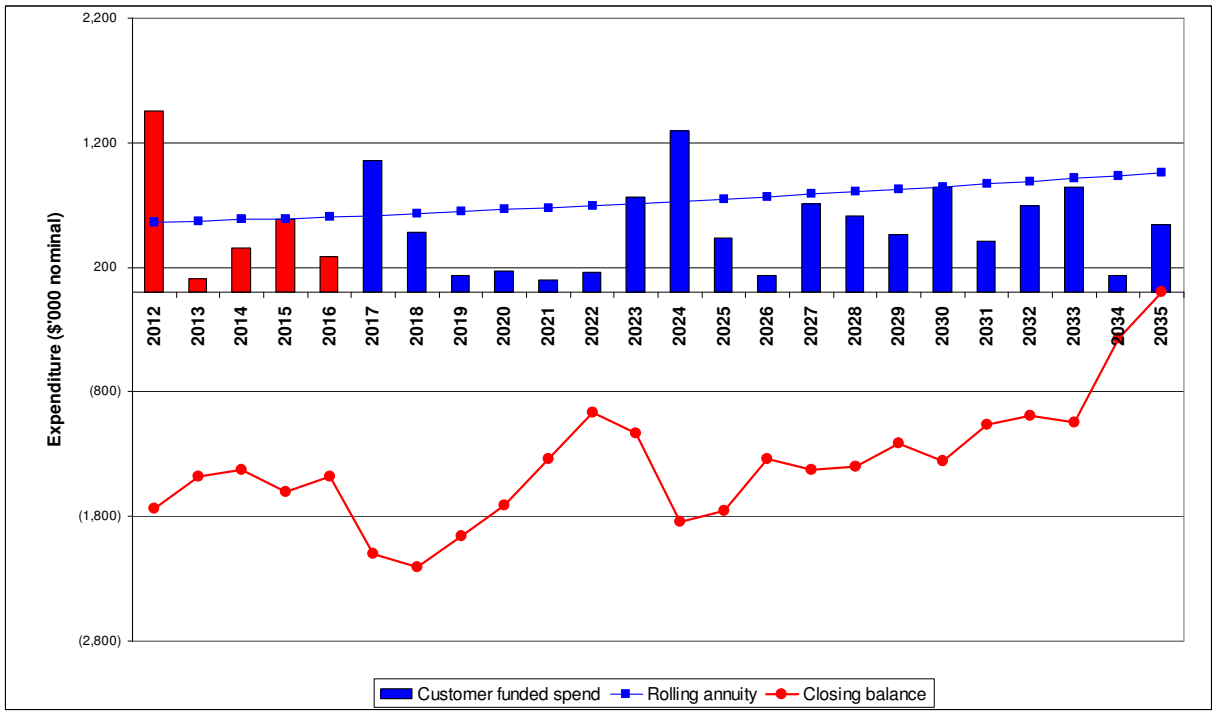
SunWater previously established an Asset Refurbish Annuity for the five year period 2006 to 2011 for this scheme. The five year average annual spend was $580,428 (the renewals annuity for the bulk and distribution systems was previously bundled).

SunWater has elected to continue with a renewal annuity approach for the five years to 2016. The total renewal annuity is $2.908 million over this period, averaging $582,000 per year in nominal terms.

The renewals annuity for the period 2012 to 2016 is higher than for the previous five year period, largely because significant expenditures in 2012, 2018, 2023 and 2024 occur earlier in the annuity calculation. A review of these expenditures has been discussed in **Section 4.3.3**.

Also contributing to the increase in the renewals annuity is the negative opening balance for the regulatory period, of -$750,000 (nominal). As discussed in **Section 4.3.2**, SunWater was unable to provide a list of renewals projects and budgets originally planned for the period 2006 to 2011. Consequently, it has not been possible to review in any detail, the reasons for variations in planned renewals expenditure. However, significant expenditure incurred as a result of the Bedford Weir incident, the upgrade to comply with ROP river release requirements, and the Intersafe project is likely to have contributed to the negative opening balance.

Figure 4-4 shows the rolling annuity and the annuity closing balance through time.



Source: SunWater spreadsheet, *Annuity charts – V610 03.xls*

Figure 4-4 Nogoa Mackenzie - Renewals Annuity ($ nominal)

4.3.5 Summary of findings on renewals expenditure

As SunWater has not been able to provide the list of renewals projects that it intended to deliver during the current price path, it has not been possible to undertake a detailed assessment of SunWater's historical renewals expenditure. However, Halcrow understands that projects not previously identified by SunWater at the time of the 2005/06 Tier 1 review include the Fairbairn Dam Right Bank Outlet works upgrade, investigation and legal costs associated with the Bedford Weir incident of 2008, and the Intersafe Gated Project which is required to reduce the safety risk to staff. These projects involve significant expenditure and are likely to have contributed to the forecast renewals annuity negative opening balance (of -$732,000 in 2012).

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow sought to undertake a detailed review of a selection of forecast renewals projects. Nineteen projects were reviewed, covering the period 2012 to 2036.

As detailed planning is not currently undertaken until 12 months prior to the scheduled renewals date, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects beyond 2012 has been provided. Where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure, although this has not been possible in all cases. In addition, during the site visit to the Nogoa Mackenzie bulk Water Supply Scheme, inspections were focussed (to the extent possible) on the selected projects.

On the basis of the review undertaken, Halcrow is generally satisfied that the proposed expenditure is prudent and efficient. However, Halcrow is of the opinion that one project is not justified and the expenditure forecasts for five of the projects reviewed are excessive. In some cases, a rescheduling of periodic work has also been recommended.

Table 4-15 summarises the proposed adjustments.

Table 4-15 Nogoa Mackenzie –Proposed Renewals Program Adjustments

Halcrow Review ID	Year/Adjusted Year	SunWater Description	Project Direct Cost ($2011 real)	
			SunWater Proposed ($000)	Halcrow Adjusted ($000)
Bedford Weir				
LBN/1	2012 then 10 yearly	12EIAXX Refurbish Bedford OWK2 Gate	29	20
LBN/2	2017	Replace Hydraulic System	180	130
Fairbairn Dam				
LBN/4	2012	11EIAXX - Refurbish Right bank Outlet Works	486	-
LBN/8	2014 then 8 yearly; Adjusted: 2014 then 10 yearly	14EIA-Refurbish Hoists	20	20
LBN/9	2014 then 8 yearly and 2015 then 8 yearly Adjusted: 2014 then 10 yearly and 2015 then 10 yearly	Refurbish Hoist - Overhaul motor & electrics & replace ropes	16 and 32	16 and 32
LBN/10	2014 and 2027 Adjusted: 2014 and 2029	Replace Level Transmitter & Rtu	52	35
LBN/11	2015 Adjusted: 2015 and 2025	Replace Lh Lift Gate (Inlet) Adjusted: refurbish in 2015 and replace in 2025	27	8 and 27
LBN/12	2015 Adjusted: 2015 and 2025	Replace Rh Lift Gate (Inlet) Adjusted: refurbish in 2015 and replace in 2025	27	8 and 27
LBN/13	2015 Adjusted: 2015 and 2025	Replace Cen Lift Gate (Inlet) Adjusted: refurbish in 2015 and replace in 2025	27	8 and 27
LBN/16	2015 and split between 2028 & 2030 Adjusted: 2015 and 2030	Refurbish Metalwork - refurbish/replace ladders, covers & rails	52	52
LBN/21	2020 and 2033 Adjusted: 2020 and 2035	Replace Selma Gatehouse Control Equip	75	75
Fairbairn Dam Wastewater Treatment Plant				
LBN/24	2017 then 13 yearly and 2018 then 15 yearly Adjustment: 2017 then 15 yearly and 2018 then 15 yearly	Replace Control Equipment	137 and 8	137 and 8

5 Emerald Distribution System (Nogoa Mackenzie)

5.1 System Description

5.1.1 Overview

The Emerald Distribution System is located near the town of Emerald, and consists of 126 kilometres of channels and 144 kilometres of drains.

The distribution system has 147 customers. The scheme comprises 86,145 megalitres (ML) of medium priority Water Access Entitlement (WAE) and 1,172ML of high priority WAE. In addition, SunWater holds 22,49ML of medium priority WAE and 7,153WAE for distribution losses.[92]

The Emerald Distribution System comprises two (2) sub-systems, the Selma sub-system and the Weemah sub-system, which together consist of 126 kilometres of supply channels and 144 kilometres of drains. The system principally supplies irrigators, but also a small number of stock and domestic water customers.

As noted in **Section 4.1**, a site visit was undertaken to the Nogoa/Mackenzie Bulk Water Supply Scheme (WSS) and Emerald Distribution System on Tuesday and Wednesday, 8-9 March 2011. The principal focus of the visit was to meet with SunWater Operations staff and inspect key elements of the Scheme with a view to gaining an understanding of:

- the nature and extent of the scheme and its key components;
- the nature and extent of operations and maintenance activities undertaken in respect of the Scheme; and
- the nature and extent of proposed and recently completed (ie. during the previous price path period) renewals projects; and where possible to assess the need for the proposed renewals projects.

The following sections provide an overview of observations made and learning derived from the site visit to the Emerald Distribution System.

5.1.2 Selma sub-system

The Selma sub-system comprises a main channel and a number of spur channels. It operates principally under gravity, but includes five re-lift pumping stations; these are owned and operated by SunWater. All supplies into the Selma sub-system are pumped when the water level in Fairbairn Dam falls below 66.8 percent of full supply capacity. There are also a number of privately owned re-lift pumping stations which are used to service additional areas of land, thereby increasing demand on the system.

[92] SunWater, *Emerald Distribution System Network Service Plan,* page 14.

A total of 36 irrigation customers are serviced by the Selma sub-system. The system operates at a capacity of 770ML per day, which is in excess of its design capacity. Facilities are available for ordering of water via the internet based SunWater On-line, however, the majority of customers prefer to use the telephone ordering system or personal contact.

The upper reaches of the sub-system are operated using the Total Channel Control (TCC) proprietary channel operating system, which was installed on a trial basis. TCC automates operation of the channel system, from water order to delivery at customer supply points. It is understood that the trial was undertaken for SunWater as a whole, not specifically for the Emerald Distribution System, and that the project was funded under the SunWater Dividend Reinvestment Scheme. SunWater operators have indicated that, whilst there has been some positive operational experience with the system, there have also been problems, specifically at farm meters. A conclusion in respect of the trial has not yet been drawn.

The Selma sub-system includes a significant length of drains. These are predominantly surface (open earth) drains, however, there is also a network of deep (subsurface) drains that were installed in the late 1980s.

5.1.3 Weemah sub-system

The Weemah sub-system comprises a single channel, which operates under gravity only. It is operated at a peak capacity of 330ML per day, which is in excess of the design capacity, and services a total of 16 customers.

There is a minimal extent of drainage in the Weemah sub-system. There is also the Codenwarra Levee Bank, which required some repair work following the recent flood event.

Based on discussions with SunWater Operations staff, Halcrow understands that changes to cropping have led to higher demand and the need to operate channels in excess of design capacity. Operating the channels at flow rates in excess of design capacity leads to:

- the need for increased operational control of flows in the system;
- increased bank erosion at the water line; and
- higher chemical use for weed control (chemical dosing is based on flow rates).

5.2 Operating Expenditure

5.2.1 Overview

SunWater's historical operating expenditure for the Emerald Distribution Scheme has fluctuated over the period 2007 to 2011, with an overall downward trend. In 2007, operating expenditure was $1,683,000, while the forecast expenditure for 2011 is $1,369,000. In 2012, SunWater has forecast that expenditure will remain in line with 2011, after which it is forecast to increase over the period to 2016. A breakdown of operating expenditure by Activity and Type is provided in **Figure 5-1** and **Figure 5-2**.

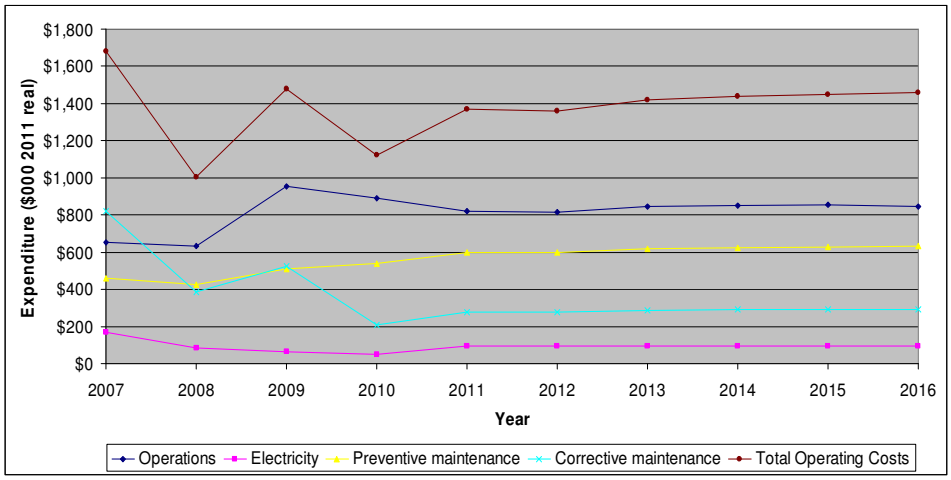


Figure 5-1 Operating Expenditure by Activity for Emerald[93]

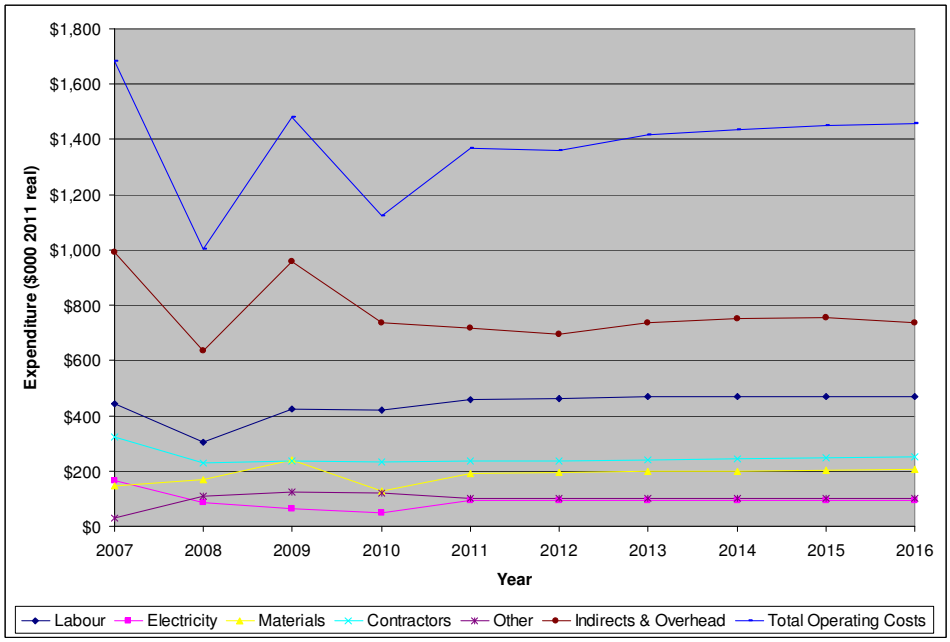


Figure 5-2 Operating Expenditure by Type for Emerald[94]

'Indirects & Overhead' expenditure represents the largest component of operating costs. Labour and Contractors are the most significant components of direct expenditure (by Type).

Table 5-1 includes a breakdown of historical and proposed operating expenditure for the Emerald distribution scheme by Activity, while **Table 5-2** includes a breakdown of historical and proposed operating expenditure by Type.

[93] Total Operating Costs include Revenue offsets.
[94] Total Operating Costs include Revenue offsets.

Table 5-1 Operating Expenditure by Activity for Emerald

Activity ($ 000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Operations	653	635	954	890	823	814	846	853	856	846
Electricity	166	86	64	47	95	95	95	95	95	95
Preventive maintenance	462	425	508	539	599	600	617	625	630	631
Corrective maintenance	820	387	523	206	279	279	288	291	294	293
Revenue offsets	-418	-529	-570	-558	-427	-427	-427	-427	-424	-407
Operating Costs	**1,683**	**1,004**	**1,479**	**1,123**	**1,369**	**1,361**	**1,418**	**1,437**	**1,451**	**1,458**

Source: Extracted from SunWater Emerald Distribution Scheme NSP, Table, page 7.

Table 5-2 SunWater Expenditure by Type for Emerald

Type ($ 000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	442	306	424	421	457	464	471	471	471	471
Electricity	166	86	64	47	95	95	95	95	95	95
Materials	146	170	242	127	193	196	198	201	204	207
Contractors	325	229	237	232	235	238	242	245	249	253
Other	30	108	123	119	101	101	101	101	101	101
Indirects & Overhead[95]	991	634	960	735	716	694	738	751	755	738
Revenue offsets	-418	-529	-570	-558	-427	-427	-427	-427	-424	-407
Total Operating Costs	**1,683**	**1,004**	**1,479**	**1,123**	**1,369**	**1,361**	**1,418**	**1,437**	**1,451**	**1,458**

Source: Extracted from SunWater Emerald Distribution Scheme NSP, Table, page 7.

The following sections provide a detailed review and discussion of the key elements of SunWater's proposed operating expenditure by Activity.

5.2.2 Operations

Expenditure on operations has historically accounted for between 40 to 80 percent of total operating costs for the Emerald Distribution Scheme. Operational activities associated with the Emerald Distribution Scheme include scheduling and delivery of water and maintaining supply at the required flow rates. Operational activities for the scheme are identified in the *Nogoa Mackenzie Water Supply Scheme - Scheme Operation Manual.* [96]

A breakdown of historical expenditure into key operations sub-activities is shown in **Table 5-3**. A similar breakdown for forecast expenditure has not been provided.

[95] Indirect and Overhead expenditure are excluded from the scope of this review.
[96] SunWater, *Nogoa Mackenzie Water Supply Scheme: Scheme Operation Manual*, Version 1-1, undated.

SunWater has indicated that the historical data contains some incorrect codings to sub-activities, and that 2007 has the majority of anomalies because many expenses were retrospectively re-categorised to fit into the Business Operating Model structure (new organisational structure) and this was not a completely precise process. The table is shown here to provide a general outline of the expenditure associated with sub-activities.

Table 5-3 Emerald – Breakdown of Historical Operations Expenditure

($ '000 2011 real)	Historical			
	2007	2008	2009	2010
Customer Management [97]	15	-	-	36
Workplace H&S	-	-	1	-
Environmental Management	-	-	14	24
Water Management	2	-	-	1
Scheme Management	7	160	414	390
Dam Safety	-	-	-	-
Schedule/Deliver	643	463	498	423
Metering	-	8	15	16
Facility Management	-	-	-	-
Other	-14	4	12	-1
Total	**653**	**635**	**955**	**889**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion down to sub activity.xls*',

As evident from **Table 5-3**, the historical operations expenditure primarily relates to scheme management and scheduling and delivery of water. There appears to have been significant variation in scheme management expenditure over the period, however, this may be due to incorrect allocation of expenditure to sub-activities.

Halcrow undertook a review of work orders for operations covering the period 2009 to 2011. Work orders include three monthly meter reading, site inspection of Selma pump station, and scheduling and delivery of water.

SunWater's expenditure on operations has increased significantly, from approximately $653,000 in 2007 to approximately $823,000 in 2011, an increase of 26 percent. This is also shown in **Table 5-4**.

[97] Customer management relates to activities associated with customer interfacing and enquiries; billing and account management; and water trading activities. These activities are now predominantly captured as indirect and overhead costs.

Table 5-4 Emerald – Operations Expenditure

Type ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	188	166	246	276	280	284	288	288	288	288
Materials	-1	35	14	13	16	16	16	17	17	17
Contractors	31	5	21	13	-	-	-	-	-	-
Other	7	93	117	114	99	99	99	99	99	99
Total Direct Costs	**226**	**299**	**399**	**416**	**395**	**400**	**404**	**404**	**405**	**405**
Indirects	196	153	282	172	148	132	153	157	159	156
Overheads	231	182	274	300	280	282	288	292	294	285
Total	**653**	**635**	**955**	**889**	**823**	**814**	**846**	**853**	**859**	**846**
Annual change (%)		-3%	50%	-7%	-7%	-1%	4%	1%	1%	-2%
Change since 2007 (%)		-3%	46%	36%	26%	25%	30%	31%	32%	30%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

As evident from **Table 5-4**, the most significant element of expenditure is Indirects and Overheads. The key elements of direct expenditure relate to labour and 'Other.'

SunWater's expenditure on labour increased significantly between 2008 and 2009. SunWater has explained that the jump in labour in 2009 was due to increased Water Management and Scheme Management costs as a result of an increase in water storage following the drought. SunWater noted that minimum work was undertaken in 2007 and 2008 during the drought.

Halcrow understands that SunWater's forecast expenditure is based on its 2011 budget. The labour forecast includes real increases of 1.5 percent in 2012 and 2013, which is consistent with its Enterprise Agreement (of an increase of four percent nominal for 2012 and 2013). Labour is forecast to remain steady (in real terms) thereafter. Its forecast expenditure for materials and contractors is based on the assumption that price will outstrip inflation by approximately 1.5 percent per annum. Halcrow's comments in relation to cost escalation of materials and contractors are included in **Section 3.9.3**; an adjustment is proposed accordingly.

During site visits to the Nogoa Mackenzie System, SunWater advised that the recent restructure had resulted in a reduction of 6No staff located at Emerald (encompassing the bulk and distribution systems). This included the loss of 3No reception staff responsible for recording water orders and customer interfacing, a mechanical fitter and 2No operational staff. It is understood that recording water orders and customer interfacing has been centralised, and the costs associated with this should be reflected in Indirects and Overheads. Halcrow would expect the reduction in operations staff to be reflected in direct labour expenditure, however, from the information provided to this review, it has not been possible to confirm this. While SunWater has provided a breakdown of labour expenditure showing

labour from the different resource centres, a similar breakdown has not been provided for historical expenditure.

SunWater has provided an extract of its resource planning tool used to develop labour forecasts for 2012. Halcrow has been able to confirm that the forecast labour expenditure has been built up using the methodology outlined in **Section 3.6.6**. The extract provided indicates that the direct labour charge to Emerald Distribution scheme in 2012 is based on 4,675 hours per annum for operations staff from the North resource centre and the Asset Management resource centre. This accounts for approximately $211,580 per annum of the labour expenditure. This is equivalent to approximately 3 FTE staff working on operations. Noting that an allowance of approximately 5.5 to 6 FTE has been included for operations for the bulk scheme, this allowance appears high, although more information on the review of work practices and how these have driven allowances for labour hours is required to enable the prudence and efficiency assessment to be undertaken.

Labour hours and charges for Corporate Council, Strategy, Health & Safety or Services Delivery resource centres are not shown on the extract of the resource planning tool provided, but account for approximately $68,000 per annum of direct labour expenditure.

As part of the second round of the stakeholder consultation process, stakeholders sought clarification of whether the costs associated with the operation, maintenance and renewal of the outlet for Fairbairn Dam to the Selma distribution system are allocated to the bulk or distribution scheme. SunWater indicated that while costs associated with releases of water to the distribution schemes are typically included under bulk supply costs, this is not the case for the outlet to the Selma distribution system. SunWater confirmed to Halcrow that these costs are allocated to the distribution system. It noted that costs for the Selma pump station, which is physically located in Fairbairn Dam, are allocated to the distribution system, as is the electricity associated with the Selma pumping station.[98] Allocating the expenditure in this way means that distribution customers will be charged for releases of water from Fairbairn Dam (from the right bank outlet)[99] as part of the bulk charge in addition to being directly charged for operation of the outlet to the Selma distribution system as part of the distribution charge. It has not been possible to identify the forecast costs associated with the operation of the Selma outlet, as the forecast expenditure is not available to this level of disaggregation.

Forecast expenditure on 'Other' primarily relates to insurance ($92,000 per annum), which is excluded from the scope of Halcrow's review, and Local Authority rates ($4,000 per annum). SunWater is required by law to pay Local

[98] SunWater, *Request for Information by Halcrow* (word document *Doc#1079202 – Information request by HALCRO.DOC)*, email dated 31 May 2011.

[99] Fairbairn Dam has two separate outlets, one on each bank. The Left Bank Outlet releases into the Selma Main Channel by means of an open channel system. The Right Bank Outlet works releases into the Weemah Main Channel and the Nogoa River. (SunWater, *Fairbairn Dam – Operation and Maintenance Manual*, November 2006, page 11-12).

Authority rates. The rates are associated with the land upon which the Emerald distribution channels have been constructed, with payments made to Emerald Shire Council. SunWater provided a download from SAP detailing payments made in 2010, of $4,367. SunWater's forecast expenditure is in line with historical payments, and is therefore considered appropriate. As with other elements of operations expenditure, 'Other' expenditure has been allocated between different user types in accordance with WAE. Discussions in relation to the allocation of costs are included in **Section 3.6.8.**

Although Halcrow has been unable to undertake a detailed review of SunWater's operations expenditure, on the basis of the explanations provided by SunWater, Halcrow is generally satisfied that the expenditure appears to be reasonable although the labour expenditure is greater than expected. In order to undertake a definitive assessment of prudence and efficiency it would be necessary to see detailed activity based budgeting or at least the results of the review of work practices together with how this has informed assumptions in relation to forecast labour hours.

5.2.3 Preventative maintenance

5.2.3.1 Overview

In SunWater's reporting system, preventative maintenance consists of three activity types; namely condition monitoring, servicing and weed control.[100] This section provides an overview of SunWater's historical and forecast expenditure on preventative maintenance for the Emerald Distribution System. Additional discussion of SunWater's approach to forecasting preventative maintenance expenditure is included in **Section 3.6.3**.

Table 5-5 Emerald – Preventative Maintenance Expenditure

Expenditure ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	88	58	81	95	111	113	114	114	114	114
Materials	87	66	94	94	133	135	137	139	141	143
Contractors	71	171	139	174	170	172	175	178	180	183
Other	9	4	1	2	2	2	2	2	2	2
Total Direct Costs	**254**	**299**	**316**	**365**	**416**	**422**	**428**	**433**	**438**	**442**
Indirects	93	54	93	59	59	52	61	62	63	62
Overheads	114	72	99	115	124	125	128	129	130	127
Total	**462**	**425**	**508**	**539**	**599**	**600**	**617**	**625**	**630**	**631**
Annual change (%)		-8%	20%	6%	11%	0%	3%	1%	1%	0%
Change since 2007 (%)		-8%	10%	17%	30%	30%	34%	35%	37%	37%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

[100] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 4.

Table 5-5 provides a breakdown of historical and forecast expenditure on preventative maintenance by item. The disaggregated cost data provided to Halcrow does not separately identify expenditure associated with condition monitoring, servicing and weed control.

As evident from **Table 5-5**, SunWater is forecasting a significant increase in direct expenditure on preventative maintenance when compared to its historical expenditure. This is primarily driven by increases in labour and materials.

The following paragraphs include a review of the historical and forecast preventative maintenance expenditure including weed control and condition monitoring and servicing.

5.2.3.2 *Weed Control*

SunWater uses three approaches to weed control in the Emerald Distribution System; these include:

- Acrolein chemical dosing of the water held in the channel system;
- Chemical Weed Control, ie. chemical spraying of weeds using "Round-up" or similar products; and
- Mechanical Weed Control, ie. slashing or burning of weeds.

Chemical spraying and mechanical weed control activities are typically undertaken along channel batters, roads and in drains.

Acrolein dosing is undertaken in accordance with the following:

- it is only applied to the channel system (ie. not the river system);
- it is applied by SunWater staff; it is not contracted out;
- prior to application, SunWater:
  - provides notification of impending application;
  - puts out signs advising of application; and
  - removes signs the day following application;
- there is a requirement that there is no system outflow during and immediately following application (flow to customer storages is allowed);
- Acrolein is injected at intervals along the system from a purpose built trailer, to ensure that required dosage is maintained as water flows;
- application is dependent upon suitable weather; and
- the system remains closed for a period of 48 hours (Acrolein has an effective half life of 6 hours).

It is noted that Acrolein dosing is undertaken using a slug dosing process in all other areas of the state. In those cases, the system is completely closed and drained, and a slug dose of Acrolein is applied as the channel is refilled.

Historical expenditure in respect of weed control is shown in **Table 5-6**.

Table 5-6 Emerald – Historical Preventative Maintenance Costs – Weed Control

Expenditure ($2011 real)	Expenditure			
	2007	2008	2009	2010
Labour	40	15	28	54
Materials	80	50	83	88
Contractors	67	149	136	171
Other	2	-	-	0
Total Direct Costs	**188**	**214**	**247**	**313**
Indirects	42	14	32	33
Overheads	54	25	41	70
Total – Weed Control	**283**	**252**	**321**	**417**

Whilst there is an absence of clearly apparent trends in the historical expenditure, the following comments were provided in respect of the main variances:

- there was increased weed growth in 2010 compared to previous years;
- increased labour costs in 2010 relate to significant weed burning activity;
- contractor costs in 2007 were significantly less than following years as this represented the end of the drought period (during which there was reduced peripheral weed growth); and
- reduced labour and material costs in 2008 indicate reduced use of Acrolein in this year.

Halcrow notes that, following the breaking of the drought in 2007 (or thereabouts), as well as increased moisture promoting peripheral growth, the increased runoff is likely to have carried increased nutrients into the system; this would promote the growth (weeds and algae) within the water.

The breakdown of forecast expenditure provided to this review does not separately identify all of the expenditure associated with weed control, although it does identify contract slashing costs, and materials (Acrolein).

Forecast weed control expenditure - contractors (slashing and spraying)
As noted in **Section 3.6.3.3**, slashing and spraying is typically outsourced to contractors. SunWater's forecast expenditure includes an allowance of $170,000 in 2011 for weed control contractors. This has been inflated by four percent per annum in accordance with SunWater's assumed inflator for materials and contractors in the years 2012 to 2016. This allowance is in line with the expenditure in 2010, and compares to an average expenditure of $139,000 over the past four years.

During interviews with SunWater, it was noted that expenditure forecasts of 'contractors weed control' are based on existing weed control contracts, or if subject to renewal, on expectations of what the likely contract rates will be.

SunWater indicated that contracts typically run for three years, and that they are market tested when due for renewal.

As part of this review, Halcrow reviewed a copy of the weed control contract for the Emerald Distribution System.101 The current contract is dated 16 July 2009, and runs for a period of three years. The contract is based on a schedule of rates which includes slashing of earth and lined channels banks, area drain banks and inside batters and catch drains. Blanket spraying includes drainage water ways - low flow areas, and drains and strips adjacent to channels on channel banks. SunWater has not indicated the number of slashings or blanket sprayings per year it has assumed in developing its forecast expenditure. However, the contract provides an estimate based on four slashings and five blanket sprayings per year, which amounts to approximately $214,000; this indicates that SunWater's forecast expenditure ($170,000 per annum) is based on four to five slashings and blanket sprayings per year. On the basis of the available information, Halcrow is satisfied that the allowance for 'Contractors - weed control' is both prudent and efficient.

SunWater has also applied an escalation of approximately 1.5 percent in real terms to expenditure on contractors. As discussed in **Section 3.9.3**, from the information provided by SunWater, it is difficult to conclude that an escalation factor of greater than the CPI (assumed at 2.5 percent) should be applied.

Forecast weed control expenditure - Materials (Acrolein)

As noted above, Acrolein is applied to the channel system by SunWater staff. SunWater has provided a copy of an Internal Position Paper - Acrolein, dated 30 July 2010, which details its approach to forecasting Acrolein usage in the coming price path period.

SunWater has stated that current volumes have been treated as the base line for future consumption. SunWater's historical and forecast use of Acrolein is shown in **Table 5-7**.

Table 5-7 Historical and forecast use of Acrolein

Distribution System	Number of Acrolein Cylinders (200 L) per year					Annual Cost
	2008 Actual	2009 Actual	2010 Actual	2011 Budget	Projected Annual Usage	
Emerald	6	3	15	16	15	$91,708

Source: SunWater Internal Position Paper – Acrolein, dated 30 July 2010, page 1.

As evident from above, SunWater's use of Acrolein has fluctuated significantly over the current price path period. SunWater has not explained the basis of its assumption of 15 cylinders for the Emerald Distribution System, other than to state that this is the volume that will be required to deliver the water and maintain customer standards of service.

101 The contract is for both the Dawson Valley Water Supply Scheme and the Nogoa Mackenzie Water Supply Scheme.

Halcrow notes the inherent uncertainty in forecasting Acrolein usage. The incidence of weed growth is influenced by many factors, including water turbidity (turbid water limits weed growth) and seasonal impacts. Influences that would be expected to increase weed growth (such a high rainfall) have been experienced within the past couple of years, as reflected in the recorded increase in Acrolein use. Halcrow accepts that SunWater's proposed use of Acrolein appears appropriate.

SunWater's forecast expenditure assumes the cost of a 200L cylinder is approximately $6,150 ($2011 real). Halcrow understands that this is based on its last order of Acrolein in 2010. In an attachment to its *Internal Position Paper - Acrolein,* SunWater provided documentation from its US supplier which indicates that the cost of the product is to reduce by approximately 15 percent. However, this reduction does not appear to be reflected in SunWater's forecast of expenditure. Taking into account the reduction in the unit rate of Acrolein, expenditure would be $5,200 per annum ($2011 real). Assuming 15 cylinders per annum, this is equivalent to $78,000 ($2011 real).

In its *Internal Position Paper - Acrolein*, SunWater also noted that the cost of Acrolein has been volatile over the period 2005 to 2009, and that while it expects variation in the price of the chemical to be considerable, in the absence of justification it has only used CPI to inflate the cost of Acrolein.[102] Halcrow supports this approach but notes that in its NSP, SunWater has proposed that materials should be escalated by four percent per annum in nominal terms (refer to **Section 3.9.3**). This is reflected in the materials costs included in **Table 5-5**.

From the information provided to this review, it is not possible to identify the forecast labour expenditure associated with Acrolein dosing (the breakdown of labour expenditure presented in **Table 5-5** also includes condition monitoring and servicing activities). Consequently, it has not been possible to review this expenditure.

5.2.3.3 Condition Monitoring and Servicing

SunWater provided a breakdown of historical expenditure into condition monitoring and servicing, shown in **Table 5-8**. A similar breakdown has not been provided for forecast expenditure.

[102] Halcrow has verified that the forecast expenditure on Acrolein does not include an increase beyond inflation over the period 2012 to 2016 (note, only verified for distribution schemes).

Table 5-8 Emerald – Historical Preventative Maintenance Expenditure - Condition Monitoring and Servicing

Expenditure ($ 000 2011 real)	Historical			
	2007	2008	2009	2010
Labour	49	44	53	41
Materials	7	15	11	5
Contractors	4	22	3	3
Other	7	4	1	2
Total Direct Costs	**66**	**85**	**69**	**52**
Indirects	51	40	61	26
Overheads	60	47	57	45
Total	**178**	**173**	**187**	**122**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*'.

As evident from **Table 5-8**, direct expenditure on servicing and condition monitoring is primarily associated with labour. With the exception of 2008, the direct expenditure has remained reasonably steady.

Preventative maintenance/servicing activities undertaken in respect of the Emerald Distribution System typically include:

- in respect of the Total Channel Control System:
  - maintenance of solar panels;
  - battery checks and servicing; and
  - flow calibration.
- In respect of the drainage system; de-silting and weed control.

SunWater has provided a summary listing of maintenance works orders which confirms the nature of activities undertaken. A review of the list reveals that activities are generally appropriate to operation of the irrigation scheme.

As noted in **Section 3.6.3.2**, Halcrow understands that SunWater's condition monitoring and servicing forecast expenditure is primarily based on forecasts developed by Parsons Brinkerhoff,[103] although it also includes allowances for additional servicing activities.

As part of the review undertaken by Parsons Brinkerhoff, it forecast expenditure of approximately $59,800 per annum ($2010 real) on condition monitoring and servicing for the coming price path period. This is equivalent to approximately $61,600 per annum ($2011 real); it excludes overhead and indirect costs.

The condition monitoring and servicing activities costed by Parsons Brinkerhoff include servicing of cranes, condition monitoring and inspection of the Selma relift pumps, servicing of gauging stations, maintenance of meters, and inspection of the

[103] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010.

Total Channel Control System. Halcrow has reviewed the listing and is satisfied that preventative maintenance activities costed by Parsons Brinkerhoff are consistent with the nature and required frequency of activities undertaken on the scheme.

Halcrow notes that costs associated with the Total Channel Control System should be ring-fenced, and not included within the NSP. Halcrow sought clarification from SunWater in respect of the total costs associated with the channel automation trial included in the NSP. SunWater noted that, "*there is no mention of the channel automation trial in the NSP for Emerald and also no allowance for trials in the forecast figures in the financial model.*"[104] However, Halcrow notes that the condition monitoring and servicing activities costed by Parsons Brinkerhoff include $13,332 per annum associated with the trial. These costs should be removed from the preventative maintenance expenditure.

Except for the costs associated with the Total Channel Control System, Halcrow is generally satisfied that the expenditure forecast developed by Parsons Brinkerhoff is based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken. However, Halcrow notes that this estimate is built up from SunWater's existing work instructions and its current approach to maintenance, which is yet to be optimised. Consequently, there is likely to be scope to achieve efficiency savings in the delivery of servicing and condition monitoring activities (this is discussed in greater detail in **Section 5.2.4**).

Accounting for the forecast expenditure developed by Parsons Brinkerhoff, and expenditure for weed control reviewed in **Section 5.2.3.2**, the remaining expenditure on preventative maintenance is approximately $92,400 per annum. This expenditure includes labour associated with dosing of Acrolein, which cannot be separately identified from the disaggregated cost data provided to this review. It is noted, however, that total labour costs associated with weed control in 2010amount to $54,000 ($2011 real) (refer **Table 5-6**); Acrolein use in this year was equal to the forecast use of 15 cylinders per annum, so in absence of more robust information, provides an indication of likely labour costs.

As noted in **Section 3.6.3.2**, SunWater's forecast of preventative maintenance expenditure also includes expenditure related to "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves*".[105] SunWater has not provided any information on how it has forecast expenditure relating to these activities other than to note that it has been calculated from an average of prior years' expenditure. Consequently, Halcrow is unable to make an assessment of whether this element of preventative maintenance is prudent or efficient.

In the absence of justification for the remaining $38,400 per annum, an adjustment of the forecast preventative maintenance expenditure by this amount is proposed.

[104] SunWater, *Request for Information by Halcrow (word doc#1079292-Information request by Halcro.doc')*, dated 31 May 2011.
[105] SunWater email, *RE Preventative Maintenance*, 9 March 2011.

5.2.4 Corrective maintenance

Table 5-9 shows a breakdown of historical and forecast expenditure on corrective maintenance. As evident from the table, expenditure on corrective maintenance has decreased significantly in the period since 2007, from $820,000 in 2007 to $206,000 in 2010. SunWater has forecast an increase in expenditure in 2011 to $279,000, after which time it is forecast to increase marginally in the period to 2013, then remain relatively consistent. These increases are driven by increases in labour, materials and contractors.

Table 5-9 Emerald – Corrective Maintenance Expenditure

Expenditure ($ 000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	166	81	96	50	66	67	68	68	68	68
Materials	60	69	134	20	44	44	45	45	46	47
Contractors	223	53	77	45	65	66	67	68	69	70
Other	14	10	4	2	-	-	-	-	-	-
Total Direct Costs	**463**	**214**	**310**	**117**	**175**	**177**	**180**	**181**	**183**	**185**
Indirects	168	75	105	31	35	31	36	37	37	37
Overheads	188	98	107	57	70	71	72	73	73	72
Total	**820**	**387**	**523**	**206**	**279**	**279**	**288**	**291**	**294**	**293**
Annual change (%)		-53%	35%	-61%	36%	0%	3%	1%	1%	0%
Change since 2007 (%)		-53%	-36%	-75%	-66%	-66%	-65%	-64%	-64%	-64%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

Table 5-9 indicates that there was a significant reduction in expenditure in 2010. SunWater explained that expenditure in 2010 was unusually low due to wet weather.

As noted in **Section 3.6.4**, SunWater's forecast expenditure for corrective maintenance is based on an average of the past four years (including 2011), excluding outliers. While SunWater has not provided details of what outliers have been excluded when forecasting expenditure on corrective maintenance, Halcrow notes that the forecast expenditure on labour, material and contractors is significantly lower than the historical average (average direct expenditure over the period 2008 to 2011 is approximately $204,000 per annum).

A breakdown of the forecast expenditure indicates labour charges relate to staff from SunWater's Northern region. The materials expenditure includes $10,000 for heavy plant[106] and $34,000 for construction materials.

[106] It is understood that SunWater recently sold its heave plant on the basis that it would be cheaper to hire the equipment than maintain it. No business case to support this decision was available for Emerald or other schemes within the Biloela region, although it is understood that business cases have been prepared for schemes in other clusters.

Operations staff indicated that corrective maintenance activities, which are essentially repair type items of work, typically include:

- repair of channel slumps;
- repair of channel erosion (which is exacerbated by operating channels at greater than their design capacity);
- channel cleaning (de-silting);
- repair of channel gates;
- repair of gates at supply points;
- repair of pipe leaks; and
- repair of meters (typically Dethridge Wheels, which are installed on more than 85 percent of supply points).

Following the site visit, SunWater has provided a summary listing of maintenance works orders for Nogoa Mackenzie WSS (including the Emerald Distribution System) for the period 2009 to 2011 which confirms the nature of activities undertaken. Corrective maintenance work orders include repairs to drainage including repair of banks, desilting drains and repairs to the Selma drain LN3 pump station.

Halcrow notes that it is very difficult to accurately forecast corrective maintenance expenditure. Given that SunWater has proposed an increase in preventative maintenance expenditure over the coming price path period, a reduction in corrective maintenance is expected, as increases in preventative maintenance should ultimately result in an increase in asset reliability. SunWater's forecast of corrective maintenance appears to be relatively stable over the period 2012 to 2016, although it is very much lower than the historical average (for the period 2007 to 2011).

As shown in **Table 5-10**, the overall expenditure on maintenance is expected to increase over the price path period, although it remains much lower than the peak of expenditure in 2007. The mix of preventative to corrective maintenance is forecast to remain consistent (70%:30%) over the coming price path period.

Table 5-10 Emerald – Maintenance Expenditure

Direct Expenditure ($ 000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Preventive maintenance	254	299	316	365	416	422	428	433	438	442
Corrective maintenance	463	214	310	117	175	177	180	181	183	185
Total Maintenance	**717**	**513**	**626**	**482**	**591**	**599**	**608**	**614**	**621**	**627**
Annual change (%)		-28%	22%	-23%	23%	1%	2%	1%	1%	1%
Change since 2007 (%)		-28%	-13%	-33%	-18%	-16%	-15%	-14%	-13%	-13%
Preventative (%)	35%	58%	50%	76%	70%	70%	70%	70%	71%	71%
Corrective (%)	65%	42%	50%	24%	30%	30%	30%	30%	29%	29%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

As discussed in **Section 3.6.4**, Halcrow understands that SunWater is yet to review its current mix of preventative maintenance and corrective maintenance to determine whether its current approach is optimised. As identified by Parsons Brinkerhoff during its review of preventative maintenance, there is likely to be scope for SunWater to improve efficiencies and cost effectiveness; it recommended that SunWater bring forward its RCM initiative to optimise its maintenance activities. While it is understood that SunWater intends to act on these recommendations, Halcrow notes that the forecast expenditure in the NSPs do not reflect any savings that might be achieved as a result of their proposed implementation.

5.2.5 Electricity

As evident in **Table 5-11,** expenditure on electricity in the Emerald Distribution Scheme reduced each year over the period 2007 to 2010. SunWater has forecast that expenditure will double to approximately $95,000 in 2011, and remain steady in real terms thereafter.

Table 5-11 Emerald Distribution Scheme – Electricity expenditure

$ '000 2011 real	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity	166	86	64	47	95	95	95	95	95	95
Annual change (%)		-48.2%	-25.6%	-26.6%	102.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Change since 2007 (%)		-48.2%	-61.4%	-71.7%	-42.8%	-42.8%	-42.8%	-42.8%	-42.8%	-42.8%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

In its NSP, SunWater has stated that the electricity costs for the scheme primarily relate to the operation of the Selma Pump Station, and smaller re-lift pump stations at Selma Drain LN3, Selma Lateral S1B, Selma Lateral S2A, and Selma

Lateral S3A. It has also noted that the re-lift pump stations relate to individual customers.[107]

SunWater has forecast electricity using historical data, by calculating an average cost per volume of metered water delivered to customers(refer to **Section 3.6.5** for more information).

Noting that only the Selma sub-system requires pumping, and only when Fairbairn Dam drops below a 66.8 percent capacity, SunWater has calculated an average pumping cost per megalitre (ML) based on the average cost of water delivered over three years to 2010 in the Selma sub-system.[108] SunWater indicated that its forecast has been developed on what it has termed to be an 'average' year, and that it did not use 2006 and 2007 usage as these were drought years (with greater than typical expenditure). In **Section 3.6.1**, Halcrow has noted that there is a lack of clarity surrounding SunWater's interpretation of an 'average' year, particularly given that the basis for calculating an 'average' year varies across the different expenditure items and activities.

Selma pump station was only used once in the three years to 2010 (in 2008) and the re-lift pumps were used continuously in this period. The average cost ($2.57/ML) has been inflated by 13.29 percent, which is the increase in Franchise Tariffs between 2009/10 to 2010/11. This results in an average pumping cost of $2.91/ML. The forecast usage across the Selma sub-system is 32,691ML per annum, which is the average volume of water delivered in the three years 2008 to 2010. This results in a forecast of expenditure on electricity of approximately $95,000 per annum.

The use of an average flow driver (calculated over a number of years) to forecast electricity expenditure in the Selma sub-system appears appropriate, although Halcrow notes that a forecast based on electricity consumption (kWh) would eliminate the impact of the movement in historical expenditure resulting from tariff increases.

Table 5-12 provides a breakdown of electricity usage over the period from 2006 to 2010.

[107] SunWater, *Emerald Distribution System NSP*, page 26.
[108] SunWater has calculated the average using nominal electricity expenditure over each of the three years.

Table 5-12 Emerald Distribution Scheme – Historical Electricity Usage

($ '000 2011 real)	2006	2007	2008	2009	2010
kWh	1,578,511	1,337,781	826,068	153,934	248,023
ML Pumped	-	39,613	18,049	2,413	4,359
ML Delivered	31,050	23,734	18,554	21,237	58,283
Pumping Cost[1]	186,028	167,910	77,153	58,958	45,647
$/ML	5.99	7.07	4.16	2.78	0.78
$/kWh	0.12	0.13	0.09	0.38	0.18

Source: Extracted/derived from SunWater Spreadsheet *'Basic Pump Station Data 100810.xls Annual Information.'* Note (1) These costs are extracted from electricity bills. Differences between these costs and those reported in **Table 5-11** (which are extracted from SAP) are due to timing differences, credit notes etc.

Using the average electricity consumption for the years 2008 to 2010, and assuming the same proportion of peak to off-peak usage as in 2010 (the only years for which peak and off-peak data has been provided), results in an average electricity usage of approximately $85,000 per annum.

Halcrow notes that Fairbairn Dam has been operating at 100 percent capacity since September 2010, and that it is unlikely that SunWater will be required to operate the Selma sub-system pumps for the next two to three years. Halcrow is of the opinion that the forecast expenditure should be re-phased, to more accurately reflect the likely incurrence of the expenditure. Halcrow's assessment of SunWater's expenditure proposal is included in **Table 5-13**.

Table 5-13 Emerald Distribution Scheme – Assessment of Electricity Expenditure

Electricity	Price Path				
	2012	2013	2014	2015	2016
SunWater forecast	95	95	95	95	95
Halcrow assessment	0	0	0	95	95
Difference	**(95)**	**(95)**	**(95)**	**0**	**0**

5.2.6 Drainage costs

Costs associated with drainage are captured within the operating expenditure, and are included within the figures presented in **Table 5-1** and **Table 5-2**, which are discussed in **Section 5.2.2** to **Section 5.2.5**. **Table 5-14** provides a breakdown of historical and forecast costs associated with drainage for the Emerald Distribution system.

Table 5-14 Emerald Distribution Scheme – Drainage Expenditure

$ '000 2011 real	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Drainage Opex	217	188	211	175	216	222	227	233	239	245
Annual change (%)		-13.4%	12.2%	-17.1%	23.4%	2.8%	2.3%	2.6%	2.6%	2.5%
Change since 2007 (%)		-13.4%	-2.8%	-19.4%	-0.5%	2.3%	4.6%	7.4%	10.1%	12.9%

Source: SunWater '*Doc#1079202 – Information request by HALCRO.doc,* dated 31 May 2011.

5.2.7 Summary of findings on operating expenditure

As previously identified, insufficient detail on both historical and forecast expenditure has been provided to enable a detailed assessment of SunWater's proposed operating expenditure. Notwithstanding the absence of detailed information, Halcrow has sought to undertake a review of SunWater's operating expenditure forecasts using the information available to this review.

While a definitive assessment of prudence and efficiency has not been possible, in general, Halcrow is satisfied that SunWater's expenditure generally appears reasonable. However, on the basis of the review undertaken, Halcrow has identified a number of areas where SunWater's forecast expenditure appears excessive. This includes expenditure on electricity, and allowances for Acrolein. Halcrow has also identified an allowance of $13,332 per annum on the Total Channel Control System which should be excluded from the preventative maintenance forecast. Furthermore, due to insufficient information, Halcrow has been unable to verify approximately $92,400 per annum of forecast expenditure on preventative maintenance activities related to additional servicing and calibration of equipment such as pumps, motors, regulator gates, meters and valves, although it appears that of this amount, costs in the order of $54,000 relate to weed control.

Halcrow has also identified a number of areas where there is likely to be scope for SunWater to achieve efficiencies in its forecast operating expenditure. This includes efficiencies likely to be achieved by optimisation of its preventative and corrective maintenance programs as it moves to an RCM approach. In addition, Halcrow notes that SunWater is seeking to increase its pumping energy efficiency through development and implementation of a portfolio energy management plan. Halcrow understands that these savings have not been incorporated into the forecast expenditures reported in the NSP.

In view of the preceding, Halcrow recommends adjustments to the forecast operating expenditure (direct costs) for the Emerald Distribution System as shown in **Table 5-15**.

Table 5-15 Emerald – Proposed Adjustments to Operating Expenditure (2012 – 2016)

Item ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
SunWater Proposed Total Direct Costs	**1094**	**1107**	**1113**	**1120**	**1127**
Adjustments:					
▪ less escalation on materials	-3	-5	-8	-11	-14
▪ less escalation on contractors	-3	-7	-10	-14	-18
▪ less adjustment for Acrolein costs	-14	-14	-14	-14	-14
▪ less adjustment for TCC Maintenance	-13	-13	-13	-13	-13
▪ less unjustified Preventative Maintenance costs	-38	-38	-38	-38	-38
▪ less adjustment for Electricity costs (Selma Pump Station)	-95	-95	-95	0	0
Total Reduction	-166	-172	-178	-90	-97
Halcrow Adjusted Direct Costs	**928**	**935**	**935**	**1030**	**1030**

5.3 Renewals Expenditure

5.3.1 Overview

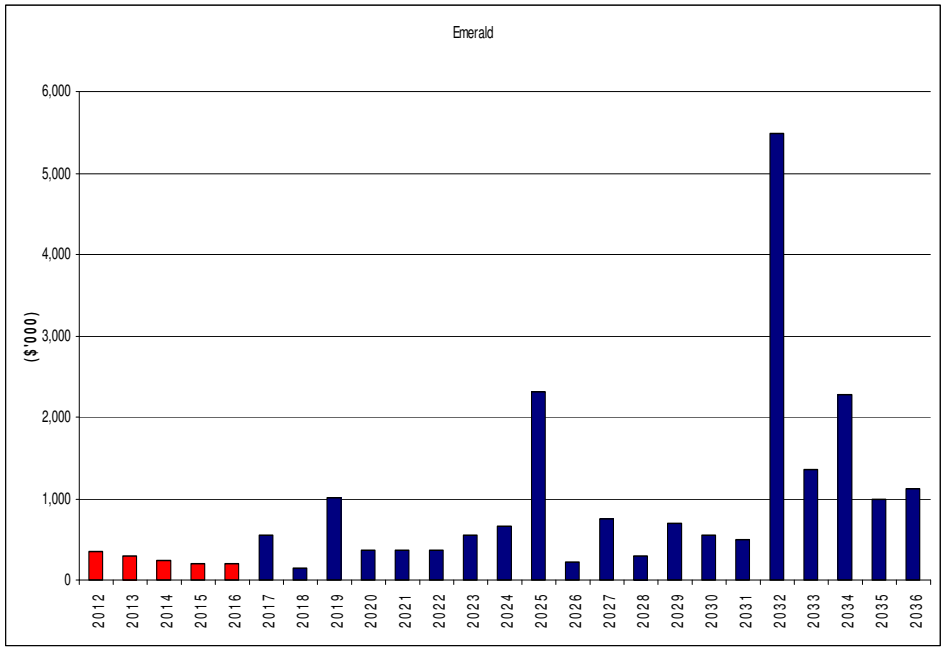
SunWater's has stated that its renewals program is based on detailed assessment of asset condition and risk of failure. **Table 5-16** summarises the renewals program for the five-year regulatory period. Renewals at Selma Pump Station account for a significant portion of the renewals expenditure in the price path period (approximately 58 percent).

Table 5-16 Emerald - Proposed for Renewals Program (2012 – 2016)

Facility ($ '000 2011 real)	Financial Year					5-yr Total
	2012	2013	2014	2015	2016	
Selma Drainage	84		88	34	89	295
Selma Irrigation Distribution	1		38		2	41
Selma Lat S1 B Irrigation Dist			13			13
Selma Lat S1 B Pump Station				15	17	32
Selma Lat S2_A Pump Station				3	9	12
Selma Pump Station	227	251	74	107	77	736
Selma S2_A Irrigation Distrib				3		3
Selma Scada	22		25	37		84
Weemah Drainage	12			12		24
Weemah Irrigation Distribution		39				39
Total	**345**	**290**	**237**	**210**	**194**	**1,276**

Source: SunWater Emerald Distribution Scheme NSP, Table 4-5, page 30.

In its NSP, SunWater has provided a forecast of expenditure beyond the price path. This is shown in **Figure 5-3**.



Source: SunWater Emerald Distribution System NSP, Figure 4-1, page 32.

Figure 5-3 Emerald - Forecast renewals expenditure

As part of this review, Halcrow undertook a review of a selection of historical and proposed renewals projects. The review of historical renewals projects sought to understand the factors contributing to the annuity opening balance. The detailed

review of forecast renewals has sought to assess the prudence and efficiency of SunWater's proposed renewals expenditure.

The following sections discuss the findings of Halcrow's review.

5.3.2 Review of historical renewals expenditure

Table 5-17 shows SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure determined during the previous pricing review.[109] As evident from the table, SunWater's actual expenditure has exceeded the LBC target expenditure in every year of the current price path period.

Table 5-17 Emerald - Actual renewals expenditure versus LBC Target expenditure

$'000 nominal	Financial Year				
	2007	2008	2009	2010	2011
Actual renewals Expenditure	254	1,059	158	1,567	1,218
LBC Target Expenditure	145	200	147	116	257
Difference	109	859	12	1,452	961

Source: SunWater spreadsheet, *Compare R&E Spend to Annuity 2007_2011.xls*.

As noted in **Section 3.8.2**, SunWater has not been able to provide a list of renewals projects that it intended to deliver during the current price path; consequently it has not been possible to undertake a detailed assessment of SunWater's historical renewals expenditure.

Halcrow did, however, obtain a breakdown of SunWater's historical expenditure on renewals expenditure for the period 2007 to 2011 (until 15 February) for projects greater than $10,000.[110] A review of the budgeted versus actual expenditure for the renewals projects undertaken indicates that a number of projects were not included within the original Board budget. Also, a number of projects exceeded the original Board budget.

Significant expenditure in the current price path has included the following (all figures are reported in $ nominal):

- Selma Drains De-silt ($25,600 in 2007, not included in the original Board budget, but delivered within the approved project budget). De-silting of the drains is undertaken to maintain channel capacity. SunWater has noted that it is undertaken to mitigate the risk of flooding in Emerald. Halcrow notes that expenditure on de-silting drains was also incurred in 2008 ($48,787), 2009 ($45,338) and 2010 ($70,334). De-silting of Selma drains is discussed in more detail in Section 5.3.3.

[109] It is noted that the Tier 1 review bundled the Emerald distribution system with the Nogoa Mackenzie system. The breakdown of LBC target expenditure has been provided by SunWater.

[110] The listing of actual expenditure on renewals and rehabilitation indicates expenditure significantly lower than that reported in the NSP. However, the listing of expenditure provided only included projects greater than $10,000 in value, which indicates that a significant element of renewals projects were lower than this threshold, or that the list provided to Halcrow was incomplete.

- Weemah MC PE Lining at 31km (Kavanagh) ($252,842 in 2008 not included in Board budget, delivered within the approved project budget). Channel lining using HDPE lining is undertaken principally to minimise (eliminate) seepage losses; it is being installed in a number of similar jurisdictions. In absence of details of the extent of lining or the size of the channel lined, Halcrow is unable to assess the efficiency of this spend.
- Selma MC - Refurbish berm roads ($49,513 in 3008, below budget). This work involves regrading of berm roads to maintain condition under repeated traffic impacts of surface runoff. In the absence of quantities, efficiency of costs cannot be assessed.
- Repair LN3 Pump Unit ($28,350 in 2009; this project was not in original board budget. Actual expenditure was greater than the $20,000 approved budget). SunWater noted that there was no Board budget as this expenditure related to an unplanned pump failure. It noted that actual costs were higher than expected when outsourced.
- Install Fall Arrest Static Lines - Selma Pumpstation Crane ($28,281 in 2009; project not in original board budget, less than approved budget). Fall arrest lines are installed on steep ladders/stairs for WH&S compliance.
- Intersafe Gated - Weemah MC – CCB ($804,833 in 2010. This project was not in the original Board budget; actual expenditure was greater than approved budget of $421,243). This project is part of the organisation wide Intersafe project (which is discussed in more detail below).
- Intersafe Gated - Selma MC – CCC ($329,804 in 2010, Original board budget of $287,534, approved budget increased to $419,660). As noted above, this project is part of the organisation wide Intersafe project.

SunWater's 2011 budget includes significant renewals expenditure, including:

- Refurbish Selma Drains ($58,852 budgeted). De-silting of Selma drains is discussed in more detail in Section 5.3.3;
- Intersafe Gated - Weemah MC – CCB ($399,147 budgeted);
- Intersafe Non-Gated - Selma MC – CCC ($100,000 budgeted); and
- Intersafe Gated - Selma MC – CCC ($88,070 budgeted).

SunWater has indicated that the Intersafe project was not included in the price path, however, the SunWater Board decided to undertake the work following a report from Intersafe recommending that SunWater take action to reduce the safety risk to staff. The project was budgeted at a corporation level ($14.4 million) and costed at the scheme level on implementation. The project is expected to be completed on time (30 June 2011) and budget ($14.4 million).

Documentation provided by SunWater indicates that the project was first initiated in 2005, when it engaged InterSafe Group Pty Ltd (InterSafe) to undertake a pilot study in Mareeba, to identify Work Health and Safety (WH&S) risks associated with water distribution infrastructure. Intersafe identified forty three (43) potentially damaging tasks, of which twenty seven (27) were deemed high risk. Some high risk included pulling channel drop boards, operating slide gates,

operating valves, and lifting scour pit lids.[111] SunWater again engaged InterSafe to conduct 'focus recall sessions' around the state to identify WH&S risks, and to verify the outputs of these sessions with a detailed study of the Burdekin Distribution System. Papers from the March 2009 SunWater Board meeting indicate that the outcomes of the Burdekin detailed review generally confirmed that the hazards identified in Mareeba existed throughout SunWater's portfolio and that the extent of rectification works was likely to be significantly more than previously anticipated.

Regions prepared preliminary estimates of costs for asset modifications necessary to remove extreme risks and high risk hazards. The preliminary estimate was $6 million over three years, starting in 2008/09 (covering all regions). SunWater then initiated a project and engaged an additional contractor to assist with finalising a program to reduce all risks to medium or lower. Detailed risk assessments were undertaken in each region, resulting in a revised estimate of $14.4 million (including 20 percent contingency) to reduce all extreme and high risks. Of this, $2.103 million (excluding contingency) was for the Biloela schemes.

SunWater has provided Halcrow with a copy of spreadsheets detailing the risk assessments undertaken on the Weemah and Selma channels.[112] While the spreadsheets confirm that detail risk assessments have been undertaken, in many instances, the functional location, description of the assets being risk assessed is not identified. Some estimates of cost are provided, although not in all cases.

The Intersafe project is being delivered by contractors, with SunWater maintaining management of the project. SunWater provided project costs as of February 2011, which indicates that the actual expenditure incurred to date in Biloela is $2.1 million, with the project outturn cost forecast to be $2.37 million. This compares to the $2.103 million forecast in March 2009, although it appears that this estimate was later revised to $2.461 million (Halcrow has not been provided with any documentation relating to this upwards revision). A further breakdown of actual expenditure indicates that $1.496 million of this relates to work in the Weemah and Selma sub-systems, this excludes overheads, which total $0.19 million for the Biloela schemes (the allocation of the overhead between schemes has not been provided).

Halcrow is satisfied that the expenditure is prudent on the basis that SunWater has a legal obligation to ensure the health and safety of its employees. Noting that SunWater went to market and is using contractors to deliver the project, Halcrow is satisfied that project costs represent market rates. However, as a full breakdown of the works involved with the project has not been provided, a definitive assessment of efficiency has not been possible.

[111] SunWater, Paper from March 2009 meeting of Board Directors - *Update on Structure Upgrades WHS Risk Reduction*, 11 March 2009.
[112] SunWater spreadsheets, '*Production#1008929-v2-Risk Assessment Review Selma.xls*', and *Production#1008857-v2-Risk Assessment Review Weemah.xls*.

5.3.3 Review of forecast renewals expenditure

5.3.3.1 Overview

In order to assess the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow sought to review a selected of renewals and rehabilitation projects in detail. The projects selected for review include those driving the significant expenditures in 2025 and 2032.

The projects selected for review are included in **Table 5-18**, and account for approximately 40 percent of forecast expenditure.

Table 5-18 Emerald – Selections from Proposed Renewals Program

Halcrow Review ID	Year	SunWater Description	Project Cost		Total Cost 2012 to 2036 ($000)[1]
			Direct Cost ($000)	Total Cost ($000)	
Selma Drainage					
LIW/1	2012 and two yearly thereafter	Refurbish: Selma Drains - Desilt drains-new strategy	60	84	1,123
Selma Irrigation Distribution					
LIW/2	2019-2020, and 2034-35	Replace Control Equipment	256	356	779
LIW/3	2025	Replace Hdpe Synthetic Liner 31309-34225M	483	666	666
LIW/4	2025	Replace Hdpe Synthetic Liner 34225-36411M	322	443	443
LIW/5	2032	Replace Concrete Lining (2032)	4,279	4,785	4,785
Selma Pump Station					
LIW/6	2013 and 2028	Replace Logic and Control	137	197	392
LIW/7	2015 and five yearly thereafter	10EIA18-Refurbish pump No.2 Selma P/Stn	37	53	257

Note (1): Total cost includes the cost of each recurring project within the period 2012 to 2036.

Halcrow requested that SunWater provide the following information:

- the project scope and the driver for each project;
- the basis of expenditure forecast (unit rates, quantities etc); and
- condition reports/asset management plans demonstrating the need for the renewals expenditure.

As discussed in **Section 3.8.3**, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects has been provided. However, where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure. This has not been possible in all cases, due to insufficient information on the proposed expenditure.

The following paragraphs include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency. Halcrow's review of each project has only considered the direct costs. Indirect costs and overheads, which have been applied to all projects, are the subject of a separate review.

5.3.3.2 Selma Drainage

LIW/1 Refurbish Selma Drains - Desilt drains- new strategy – SEL

SunWater's renewals program includes an allowance of $84,000 in 2012 for desilting the Selma drains, and a continuing allowance to de-silt the drains every second year. The expenditure for each incidence is between $84,000 and $89,000, with total expenditure of $261,000 forecast for the period 2012 to 2016, and $1.123 million forecast for the period to 2012 to 2036.

Selma drainage assets have been in operation since 1973. An asset life has not been entered into the SAP-WMS system, however, the system identifies that the remaining life of the asset is 118 years. However, there is also an additional refurbishment frequency scheduled at 19 year intervals, with the next occurrence in 2030 (this is a separate renewals project with forecast expenditure of $62,000).

During site inspections, SunWater operations staff indicated that refurbishment and de-silting of drains is a rolling program with prioritisation based on operator knowledge of the drainage system. It noted that the entire system would typically not be refurbished and de-silted every two years, but only parts of the system. This aligns with comments made by irrigators at a meeting held between SunWater, the QCA and the Emerald/Nogoa Mackenzie irrigators who said that "*some drains have not been maintained for several years*".[113]

The most recent drainage condition assessment was undertaken in December 2000. Overall, this recorded significant deterioration with substantial refurbishment required to ensure ongoing operation.

Extracts from SAP-WMS indicate that refurbishment and maintenance planning of the 123.9km of drains within the Selma system is combined under the same functional location. Halcrow does not agree that a single condition assessment could be reflective of the entire drainage system.

In the Emerald NSP,[114] SunWater has stated that the requirement for these works was determined by risk assessment, and that de-silting mitigates the risk of flooding in Emerald. Given that the majority of the drainage channels are located and discharge away from the town of Emerald, it is unclear how desilting of channels mitigates flood risk.

The extracts from SAP-WMS provided to this review indicate that a risk assessment has been undertaken to assess the risks from the failure of drainage earthworks. The risk assessment, undertaken in 2007, shows no risk against

[113] Meeting between QCA, Halcrow and irrigators held in Emerald on 8 March 2011.
[114] SunWater, Emerald Distribution System Network Service Plan (#1015154), page 30.

WH&S, environment and financial categories. However, production/operations and stakeholder relations show a moderate consequence and pose a high risk to SunWater.

During the site inspection, SunWater operations staff presented examples of channels that have been recently refurbished and channels that would require refurbishment in the near future. SunWater commented that it has a program to incise low flow channels within the existing drains to help lessen ongoing maintenance requirements. Halcrow understands this occurs when drains are refurbished; however from the information provided to this review, there does not appear to be a formal record of this in SAP-WMS. This could possibly explain the larger than average expenditure which occurred in 2010, as shown in **Table 5-19** which summarises historical expenditure in the Selma Channel System for drain refurbishment.

Table 5-19 Emerald – Historical Expenditure on De-silting Selma Drains

Year	Budget ($ 2011 real)	Yearly Total ($ 2011 real)
2007	29,455	29,277
2008	69,492	54,232
2009	65,258	48,963
2010	72,472	72,472
Average		**51,236**
2*Average		**102,472**

Source: SunWater spreadsheet *2007 – 2011 project.xls*

Over the past four years, average expenditure to de-silt Selma drainage has been approximately $51,236 per year (including indirects and overheads), or $102,472 every two years.

Halcrow notes that, of the $84,000 proposed in 2012, $60,000 is direct costs. Direct costs increase to $62,000 from 2016 forwards.

On the basis of the information available to this review, Halcrow is satisfied that forecast (direct) expenditure on refurbishment and desilting of the Selma drainage system is prudent and efficient. Should the low-flow channels lead to improved refurbishment serviceability, then expenditure to service the channels should be adjusted in the future.

Given there is a single functional location for the entire Selma drainage system, it would be difficult to report a single condition assessment representative of the condition of all drainage. It is recommended that SAP-WMS be used more extensively as the basis for planning. For example, channels could be split up on the basis of reaches, and condition assessments prepared on the basis of reaches to allow more accurate refurbishment planning.

Halcrow also notes that some farmers have opted to utilise SunWater drainage assets to capture tail water on their properties. SunWater contends that using drains for temporary storage of water prior to reuse, results in more silt deposition.

5.3.3.3 Selma Irrigation Distribution

LIW/2 Replace Control Equipment

SunWater's renewals program includes expenditure to 'replace control equipment' in 2019 ($357,000) and 2020 ($35,000), and again in 2034 ($353,000) and 2035 ($35,000).

Extracts of SAP-WMS[115] provided to this review indicate that the control equipment refers to the "*Selma meters, control structure, Parshall flume & regulating gate.*" Items that make up control equipment include antennas, cabling, enclosures, radio, remote telephony units, sensors, transmitters, solar panels, batteries, battery chargers and controllers. Control equipment forms part of the Total Channel Control System.

Extracts from SAP-WMS indicate that the control equipment in the Selma channel has been in operation since 2004. SAP-WMS indicates that the control equipment has a 15 year life which is consistent with SunWater's Asset Hierarchy Development Manual,[116] which lists the estimated life of metering equipment to be 15 years.

SunWater's condition assessment manual[117] that recommends a maximum assessment frequency for controls and SCADA (which includes control panels) of two years.

The replacement interval of 15 years is consistent with replacement intervals for other control equipment. On this basis, replacement every 15 years is considered prudent. Based on the information provided, expenditure is also considered efficient.

LIW/3 and LIW/4 Replace HDPE Synthetic Liner

These two renewals projects are planned for 2025, and involve replacing the HDPE synthetic channel liner between chainage 31,309m and chainage 34,225m and between chainage 34,225m and chainage 36,411m on the Selma Main Channel. The combined length of liner to be replaced is 5,102 metres, at a total direct cost of $804,000. The direct cost for replacement is $158 per metre of channel (average over the two sections). Based on site inspections it is understood that the HDPE channel lining is 2 mm thick.

The HDPE synthetic liner has been in operation since August 2005. Halcrow notes that the asset life entered into the SAP-WMS system is 20 years which aligns with the estimated life in SunWater's guide.[118] During site inspections SunWater

[115] SunWater, R&E SAP downloads for Emerald, Selma Irrigation, from email dated 16 March 2011.
[116] SunWater, A Guide to SAP PM Asset Hierarchy Development dated 20 January 2009 version 6.5.
[117] SunWater, Users Manual for Assessing Electrical Assets, 27 October 2008, Version 5.2
[118] SunWater, A Guide to SAP PM Asset Hierarchy Development dated 20 January 2009 version 6.5.

indicated that it has had positive experience with similar HDPE liner in the Mareeba Channel (in the Mareeba Dimbulah Water Supply Scheme), which has now been in operation for 15 years and is expected to last at least 20 years. SunWater noted that it would re-estimate the life of the liner should the integrity of the Mareeba liner continued to be maintained.

From the SAP-WMS extracts provided to this review, it does not appear that a condition assessment or risk assessment has been undertaken of the Selma liner. Halcrow notes that SunWater's users manual recommends a maximum assessment frequency of five years. Halcrow understands that the channel lining program is determined via permeability and hydraulic testing.

During site inspections, SunWater noted that the driver for channel lining is to prevent seepage. The SunWater Board will, however, only approve initial channel lining when the saved water can be sold.

Based on the information reviewed, replacement of the HDPE liner in 2025 is considered prudent and efficient.

LIW/5 Replace Concrete Lining

This renewals project is planned for 2032, and involves replacement of concrete lining in the Selma distribution system to reduce leakage at a direct cost of $4,279,000. SunWater advised that concrete lining is located between chainage 25,237m and chainage 26,917m, a total length of 1,680m. Based on direct costs, this equates to a replacement cost of $2,547 per metre. The dimensions of the channel are unknown.

Extracts from SAP-WMS indicate that the concrete lining in the channel has been in operation since 1981, with an asset life of 80 years. The estimated replacement date for the lining is 2061. Halcrow notes that the asset life entered into SAP-WMS is at variance with estimated life for channels with concrete lining of 50 years provided in SunWater's Asset Hierarchy Development Guide.[119] The replacement frequency entered into SAP is for every 70 years, whilst the first replacement is scheduled for 2032, which is consistent with 50 year asset life.

Given lining of channels with HDPE has recently achieved positive results elsewhere in the Selma Irrigation Channel and lining cost is in the order of $165 per metre of channel (varies depending upon channel profile), expenditure to replace existing concrete lining with new concrete lining in 2032 is not considered prudent or efficient. Preparation for the initial installation of a HDPE lining, which would include shaping of the channel profile and the supply and placement of sand bedding, would add addition cost (compared to replacement); allowing for an all inclusive installation cost of $330 per metre direct cost would result in an installation cost of $555,000 (direct).

[119] SunWater, A Guide to SAP PM Asset Hierarchy Development dated 20 January 2009 version 6.5.

5.3.3.4 Selma Pump Station

LIW/6 Replace Logic and Control

This renewals project is planned for 2013 at $197,000 (direct cost of $137,000) and again for 2028 at $195,000 (direct cost $142,000). The Selma pump station is located on the left embankment of the Fairbairn Dam; it has three variable discharge pumps with a capacity in excess of 800ML/day.[120] It is understood that the logic and control system controls the three Selma pumps. The asset life entered into SAP-WMS system for the logic and control system at Selma pump station is 15 years. This is five years more than the estimated asset life in SunWater's SAP Asset Management Guide,[121] which is 10 years, but is broadly consistent with control system asset life adopted elsewhere.

The most recent condition assessment of the logic and control at Selma pump station was undertaken in 2000. At this time, the logic and control unit was recorded as being in 'perfect as new' condition. SunWater's condition assessment manual[122] recommends the maximum assessment frequency for controls and SCADA (which includes PLC's) to be 2 years, which indicates that a revised condition assessment is long overdue. It is recommended that condition assessments are undertaken at the frequency recommended in SunWater's electrical asset guide.[123]

The risk assessment in SunWater's SAP-WMS system undertaken in October 2005 indicates that that failure of the logic and control system would have moderate consequences for WH&S, insignificant consequences for the environment and minor consequences for financial, production/operations and stakeholder relations. Each consequence, however, resulted in a low risk with a comment entered into the SAP-WMS system stating that failure would result in loss of short term delivery capacity.

In 2009 Parsons Brinkerhoff undertook an audit of approximately 20 percent of SunWater's water infrastructure electrical switchboards.[124] Whilst the Selma pump station logic and control unit wasn't audited, Parsons Brinkerhoff found that all PLC's audited were approximately 11 years old and were in good condition. Of the five PLC's Parsons Brinkerhoff reviewed, none was recommended for replacement at that time.

Halcrow notes that expenditure to ensure appropriate logic and control of major pump stations is prudent. However, given that a condition assessment has not been recently undertaken, and logic and control boards located at other facilities were found to be approximately 11 years old and in good condition, it is difficult to confirm that expenditure to replace the logic and control unit at Selma pump station in 2013 is required.

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[120] SunWater, *Nogoa Mackenzie Water Supply Scheme – Scheme Operation Manual*, Version 1-2.
[121] SunWater, *Users Manual for Assessing Mechanical Assets, Version 5.3*, 05 January 2009.
[122] SunWater, *Users Manual for Assessing Electrical Assets, Version 5.2*, 27 October 2008.
[123] SunWater, *Users Manual for Assessing Electrical Assets, 27 October 2008*, Version 5.2
[124] Parsons Brinckerhoff, *SunWater: Audit of Electrical Sites*, 24 July 2009.

LIW/7 Refurbish pump No.2 Selma P/Stn

The description entered into SAP-WMS for the renewals project is '*Refurbish Pump - Selma Pstn Pun2 - bearings, bushes, sleeves*'. Pump No. 2 is one of three pumps located within the Selma pump station. Pump No.2 has been in operation since 1974 and an asset life of 50 years has been entered into the SAP-WMS system. The estimated asset life for large pumps is listed in SunWater's Asset Hierarchy Guide as 60 years. The estimated replacement cost of the pump is $229,317 ($ 2008). SAP-WMS indicates that the pump is scheduled to be refurbished every five years.

A review of SunWater's historical renewals expenditure indicates that the most recent refurbishment (code 10ELA18) occurred in 2010 at a cost of $55,321 ($2010). A second entry in the historical renewals for 2010, (code 10EIA25 '*Refurbish Motor - Selma Pstn Pun2 - Varnish, bake & bearings*') indicates expenditure of $18,317 (versus a budget of $25,470 ($2010). It is also noted that a separate entry has been recorded in SAP-WMS to refurbish the Selma pump No. 2 in 2011 with projected expenditure of $65,475. It is understood that this refurbishment is expected to be a 'one-off' refurbishment as the frequency of occurrence entered into SAP-WMS is 500 years.

Over the most recent five year period, and including budgeted expenditure in 2011, a total of approximately $146,000 is forecast to refurbish pump No.2. This is equivalent to approximately 64 percent of the asset replacement. Halcrow notes that it may be worthwhile performing a detailed investigation of the remaining life of the pump to assess whether a replacement pump would lead to more efficient expenditure over the longer term.

The most recent condition assessment of the pump was undertaken in March 2010, at which time it was recorded that the pump exhibited moderate deterioration with minor refurbishment required to ensure ongoing reliable operations.

Based on the available information, Halcrow recommends that a whole of life assessment is made of pump No.2 to determine the benefits of the refurbishment versus replacement.

5.3.4 Treatment of channel lining projects

As part of the second round consultation, stakeholders raised the issue of whether replacement of channel lining should be paid from renewals or from the proceeds of the sale of WAEs used to fund the initial lining of the distribution channels.[125]

SunWater has indicated that the channel lining projects were undertaken in Emerald to reduce system leakage and in doing so improve channel efficiency. It confirmed that the original projects were funded by the sale of converted water allocation, and that because of this, there is no requirement to include revenue from the sale of water allocations as a revenue offset.[126]

[125] QCA, *Second Round Consultation – Issues Arising for Nogoa Mackenzie WSS*, 11 April 2011.
[126] SunWater, *Doc#1079202 – Information request by HALCRO.DOC*, email dated 31 May 2011.

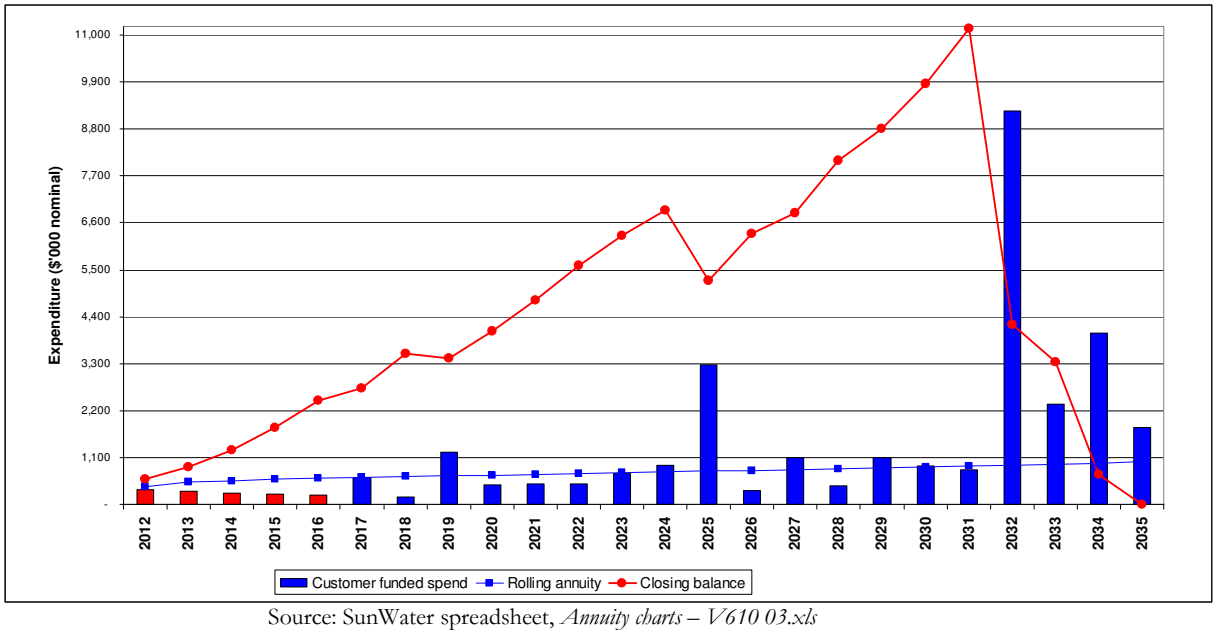
Further comment regarding the validity of this approach is beyond the scope of Halcrow's review.

5.3.5 Renewals annuity

The renewals annuity for the bulk and distribution systems was previously bundled (ie. the bulk and distribution systems were considered collectively). SunWater has adopted a renewals annuity approach for the five year period ending 2016. The total renewal annuity is $2.707 million over this period, averaging $541,000 per year in nominal terms. The opening balance is +$478,000.

The trend in renewals expenditure is expected to increase in real terms given several significant out-year expenditures in 2025 and 2032. A review of these expenditures has been discussed in **Section 5.3.3**.

Figure 5-4 shows the rolling annuity and the annuity closing balance through time. As evident from the graph, SunWater's annuity closing balance is forecast to be significantly in surplus until the proposed channel relining project in 2032. Deferral of this project or a change to the project scope (ie. replacement with HDPE lining) will have a significant impact on the renewals annuity.



Source: SunWater spreadsheet, *Annuity charts – V610 03.xls*

Figure 5-4 Emerald - Renewals Annuity ($ nominal)

5.3.6 Summary of findings on renewals expenditure

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow sought to undertake a detailed review of seven forecast renewals projects. The projects selected covered a substantial element of SunWater's proposed renewals program.

As previously noted, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects beyond 2012 has been provided. Where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure. In addition, during the site visit to the Emerald Distribution Scheme, inspections were focussed (to the extent possible) on the selected projects.

On the basis of the review undertaken, Halcrow is generally satisfied that the proposed expenditure is prudent and efficient. However, for some of the projects reviewed, Halcrow is of the opinion that the costs appear excessive, or that there may be scope to defer the proposed expenditure (due to inconsistency in recurrence forecasts).

Table 5-20 summarises the proposed adjustments.

Table 5-20 Emerald –Proposed Renewals Program Adjustments

Halcrow Review ID	Year/Adjusted Year	SunWater Description	Project Direct Cost ($2011 real)	
			SunWater Proposed ($000)	Halcrow Adjusted ($000)
Selma Irrigation Distribution				
LIW/5	2032	Replace Concrete Lining (2032)	4,279	555
Selma Pump Station				
LIW/6	2013 and 2028 Adjustment: 2018 and 2033	Replace Logic and Control	137	137

The following were noted as part of review of Emerald renewals expenditure:

- There appears to be a delay in the updating of SAP-WMS with new condition assessments, reflecting refurbished asset conditions.
- Some asset renewals expenditure is split over consecutive years, even though it relates to assets that are part of the same facility. Halcrow notes that it may be more efficient for this work to be undertaken in the same year, to reduce impacts on customers and to increase efficiency of the expenditure.
- For large expenditure such as replacement of concrete lining, alternative options to reduce expenditure should be assessed well in advance of programmed implementation.
- Halcrow notes that SunWater uses a condition assessment approach to inform final programming, and this may see movement in timelines, both forwards and backwards. This approach was supported by discussions with SunWater operators who identified cases where programmed activities had been pushed back and or brought forward.

6 Lower Fitzroy

6.1 Scheme Description

The Lower Fitzroy Bulk Water Supply Scheme (WSS) is located near Rockhampton; it forms part of SunWater's Central region. The scheme has only one key asset, the Eden Bann Weir, which is located on the Fitzroy River. Other assets include the Stanwell Pump Station, the 28 kilometre Stanwell Pipeline and the land on which they stand, however, these assets have been excluded from the Scope of Halcrow's assessment and are not detailed in the Lower Fitzroy NSP.[127]

The Eden Bann Weir is regulated under SunWater's Resource Operating Licence (ROL) and is listed in the Fitzroy Basin Resource Operations Plan (ROP).

The scheme has 24 bulk water customers and comprises 3,100 megalitres (ML) of medium priority Water Access Entitlement (WAE) and 25,520ML of high priority WAE.[128]

Water supplied by SunWater in the Lower Fitzroy WSS is used for industrial and agricultural purposes, however, the primary use for the scheme is to supply cooling water via the Stanwell Pipeline to the Stanwell Power Station.[129] The majority of agricultural customers draw directly from the Lower Fitzroy River, although some are also supplied from the Stanwell Pipeline.

6.2 Operating Expenditure

6.2.1 Overview

SunWater historical operating expenditure has been variable for the Lower Fitzroy Bulk WSS. The lowest expenditure over the historical path occurred in 2008 ($188,000), with the highest expenditure occurring the following year in 2009 ($327,000). Expenditure in 2011 is budgeted at $265,000, and is forecast to marginally increase every year until 2014 ($292,000), and then reduce steadily until 2016 ($277,000). A breakdown of operating expenditure by Activity and Type is provided in **Figure 6-1** and **Figure 6-2**.

[127] SunWater (2011), Scheme Information http://sunwater.com.au/schemes accessed 24 February 2011.
[128] SunWater, *Lower Fitzroy Water Supply Scheme Network Service Plan,* page 13.
[129] SunWater (2011), Scheme Information http://sunwater.com.au/schemes accessed 24 February 2011.

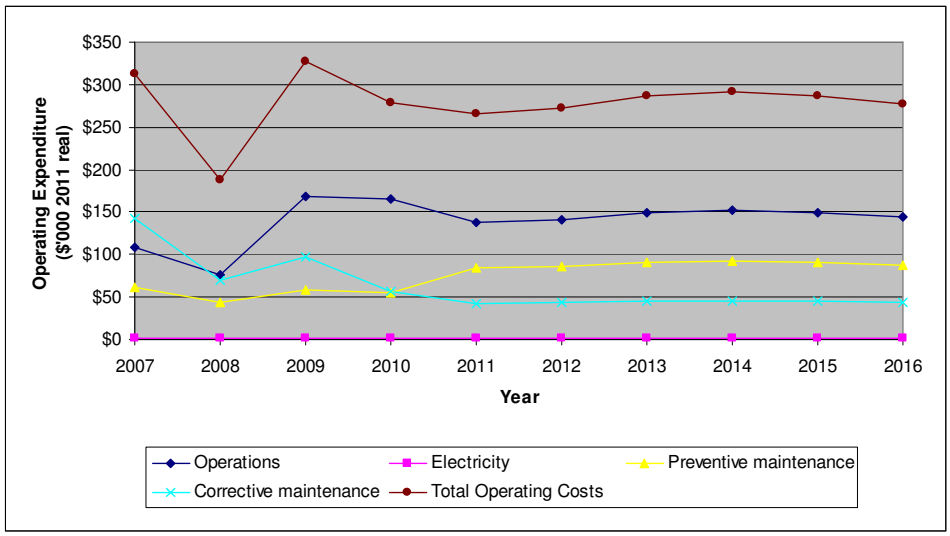


Figure 6-1 Operating Expenditure by Activity for Lower Fitzroy

As evident from **Figure 6-1** expenditure on 'Operations' has typically accounted for the majority of operating expenditure. In 2007 it accounted for approximately 35 percent of total operating costs, increasing to 59 percent in 2010. SunWater's forecast indicates that 'Operations' will account for 52 percent of operating expenditure for 2011 over the period 2012 to 2016.

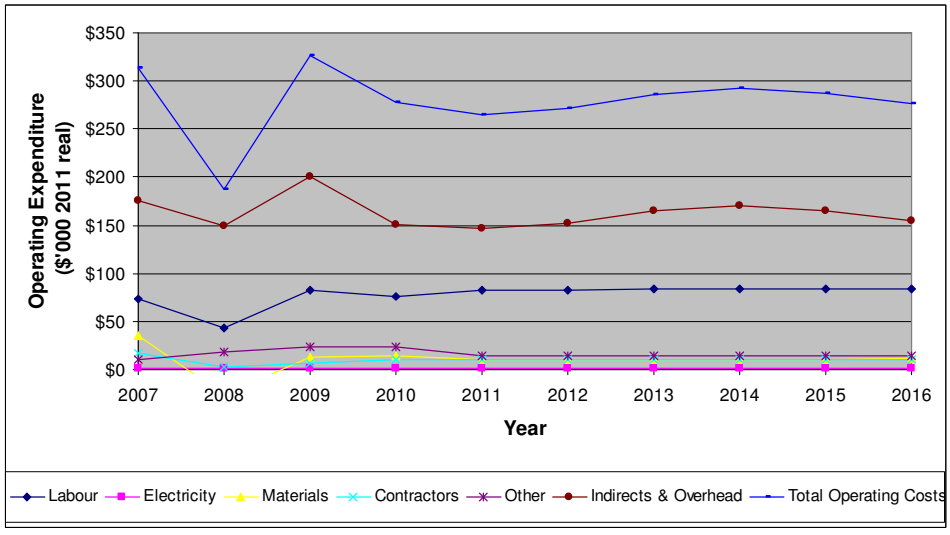


Figure 6-2 Operating Expenditure by Type for Lower Fitzroy

'Indirects & Overhead' expenditure represents the largest component of operating costs (by Activity). Expenditure on 'labour' and 'other' are the most significant components of direct expenditure. As evident from **Figure 6-2**, excluding the impact of 'Indirects & Overheads', SunWater's forecast operating expenditure is relatively stable in the period to 2016.

Table 6-1 includes a breakdown of historical and proposed operating expenditure for the Lower Fitzroy Bulk WSS, while **Table 6-2** includes a breakdown of historical and proposed operating expenditure by Type.

Table 6-1 Operating Expenditure by Activity for Lower Fitzroy

Item ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Operations	109	76	169	165	138	141	149	152	149	144
Electricity	1	1	1	1	1	1	1	1	1	1
Preventive maintenance	61	43	59	55	84	86	91	93	91	88
Corrective maintenance	142	69	97	57	42	43	45	46	45	44
Revenue offsets	0	-1	0	0						
Operating Costs	**313**	**188**	**327**	**278**	**265**	**272**	**286**	**292**	**287**	**277**

Source: Extracted from SunWater Lower Fitzroy Water Supply Scheme NSP, page 6.

Table 6-2 SunWater Expenditure by Type for Lower Fitzroy

Activity ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	73	43	82	76	82	83	84	84	84	84
Electricity	1	1	1	1	1	1	1	1	1	1
Materials	35	-26	13	15	11	11	11	11	11	12
Contractors	17	3	6	10	10	10	10	10	11	11
Other	11	19	23	24	15	15	15	15	15	15
Indirects & Overhead[130]	176	149	201	151	147	152	165	171	165	155
Revenue offsets	0	-1	0	0						
Total Operating Costs	**313**	**188**	**327**	**278**	**265**	**272**	**286**	**292**	**287**	**277**

Source: Extracted from SunWater Lower Fitzroy Water Supply Scheme NSP, page 7.

The following sections provide a detailed review and discussion of the key elements of SunWater's proposed direct operating expenditure by Activity.

6.2.2 Operations

Operational activities associated with the Lower Fitzroy Bulk WSS include releasing of water, reading meters, water quality monitoring, compliance reporting, site inspections and environmental management. Operational activities for the scheme are identified in the *Lower Fitzroy Water Supply Scheme – Scheme Operation Manual*.[131]

[130] Indirect and Overhead expenditure are excluded from the scope of this review.
[131] SunWater, *Lower Fitzroy Water Supply Scheme: Scheme Operation Manual*, Version 1-1, undated.

The ROP dictates the operation and management of Eden Bann Weir. Customers are not required to order water, and instead can take water directly from the river or from offtakes from the Stanwell Pipeline.

The IROL and the ROP list the volumetric and quality monitoring that SunWater is obligated to undertake. Monitoring the presence of Blue Green Algae is also undertaken as required.

A significant element of the operational activities undertaken on the scheme relates to collecting and reporting of data relating to water supply, the environment and safety. SunWater uses a range of systems to collect and report data in the required formats. Reporting requirements are identified in a number of documents and are summarised in the *Scheme Operation Manual*.

A breakdown of historical expenditure into key operations sub-activities is shown in **Table 6-3**. A similar breakdown for forecast expenditure has not been provided.

Table 6-3 Lower Fitzroy – Breakdown of Historical Operations Expenditure

($ '000 2011 real)	Historical			
	2007	2008	2009	2010
Customer Management	-	-	-	1
Workplace H&S	-	-	-	-
Environmental Management	16	20	40	18
Water Management	7	1	47	23
Scheme Management	40	31	49	85
Dam Safety	-	-	8	6
Schedule/Deliver	44	23	18	23
Metering	-	1	7	8
Facility Management	-	-	-	-
Other	2	-	-	2
Total	**109**	**76**	**169**	**165**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion down to sub activity.xls*',

As evident from **Table 6-3**, the key elements of operations expenditure relate to scheme management, water management, delivery of water and environmental management.

Table 6-4 provides a breakdown of historical and forecast expenditure on operations at the Lower Fitzroy Bulk WSS.

Table 6-4 Lower Fitzroy – Operations Expenditure

Type ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	30	16	43	47	44	44	45	45	45	45
Materials	-2	-35	0	3	1	1	1	1	1	1
Contractors	8	2	1	1	1	1	1	1	1	1
Other	2	16	21	22	15	15	15	15	15	15
Total Direct Costs	**38**	**-1**	**64**	**73**	**60**	**60**	**61**	**62**	**62**	**61**
Indirects	37	24	58	42	35	37	43	51	45	38
Overheads	33	53	47	51	43	44	45	51	48	44
Total	**109**	**76**	**169**	**165**	**138**	**141**	**149**	**164#**	**154#**	**144**
Annual change (%)		-30%	122%	-3%	-16%	2%	5%	10%	-6%	-7%
Change since 2007 (%)		-30%	56%	52%	27%	30%	37%	51%	41%	32%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.
Note (#) Minor differences in expenditure between this table and the NSP relates to indirects and overheads. The figures in the NSP are correct.

SunWater has explained that the negative expenditure on materials in 2008 relates to a 'settlement error'. The positive amount was allocated to the Stanwell pipeline. It has noted that forecast expenditure is based on prior year costs, excluding the impact of such errors.

The key elements of direct expenditure relate to labour and 'other'. Average expenditure on labour over 2007 to 2010 was $34,000, although expenditure in 2009 and 2010 was significantly greater than in 2007 and 2008. The forecast expenditure is in line with expenditure in 2009 and 2010. From the information provided to this review, it is not evident why expenditure on labour has fluctuated since 2007. A review of the storage volume at Eden Bann Weir indicates that storage volumes generally remained above 35,000ML over the period since 2007, with the exception of 2009, when storage fell to approximately 11,000ML. Consequently, Halcrow has been unable to verify the reason for the increase in labour expenditure on labour since 2007.

SunWater has provided an extract of its resource planning tool used to develop labour forecasts for 2012. Halcrow has been able to confirm that the forecast labour expenditure has been built up using the methodology outlined in **Section 3.6.6**. The extract provided indicates that the direct labour charge for operations to the Lower Fitzroy Bulk WSS in 2012 is based on approximately 600 hours per annum for operations staff from the Central resource centre and the Asset Management resource centre. This accounts for approximately $33,000 per annum of the labour expenditure. This is equivalent to approximately 0.4 FTE staff working on operations. In order to assess whether this allowance is reasonable, more information is required on the reasons why labour hours have increased so significantly since 2007, particularly in light of the recent

organisational review to identify savings which resulted in the centralisation of services, and reductions to staff numbers.

Labour hours and charges for Corporate Council, Strategy, Health & Safety and Services Delivery resource centres are not shown on the extract of the resource planning tool provided, but account for approximately $11,000 per annum of direct labour expenditure. SunWater has not provided documentation detailing how this expenditure has been forecast.

The labour forecast includes real increases of 1.5 percent in 2012 and 2013, which is consistent with its Enterprise Agreement (of an increase of four percent nominal for 2012 and 2013). Labour is forecast to remain steady (in real terms) thereafter.

SunWater has forecast a reduction in 'other' expenditure, to $15,000 in 2011; expenditure is forecast to remain steady thereafter. SunWater noted that this is driven by a reduction in insurance costs due to the increase in asset value from other service contracts (the insurance premium calculation is based on the asset value for all SunWater assets).[132] Insurance accounts for $12,000 per annum, whilst Local Authority rates account for $2,000. SunWater is required by law to pay Local Authority rates and Land Tax and this expenditure is therefore considered appropriate.

6.2.3 Preventative maintenance

Table 6-5 provides a breakdown of historical and forecast expenditure on preventative maintenance.

Table 6-5 Lower Fitzroy – Preventative Maintenance Expenditure

Expenditure ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	17	11	16	16	27	27	28	28	28	28
Materials	3	1	4	0	4	4	4	4	4	4
Contractors	0	0	1	8	5	5	5	5	5	5
Other	2	1	0	0	0	0	0	0	0	0
Total Direct Costs	**22**	**14**	**20**	**24**	**36**	**36**	**37**	**37**	**37**	**37**
Indirects	21	17	21	14	22	23	27	28	26	24
Overheads	18	13	17	17	27	27	28	28	28	27
Total	**61**	**43**	**59**	**55**	**84**	**86**	**91**	**93**	**91**	**88**
Annual change (%)		-30%	36%	-6%	53%	3%	5%	2%	-2%	-3%
Change since 2007 (%)		-30%	-4%	-10%	37%	41%	48%	52%	49%	44%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central - 610.03.PSV*'.

[132] SunWater email, *Questions on cluster 3.doc*, dated 16 March 2011.

As evident from **Table 6-5**, SunWater is forecasting a significant jump in preventative maintenance as compared to its historical expenditure. Of the direct expenditure, this is primarily driven by an increase in expenditure on labour and contractors.

SunWater provided a breakdown of historical expenditure into condition monitoring, servicing and weed control, shown in **Table 6-6**. While a similar breakdown has not been provided for forecast expenditure, the table shows the historical fluctuations in preventative maintenance activities.

Table 6-6 Lower Fitzroy – Preventative Maintenance Expenditure

Expenditure ($ 2011 real)	Historical			
	2007	2008	2009	2010
Condition Monitoring	39	34	44	48
Servicing	23	9	13	4
Weed control	-	-	2	3
Total	**61**	**43**	**59**	**55**

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

The expenditure in 2007 is significantly greater than the expenditure in 2008 to 2010. Halcrow understands that the reason for this is the transfer of financial data into SunWater's revised Business Operating Model, which came into effect on 1 July 2008. This involved the reclassification of some activities, including some tasks previously coded as refurbishment projects to preventative maintenance codes.[133]

As noted in **Section 3.6.3.2**, Halcrow understands that SunWater's condition monitoring and servicing forecast expenditure is primarily based on forecasts developed by Parsons Brinkerhoff, although it also includes allowances for additional servicing activities.

As part of the review undertaken by Parsons Brinkerhoff, it forecast expenditure of approximately $27,300 per annum ($2010 real) on condition monitoring and servicing for the coming price path period. This is equivalent to approximately $28,200 per annum ($2011 real), which excludes overhead and indirect costs. A review of the maintenance activities costed by Parsons Brinkerhoff indicates that some maintenance activities are associated with the Stanwell pipeline and pumping station.[134] The expenditure associated with this is approximately $3,100 per annum ($2010 real), which is equivalent to approximately $3,200 per annum ($2011 real). As this expenditure does not relate to the irrigation scheme, it should be excluded from the forecast of expenditure. As the breakdown of forecast expenditure provided to this review splits out expenditure into labour, materials, contractors,

[133] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 13.
[134] These costs were inadvertently included in the review by Parsons Brinkerhoff, which was focussed on NSP related expenditure only. The majority of maintenance activities associated with the pumping station and pipeline were not assessed.

rather than into condition monitoring, servicing and weed control, it has not been possible to confirm that the forecast appropriately excludes expenditure associated with the Stanwell pipeline and pumping station. However, SunWater has confirmed that expenditure on the Stanwell pipeline has been excluded from the NSP.

Halcrow is generally satisfied that the expenditure forecast developed by Parsons Brinkerhoff is based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken. Excluding the expenditure associated with the Stanwell pipeline, the annual expenditure is approximately $25,000 per annum. However, Halcrow notes that this estimate is built up from SunWater's existing work instructions and its current approach to maintenance, which is yet to be optimised. Consequently, it is likely that there is scope to achieve efficiency savings in the delivery of servicing and condition monitoring activities. These savings are not currently reflected in the expenditure presented in the NSP.

Accounting for the forecast expenditure developed by Parsons Brinkerhoff, the remaining expenditure on preventative maintenance is approximately $11,000 per annum. As noted in **Section 3.6.3.2**, the forecast of preventative maintenance expenditure also includes expenditure related to weed control, and "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves*".[135] SunWater has not provided any information on how it has forecast expenditure relating to these activities other than to note that it has been calculated from an average of prior years' expenditure.

The breakdown of expenditure provided by SunWater indicates an allowance of $5,000 per annum for contractors for the fish lock at Eden Bann Weir (maintenance of the fish lock is not included in the Parsons Brinkerhoff forecast expenditure). SunWater noted that this expenditure relates to crane hire (from Rockhampton), which is required to install the bulkhead gate to enable work on the fishlock. It noted that an excavator is also required from time to time to remove sand and silt blocking the entrance and exit to the lock. In addition, it includes $1,000 for chemicals and $3,000 for materials (construction). While the limited available information on this expenditure means that Halcrow is not able to comment in detail on its prudence or efficiency, the expenditure does not appear unreasonable.

In the absence of justification for the remaining $2,000 per annum, an adjustment of the forecast preventative maintenance expenditure by this amount is proposed.

6.2.4 Corrective maintenance

Table 6-7 shows a breakdown of historical and forecast expenditure on corrective maintenance. As evident from the table, expenditure on corrective maintenance has fluctuated over the period; with expenditure in the coming price path period forecast to be lower than the current price path.

[135] SunWater email, *RE Preventative Maintenance*, 9 March 2011.

Table 6-7 Lower Fitzroy – Corrective maintenance expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	26	16	23	14	11	11	11	11	11	11
Materials	33	7	9	11	7	7	7	7	7	7
Contractors	9	2	4	1	4	4	4	4	4	4
Other	7	2	2	2	0	0	0	0	0	0
Total Direct Costs	**76**	**26**	**40**	**28**	**22**	**22**	**22**	**23**	**23**	**23**
Indirects	34	24	32	13	9	9	11	12	11	10
Overheads	32	19	26	16	11	11	12	12	12	12
Total	**142**	**69**	**97**	**57**	**42**	**43**	**45**	**46**	**45**	**44**
Annual change (%)		-52%	42%	-42%	-26%	2%	5%	2%	-1%	-3%
Change since 2007 (%)		-52%	-31%	-60%	-70%	-70%	-68%	-68%	-68%	-69%

As noted in **Section 3.6.4**, SunWater's forecast expenditure is based on an average of the past four years (including 2011), excluding outliers. The forecast expenditure on labour and materials is lower than the four year average.

SunWater has not provided Halcrow with the calculations in support of its forecast of corrective maintenance, however, a breakdown of the expenditure indicates labour charges of $11,000 which relate to staff from the SunWater's Central region. The materials expenditure includes $3,000 for heavy plant.

As part of the review, Halcrow obtained a breakdown of corrective maintenance work orders for the period 2009 to 2011 for Lower Fitzroy. The breakdown of work orders indicates expenditure is different to that that identified in **Table 6-7,** however, Halcrow understands this is because some work orders run over multiple years. The corrective maintenance activities undertaken include repairs to the fishlock, control equipment, meters and gates. In 2010, SunWater incurred approximately $47,000 ($ nominal) on flood repairs at the Eden Bann Weir.

Halcrow notes that it is very difficult to accurately forecast corrective maintenance expenditure. SunWater's approach, which uses historical expenditure to forecast expenditure, is commonly adopted by water utilities. This is an appropriate methodology for forecasting expenditure, however, it is also noted that SunWater has proposed an increase in preventative maintenance expenditure over the coming price path period. Halcrow notes that increases in preventative maintenance activities should ultimately result in a reduction in corrective maintenance, as asset reliability increases.

As shown in **Table 6-8**, expenditure on corrective maintenance has typically exceeded expenditure on preventative maintenance in the period to 2010, and SunWater is forecasting that this trend will continue in the period to 2016.

Table 6-8 Lower Fitzroy – Maintenance expenditure

Direct Expenditure ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Preventive maintenance	22	14	20	24	36	36	37	37	37	37
Corrective maintenance	76	69	97	57	42	43	45	46	45	44
Total Maintenance	**98**	**83**	**117**	**81**	**78**	**79**	**82**	**83**	**82**	**81**
Annual change (%)		-15%	42%	-31%	-5%	2%	3%	1%	-1%	-1%
Change since 2007 (%)		-15%	20%	-17%	-21%	-19%	-16%	-15%	-16%	-17%
Preventative Maintenance (%)	22%	17%	17%	30%	46%	46%	45%	44%	45%	46%
Corrective Maintenance (%)	78%	83%	83%	70%	54%	54%	55%	56%	55%	54%

As noted in **Section 3.6.4**, it is commonly accepted that there is an optimum mix of preventative and corrective maintenance. The optimum mix represents the most economical combination of preventative and corrective maintenance activities to achieve a desired set of outcomes. SunWater's proposed mix of preventative to corrective maintenance is approximately 45%:55% (corrective:preventative). Whilst the predominance of assets in the scheme are long life civil infrastructure, there are a number of items of mechanical and electrical equipment which would be expected to have a relatively high component of preventative maintenance as compared to corrective maintenance. In Halcrow's experience, a reactive approach to maintenance, as demonstrated by the significant proportion of corrective maintenance, is much less likely to result in efficient maintenance outcomes. Consequently, there is likely to be scope for SunWater to optimise its proposed corrective and preventative maintenance programs. However, without undertaking a detailed review of SunWater's maintenance approach, it is not possible to quantify with any certainty what savings might be achieved.

6.2.5 Electricity

Expenditure on electricity is immaterial, and has remained constant at approximately $1,000 per year over the historical period, as shown in **Table 6-9**. This represents less than 0.5 percent of total expenditure. SunWater has indicated that the electricity cost relates mainly to the operation of Eden Bann Weir, which is the only key asset within the scheme.

Table 6-9 Lower Fitzroy – Electricity Expenditure

Activity ($ '000 '2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity	1	1	1	1	1	1	1	1	1	1
Annual change (%)		0%	0%	0%	0%	0%	0%	0%	0%	0%
Change since 2007 (%)		0%	0%	0%	0%	0%	0%	0%	0%	0%

SunWater has based its forecast of electricity on its 2011 budgeted expenditure. The 2011 budget is based on actual expenditure in 2010 ($1,130 nominal), inflated by 13.29 per cent to account for the increase in franchise tariffs. SunWater has forecast that expenditure on electricity will remain constant in real terms over the price path. Noting that the expenditure has remained steady in the period since 2007, SunWater's forecast expenditure appears appropriate.

More detailed discussion on SunWater's approach to forecasting electricity costs, and methods by which it seeks to optimise expenditure on electricity is included in **Section 3.6.5**.

6.2.6 Summary of findings on operating expenditure

Insufficient detail on both historical and forecast expenditure has limited the ability of Halcrow to undertake a detailed assessment of the prudence and efficiency of SunWater's proposed operating expenditure. In particular, it has not been possible to make an assessment of all elements of SunWater's proposed expenditure on operations and preventative maintenance. However, where some information has been made available, Halcrow is generally satisfied that the expenditure appears reasonable.

Notwithstanding the above, some minor adjustments are proposed in respect of escalation on materials and contractor costs, preventative maintenance costs associated with the Stanwell Pipeline and unjustified preventative maintenance costs.

Halcrow also notes that there is likely to be some scope for SunWater to achieve efficiencies in its forecast expenditure program, via the review and optimisation of its planned and corrective maintenance programs.

In view of the preceding, Halcrow recommends adjustments to the forecast operating expenditure (direct costs) for the Lower Fitzroy Bulk WSS as shown in **Table 6-10**.

Table 6-10 Lower Fitzroy – Proposed Adjustments to Operating Expenditure (2012 – 2016)

Item ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
SunWater Proposed Total Direct Costs	**120**	**121**	**121**	**122**	**123**
Adjustments:					
▪ less escalation on materials	0	0	0	0	-1
▪ less escalation on contractors	0	0	0	-1	-1
▪ less Preventative Maintenance costs associated with Stanwell Pipeline	-3	-3	-3	-3	-3
▪ less unjustified Preventative Maintenance costs	-2	-2	-2	-2	-2
Total Reduction	-5	-5	-5	-6	-7
Halcrow Adjusted Direct Costs	**115**	**116**	**116**	**116**	**116**

6.3 Renewals Expenditure

6.3.1 Overview

Table 6-11 provides a high level summary of SunWater's renewals program for Lower Fitzroy Bulk WSS over the five-year regulatory period.

Table 6-11 Lower Fitzroy- Proposed Renewals Program (2012 – 2016)

Facility ($ '000 2011 real)	Financial Year					5-yr Total
	2012	2013	2014	2015	2016	
Eden Bann Weir	68	24	32		40	164
Lower Fitzroy River Distrib					7	7
Scheme			31	12		43
Total	**68**	**24**	**63**	**12**	**47**	**214**

Source: SunWater Lower Fitzroy Water Supply Scheme NSP, Table 4-4, page 27.

As noted in **Table 6-11**, the majority of the renewals expenditure to be incurred in the period to 2016 relates to Eden Bann Weir.

SunWater provided Halcrow with a breakdown of its proposed renewals expenditure by project for the 25 year period to 2036. The breakdown indicates significant renewals expenditure in 2022, 2023, 2036 and 2031.

In its NSP, SunWater has provided a forecast of expenditure beyond the price path. This is shown in **Figure 6-3**.

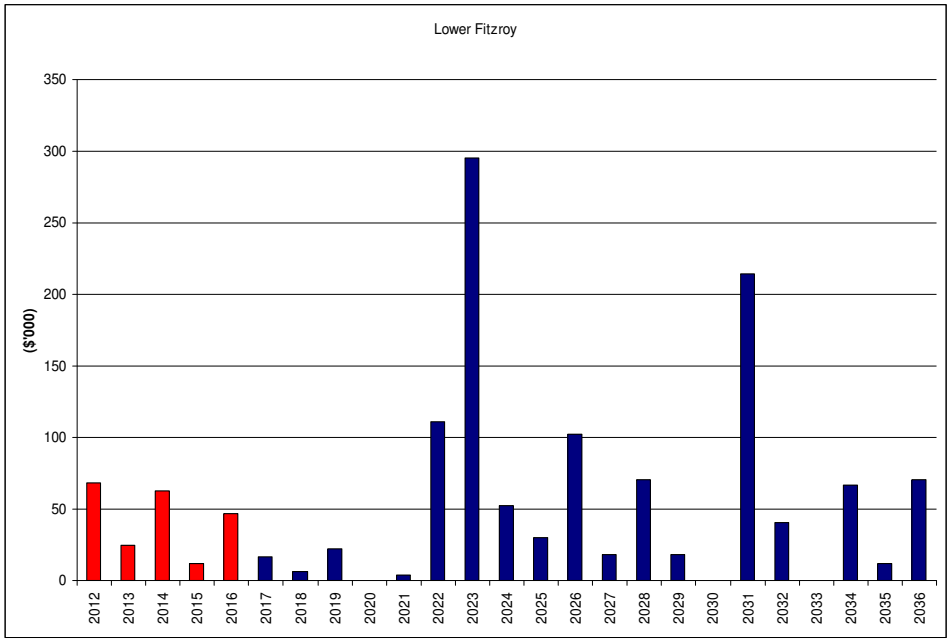


Figure 6-3 Lower Fitzroy – Proposed Renewals Program

As part of the review of the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow undertook a review of a selection of historical and proposed renewals projects. The review of historical renewals projects sought to understand the factors contributing to the difference between SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure identified in the previous Tier 1 pricing review. The detailed review of forecast renewals projects included a review of project planning and proposed outcomes to assess the prudence and efficiency of SunWater's proposed renewals expenditure.

The following sections detail the results of this review.

6.3.2 Review of historical renewals expenditure

Table 6-12 shows SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure determined during the previous pricing review.

As evident from **Table 6-12**, SunWater's actual expenditure has exceeded the LBC target expenditure in 2009 and in 2011.

Table 6-12 Lower Fitzroy - Actual renewals expenditure versus LBC Target expenditure

$'000 nominal	Financial Year				
	2007	2008	2009	2010	2011
Actual renewals Expenditure	2	6	56	18	158
LBC Target Expenditure	-	11	-	30	55
Difference	2	-5	56	-11	102

Source: SunWater spreadsheet, *Compare R&E Spend to Annuity 2007_2011.xls.*

As noted in **Section 3.8.2**, SunWater has not been able to provide a list of renewals projects that it intended to deliver during the current price path; consequently, it has not been possible to undertake a detailed review of SunWater's historical renewals expenditure. Halcrow did, however, obtain a breakdown of SunWater's historical expenditure on renewals expenditure for the period 2007 to 2011 (until 15 February) for projects greater than $10,000.[136] Significant expenditure in the current price path has included:

- Refurbish Hydraulics System - Replace Minor Valves, Service Cylinders - Eden Bann Fishlock ($28,581, in 2009; Board approved budget $20,432). SunWater noted that the additional expenditure was required as additional work was identified after the work had commenced. The expenditure involved removal of the lock inlet and outlet rams, refurbishment of inlet and outlet rams in Rockhampton, installation of new rods and seals, and reassembly.
- Regrade and Reshape Road ($6,345 in 2010). It is assumed that this work comprises renewal of an access road to the weir; the expenditure is considered minimal for work of this nature.

SunWater's 2011 budget includes significant expenditure in 2011, including:

- Fill Breech at End of Training Wall - Eden Bann Weir ($103,669 budget);
- Refurb Outlet Works Screen - Eden Bann Weir ($21,075 budget); and
- Modify Lower Ladder to Extend to Top of Fishlock - Eden Bann Weir ($25,108 budget).

6.3.3 Review of forecast renewals expenditure

6.3.3.1 Overview

In order to assess the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow selected five renewals projects to review in detail. Of the projects selected for review, three are forecast for the period 2017 to 2036, and they include the projects contributing to the significant expenditures in 2022 and 2023.

The projects selected for review are included in **Table 6-13**. The projects selected account for approximately 52 percent of the expenditure in the period 2012 to 2016.

[136] The listing of actual expenditure on renewals and rehabilitation indicates expenditure significantly lower than that reported in the NSP. However, the listing of expenditure provided only included projects greater than $10,000 in value, which indicates that a significant element of renewals projects were lower than this threshold.

Table 6-13 Lower Fitzroy – Selections from Proposed Renewals Program

Halcrow Review ID	Year	SunWater Description	Project Cost		Total Cost 2012 to 2036 ($000)[1]
			Direct Cost ($000)	Total Cost ($000)	
Eden Bann Weir					
LBF/1	2013 and 2028	13LFZ-Refurb F'Lock Fill& Drn Valves-EDEN	17	24	49
LBF/2	2023	Replace Hydraulic System	190	283	283
Scheme					
LBF/3	2014	Undertake facility review	20	31	31

Note (1): Total cost includes the cost of each recurring project within the period 2012 to 2036.

Halcrow requested that SunWater provide the following information

- the project scope and the driver for each project;
- the basis of expenditure forecast (unit rates, quantities etc); and
- condition reports/asset management plans demonstrating the need for the renewals expenditure.

For renewals projects planned for 2013 and beyond, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects was provided. This is because detailed planning is not currently undertaken until 12 months prior to the scheduled renewals date.

In lieu of this information, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure.

The following paragraphs include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency. Halcrow's review of each project has only considered the direct costs. Indirect costs and overheads, which have been applied to all projects, are the subject of a separate review.

6.3.3.2 *Eden Bann Weir*

SunWater has identified thirty three (33) renewals projects to be undertaken on Eden Bann Weir over the period 2016 to 2036. The QCA has advised that Eden Bann Weir is to be considered when assessing irrigation charges for the Lower Fitzroy scheme, and consequently it is appropriate for SunWater to include renewals schemes associated with this weir in its NSP.[137] The following paragraphs include a review of one of these schemes.

[137] Letter from Hon Stephen Robertson MP, Member for Stretton, to the Queensland Competition Authority, 28 September 2010.

LBF/1 Refurb F'Lock Fill& Drn Valves-EDEN and LBF/2 Replace Hydraulic System

The Eden Bann Weir Fish Lock is attached to the Eden Bann Weir and has been in operation since January 1995. The fish lock is hydraulically actuated and operates unattended in auto mode.[138] It is located near the left bank adjacent to the outlet works. Based on extracts from SAP-WMS, it is understood there are two butterfly valves used to control water levels located on the upstream and downstream sides.

The original asset life for the fish lock as reported in SAP-WMS is 60 years, however, no asset lives are entered into SAP-WMS for the valves or hydraulic components. It is noted that the hydraulics are planned to be replaced in 2023 after 28 years of operation. Whilst the timing of the proposed replacement works is at variance to the assigned asset life, Halcrow considers replacement after 20 years is more appropriate; consequently, replacement (after 25 years) is considered prudent.

Three condition assessments have been undertaken of the butterfly valves since 2000, with the most recent undertaken in January 2009. The condition assessment frequency appears to exceed the requirements recommended in SunWater's Mechanical Asset Guide, of every five years.[139] The most recent valve condition assessment found that the valves exhibited moderate deterioration with minor refurbishment required to ensure ongoing reliable operation.

Five condition assessments have been undertaken of the hydraulic system since 2000, with assessments since 2006 occurring at regular intervals of approximately every 12 months. This assessment frequency is in accord with SunWater's mechanical asset guide.[140] The most recent condition assessment, undertaken in October 2009 indicates that overall the hydraulic system is suffering moderate deterioration with minor refurbishment required to ensure ongoing reliable operation. The cylinder operation was recorded to be malfunctioning, motor/pump operation operating incorrectly and the protective enclosure showing advanced signs of deterioration. The asset was recorded to be between 50 to 75 percent of the age of asset refurbishment life.

Comments recorded in SAP-WMS indicate that:

- two to three needle valves are still original;
- the hydraulic pump and motor is still original;
- solenoid valves need to be replaced; and
- two hoses need to be replaced.

[138] SunWater, *Lower Fitzroy Water Supply Scheme: Scheme Operation Manual*, Version 1-1, undated.
[139] SunWater, *Users Manual for Assessing Mechanical Assets, Version 5.3*, 05 January 2009.
[140] SunWater, *Users Manual for Assessing Mechanical Assets*, Version 5.3, 05 January 2009.

Cross reference with historical renewals expenditure[141] indicates that this assessment was made after refurbishment of the hydraulics system was completed in March 2009 (at a cost of $28,581 nominal), which involved replacement of minor valves and service of cylinders.

The scheduled replacement of the butterfly valves in 2013 will not improve the condition of this asset, as this is only one element of the hydraulic system. It is understood that if the items listed in the bullet point above were replaced, this would result in a better condition rating of the hydraulic system. It is noted, however, that replacement of these items could be part of scheduled preventative or corrective maintenance.

A review of forecast expenditure indicates that there are no further refurbishments planned that would rectify the bulleted items listed above until the hydraulic system is replaced in 2023.

The risk assessment undertaken in 2005 indicates that should the fishlock fail, there is a low risk to SunWater in terms of WH&S, environment, financial, production/operations and stakeholder relations. The ROP[142] was reviewed to confirm the driver for the fish lock. No specific requirement for a fishlock could be found listed in the ROP, other than reference in Attachment 4.3G s2.4,[143] which requires that when SunWater becomes aware of a fish stranding downstream of Eden Bann Weir, or within the section affected by the operation of the weir, SunWater must investigate whether the event was associated with the Eden Bann Weir. It is noted that the Scheme Manual[144] requires reporting of fish incidents which may attract media attention.

A cost estimate has been prepared for *Refurbishment of the Fishlock Fill& Drn Valves* (LBF/2). Direct expenditure on contractors accounts for $11,800, labour $4,000 with no expenditure on materials forming part of this estimate.

Based on the information reviewed, the fish lock will likely require significant refurbishment to remain in operation another 12 years until 2023.

It is, however, noted that the total proposed renewals expenditure on the fish lock for the forthcoming 35-year period is $857,000. It is also noted that whilst historical maintenance expenditure was not reviewed, with the current condition likely to degrade over the coming years, forecast maintenance expenditure may be impacted.

Expenditure to refurbish the fish lock is considered prudent, however, in the absence of detailed information for such large programmed expenditure, Halcrow is unable to comment on efficiency.

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[141] SunWater, spreadsheet titled *2007-2011 projects.xls* on SunWater Disc 1, provided to Halcrow on 17 February 2011.
[142] DERM, Department of Environment and Resource Management, Fitzroy Basin Resource Operations Plan, January 2004, Amended July 2009 (revision 2).
[143] DERM, Department of Environment and Resource Management, Fitzroy Basin Resource Operations Plan, January 2004, Amended July 2009 (revision 2).
[144] SunWater, Lower Fitzroy Water Supply Scheme: Scheme Operation Manual, Version 1-1, undated.

6.3.3.3 Scheme

LBF/3 Undertake Facility Review

This renewals project is scheduled to take place in 2014 at a cost of $31,000 ($20,000 direct). From the information provided, Halcrow has been unable determine the nature or scope of this project. An extract from SAP-WMS indicates that a facility review is to occur every 500 years, however it is expected that this is an error.

In the absence of a condition assessment and further details, it has not possible to determine whether the expenditure on this item is prudent or efficient.

6.3.4 Renewals annuity

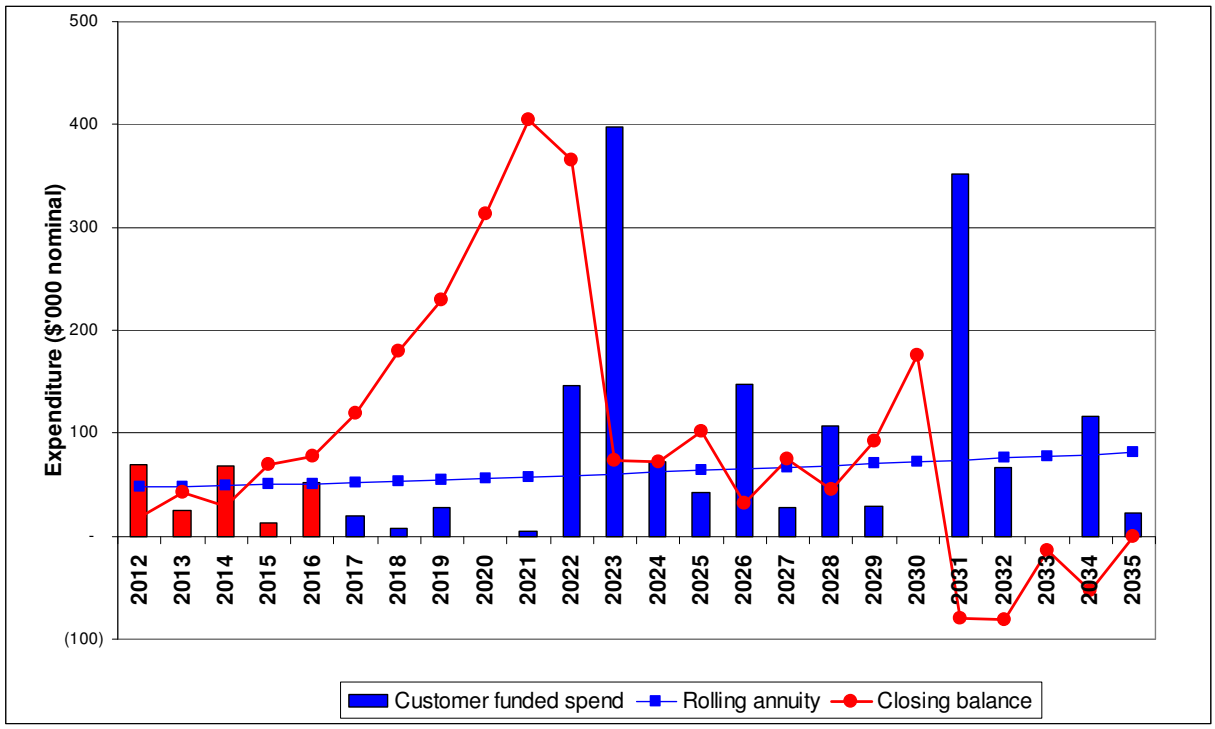
SunWater previously established an Asset Refurbish Annuity for the five year period 2006 to 2011 for this scheme. The five year average spend was $8,307.

SunWater has elected to continue with a renewal annuity approach for the five years to 2016. The total renewal annuity is $246,000 over this period, averaging $49,000 per year in nominal terms.

The renewals annuity for the period 2012 to 2016 appears significantly higher than for the previous five-year period, largely because significant expenditures in 2022, 2023, 2026 and 2031 are included. There is also a small opening balance of $36,000.

A review of a sample of these expenditures has been discussed in **Section 6.3.3**.

Figure 6-4 shows the rolling annuity and the annuity closing balance through time. As evident from the graph, SunWater's annuity closing balance is forecast to be significantly in surplus until the proposed replacement of the hydraulic system of the Eden Bann Weir Fish Lock in 2023.



Source: SunWater spreadsheet, *Annuity charts – V610 03.xls*

Figure 6-4 Lower Fitzroy - Renewals Annuity ($ nominal)

6.3.5 Summary of findings on renewals expenditure

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow has reviewed three projects in detail. However, as previously noted, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects beyond 2012 has been provided. This has limited the ability of Halcrow to assess the prudence and efficiency of the expenditure for these three projects. While two of the projects are considered prudent, it has not been possible to make an assessment on the efficiency of the proposed expenditure for any of the projects.

Table 6-14 summarises proposed adjustments identified as a result of the review.

Table 6-14 Lower Fitzroy –Proposed Renewals Program Adjustments

Halcrow Review ID	Year/Adjusted Year	SunWater Description	Project Direct Cost ($2011 real)	
			SunWater Proposed ($000)	Halcrow Adjusted ($000)
Eden Bann Weir				
LBF/2	2023	Replace Hydraulic System	190	#
Scheme				
LBF/3	2014	Undertake facility review	20	#

Note: # - Expenditure considered prudent, but insufficient information to assess efficiency.

7 Dawson Valley

7.1 Scheme Description

The Dawson Valley Bulk Water Supply Scheme (WSS) is located along the Dawson River extending from upstream of the town of Theodore to near Duaringa. It forms part of SunWater's Central region. The scheme has several key assets including the Glebe Weir, Gyranda Weir, Orange Creek Weir, Theodore Weir, Moura Offstream Storage, Moura Weir and Neville Hewitt Weir. These assets are all listed in the Fitzroy Basin Resource Operating Licence (ROP). The scheme also comprises some 300 kilometres of regulated river. SunWater has obligations in relation to the management and operation of these assets.

The Fitzroy Valley ROP groups the scheme into two sub-schemes referred to as Lower Dawson and Upper Dawson. The Lower Dawson covers the upstream limit of the Neville Hewitt Weir to the downstream end of the scheme and the Upper Dawson covers the remainder. Under the ROP model, the Gibber Gunyah and Theodore channel and drainage systems are in the Upper Dawson.[145]

The scheme has 146 bulk water customers; 43 of these customers take water directly from the distribution network. The scheme comprises 56,358 ML of medium priority Water Access Entitlement (WAE) and 5,579 ML of high priority WAE.[146]

Water supplied by SunWater in the Dawson Valley WSS is used for[147]

- agricultural irrigation of crops;
- urban water supply to the towns of Theodore, Moura, Baralaba and Duaringa; and
- industrial mining operations.

As a generalised statement, the combined Dawson Valley Bulk WSS and Theodore Distribution System is similar to the Nogoa/McKenzie Bulk WSS and Emerald Distribution System; in both cases, water is delivered to customers either directly from the river or via a channel distribution system.

SunWater does not own the land occupied by the pipelines and the channels in the Theodore and Gibber Gunya Sections.

The Dawson Valley Water Supply Scheme is managed from the Biloela Regional Centre.

[145] SunWater, *Dawson Valley Water Supply Scheme - Scheme Operation Manual*, undated, page 19.
[146] SunWater, *Dawson Valley Water Supply Scheme Network Service Plan,* page 13.
[147] SunWater (2011), Scheme Information http://sunwater.com.au/schemes accessed 24 February 2011.

7.2 Operating Expenditure

7.2.1 Overview

SunWater historical operating expenditure has fluctuated significantly since 2007. With the exception of 2008, expenditure on the scheme has increased; expenditure in 2011 is budgeted at $896,000, and is forecast to increase marginally in the period to 2016. A breakdown of operating expenditure by Activity and Type is provided in **Figure 7-1** and **Figure 7-2**.

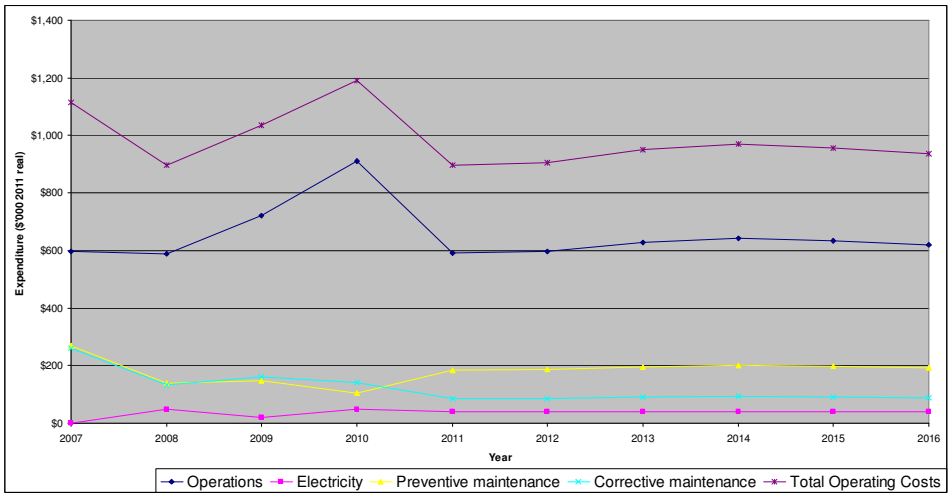


Figure 7-1 Operating Expenditure by Activity for Dawson Valley

As evident from **Figure 7-1**, expenditure on 'Operations' accounts for the majority of operating expenditure.

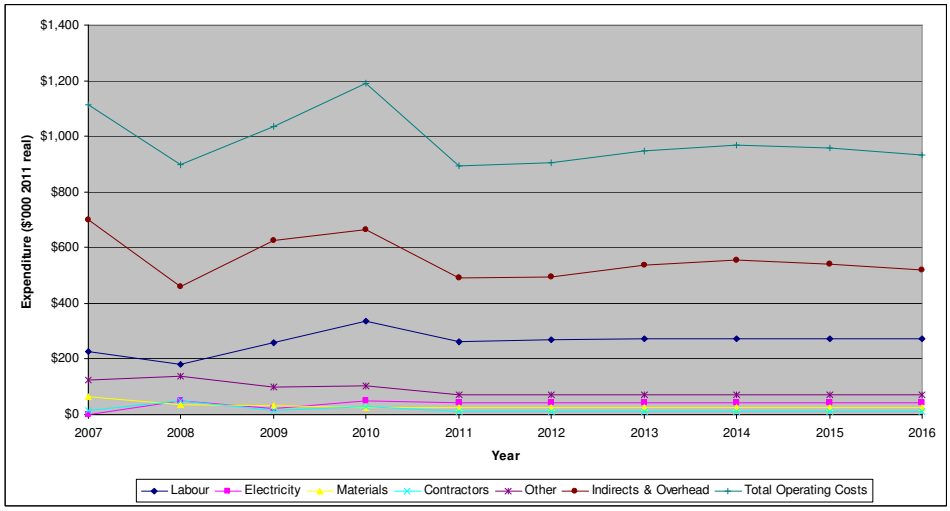


Figure 7-2 Operating Expenditure by Type for Dawson Valley

As shown in **Figure 7-2**, 'Indirects & Overhead' expenditure represents the largest component of operating costs (by Type). Expenditure on 'labour' and 'other' are the most significant components of the direct expenditure. Excluding 'Indirects & Overheads', SunWater's operating expenditure is forecast to remain relatively stable in the period 2012 to 2016.

Table 7-1 includes a breakdown of historical and proposed operating expenditure for the Dawson Valley Bulk WSS by Activity, and **Table 7-2** includes a breakdown of historical and proposed operating expenditure by Type.

Table 7-1 Operating Expenditure by Activity for Dawson Valley

Item ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Operations	598	587	722	910	592	598	628	642	633	618
Electricity	1	48	20	48	41	41	41	41	41	41
Preventive maintenance	269	140	147	104	184	186	196	200	197	193
Corrective maintenance	260	132	161	142	84	85	90	92	91	88
Revenue offsets	-14	-11	-14	-14	-5	-5	-5	-5	-5	-5
Operating Costs	**1,114**	**897**	**1,036**	**1,190**	**896**	**904**	**949**	**970**	**957**	**935**

Source: Extracted from SunWater Dawson Valley Water Supply Scheme NSP.

Table 7-2 SunWater Expenditure by Type for Dawson Valley

Activity ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	228	179	258	335	263	267	271	271	271	271
Electricity	1	48	20	48	41	41	41	41	41	41
Materials	63	34	31	25	23	23	23	24	24	25
Contractors	15	49	14	27	10	10	11	11	11	11
Other	122	139	100	103	72	72	72	72	72	72
Indirects & Overhead	699	459	627	665	492	495	536	556	542	520
Revenue offsets	-14	-11	-14	-14	-5	-5	-5	-5	-5	-5
Total Operating Costs	**1,114**	**897**	**1,036**	**1,190**	**896**	**904**	**949**	**970**	**957**	**935**

Source: Extracted from SunWater Dawson Valley Water Supply Scheme NSP.

The historical expenditure is less than the Tier 1 lower bound costs identified as part of the 2005/06 Irrigation Price Review.[148] However, a direct comparison of actual expenditure and the Tier 1 lower bound costs is not possible as the previous price review did not unbundle the Theodore Distribution Scheme from the Dawson Valley Water Supply Scheme. In addition, the Tier 1 Tables for 'scheme

[148] Statewide Irrigation Pricing Working Group, *SunWater Irrigation Price Review 2005-2006 Tier 1 Report*, April 2006.

irrigation lower bound cost' include only the irrigation share of the costs, and SunWater has indicated that grossing up of the costs is problematic.[149]

The following sections provide a detailed review and discussion of the key elements of SunWater's proposed direct operating expenditure by Activity.

7.2.2 Operations

Operational activities associated with the Dawson Valley Bulk WSS include scheduling and delivery of water, reading meters, water quality monitoring, compliance reporting, management of the Moura off-stream storage, site inspections, security management, and environmental management. Operational activities for the scheme are identified in the *Dawson Water Supply Scheme – Scheme Operation Manual*.[150]

The Dawson Valley Bulk WSS has seven major storages. The ROP includes rules in relation to minimum levels that storages can be drawn down to and the passing of river flows. Operations staff work to keep water levels in these storages at or above the nominal operating levels. The storage management process involves balancing upstream releases with water travel times, downstream releases, water losses and water taken.

Regulations for the operation of the Moura Fishway and the Neville Hewitt Fishlock are also described in the ROP. The fishways may be operated at any time as long as the volume of overflow/ ROP required releases are sufficient to operate the fishway successfully.[151]

The ROP lists the volumetric and quality monitoring that SunWater is obligated to undertake at six of the storages in the Dawson Valley Water Supply Scheme. Monitoring the presence of Blue Green Algae is also undertaken as required at four of the weirs as well as the Moura Offstream Storage.

A significant element of the operational activities undertaken on the scheme relates to collecting and reporting of data relating to water supply, the environment and safety. SunWater uses a range of systems to collect and report data in the required formats. Reporting requirements are identified in a number of documents and are summarised in the *Scheme Operation Manual*.

A breakdown of historical expenditure into key operations sub-activities is shown in **Table 7-3**. A similar breakdown for forecast expenditure has not been provided.

[149] SunWater, email from SunWater to the QCA, dated 23rd February 2011.
[150] SunWater, *Dawson Valley Water Supply Scheme - Scheme Operation Manual*, undated, page 39.
[151] Ibid, page 39.

Table 7-3 Dawson Valley – Breakdown of Historical Operations Expenditure

($ '000 2011 real)	Historical[152]			
	2007	2008	2009	2010
Customer Management	39	7	-	28
Workplace H&S	-	41	8	20
Environmental Management	99	73	77	77
Water Management	7	3	66	99
Scheme Management	142	356	391	524
Dam Safety	4	7	33	31
Schedule/Deliver	306	62	96	84
Metering	-	37	43	28
Facility Management	-	-	8	18
Other	1	1	0	1
Total	**598**	**587**	**722**	**910**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion down to sub activity.xls*',

As evident from **Table 7-3**, the key elements of operations expenditure relate to scheme management, water management and scheduling and delivery of water. There is also significant expenditure in respect of environmental management.

Table 7-4 Dawson Valley – Operations Expenditure

Type ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	147	114	181	265	180	182	185	185	185	185
Materials	7	3	1	10	6	6	6	6	10	6
Contractors	9	42	9	16	5	5	5	5	5	5
Other	110	134	90	93	66	66	66	66	66	66
Total Direct Costs	**273**	**293**	**282**	**384**	**256**	**259**	**262**	**262**	**266**	**262**
Indirects	154	158	240	238	156	157	181	192	185	172
Overheads	171	136	201	288	180	181	185	187	190	183
Total	**598**	**587**	**722**	**910**	**592**	**598**	**628**	**642**	**641#**	**618**
Annual change (%)		-2%	23%	26%	-35%	1%	5%	2%	0%	-4%
Change since 2007 (%)		-2%	21%	52%	-1%	0%	5%	7%	7%	3%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'. Note (#) Minor differences in expenditure between this table and the NSP relates to indirects and overheads. The expenditure in the NSP is correct.

[152] SunWater has indicated the data contains some incorrect codings to sub-activities; and that 2007 has the majority of anomalies because many expenses were retrospectively re-categorised to fit into the Business Operating Model structure and this was not completely precise. The table is shown here to provide a general outline of the expenditure associated with sub-activities.

SunWater has provided some high level explanations for key movements in historical expenditure.

SunWater has indicated that the reason for the significant movement in labour expenditure in the period 2007 to 2010 was due to an increase in environmental management, water management and scheme management costs as a result of water inflow.

In its NSP, SunWater has noted that the amendment to the Fitzroy Basin ROP in 2009 includes many scheme operation and management rules, some of which have led to additional responsibilities and increased compliance costs. The most significant include new arrangements to manage environmental, stock and domestic water and flow event management rules, and additional water quality monitoring to meet DERM's Water Monitoring Data Collection Standard.[153] This may account for some of the increase in labour expenditure in 2010, although given the forecast drop in expenditure on labour from 2011, the impact of these increased responsibilities on labour expenditure is not readily apparent.

SunWater also explained that between 2010 and 2011 there was a realignment of expenditure classified as Operations to Preventative Maintenance. It noted that operations surveillance was moved to Preventative Maintenance as a result of the Parsons Brinckerhoff review. Halcrow notes that SunWater's forecast expenditure on Preventative Maintenance has increased, reflecting (in part) this adjustment.

The average expenditure on labour over the period 2007 to 2010 was $177,000, which is approximately in line with forecast expenditure.

In its NSP, SunWater has stated that it undertook a review of work practices in 2010 which resulted in revised work instructions upon which the cost forecasts are based. SunWater has not provided the results of the review of work instructions, but has provided an extract of its resource planning tool used to develop labour forecasts for 2012. Based on this extract, Halcrow has been able to confirm that the forecast labour expenditure has been built up using the methodology outlined in **Section 3.6.6**. The extract provided indicates that the direct labour charge for operations to the Dawson Valley Bulk WSS in 2012 is based on 2,868 hours per annum for operations staff from the Central resource centre and the Asset Management resource centre. This accounts for approximately $145,000 per annum of the labour expenditure. This is equivalent to approximately 2 FTE staff working on operations. This allowance appears reasonable, although more information on the review of work practices and how these have driven allowances for labour hours is required to enable an assessment of prudence and efficiency to be undertaken.

Labour hours and charges for Corporate Council, Strategy, Health & Safety and Services Delivery resource centres are not shown on the extract of the resource planning tool provided, but account for approximately $34,000 per annum of direct labour expenditure.

[153] SunWater, Dawson Valley WSS Bulk Water, page 23.

The labour forecast includes real increases of 1.5 percent in 2012 and 2013, which is consistent with its Enterprise Agreement (of an increase of four percent nominal for 2012 and 2013).

SunWater has forecast a reduction in 'Other' expenditure, to $66,000 in 2011. Expenditure is forecast to remain steady thereafter. SunWater noted that this change is driven by a reduction in insurance costs due to the increase in asset value from other service contracts (the insurance premium calculation is based on the asset value for all SunWater assets).[154] Insurance accounts for $45,000 per annum.[155] SunWater has included an allowance of $14,000 for Local Authority Rates, in line with historical expenditure. SunWater is required by law to pay Local Authority Rates and this expenditure is therefore deemed both prudent and efficient.

Other costs also include allowances of $7,000 per annum for telephone, and $1,000 per annum for freight. The allowance of $5,000 per annum for contractors relates to water monitoring.

Although Halcrow has been unable to undertake a detailed review of SunWater's operations expenditure, on the basis of the information provided by SunWater, Halcrow is generally satisfied that the expenditure appears to be reasonable. A definitive assessment of prudence and efficiency has not, however, been possible from the information provided.

7.2.3 Preventative maintenance

Table 7-5 provides a breakdown of historical and forecast expenditure on preventative maintenance.

Table 7-5 Dawson Valley – Preventative Maintenance Expenditure

Expenditure ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	56	36	34	30	58	59	60	60	60	60
Materials	10	6	15	3	8	8	8	8	8	8
Contractors	1	2	4	1	4	4	4	4	4	4
Other	9	5	10	10	6	6	6	6	6	6
Total Direct Costs	**77**	**49**	**63**	**44**	**76**	**77**	**78**	**78**	**78**	**78**
Indirects	126	50	45	27	50	51	58	62	59	56
Overheads	67	41	38	33	58	58	59	60	60	59
Total	**269**	**140**	**147**	**104**	**184**	**186**	**196**	**200**	**197**	**193**
Annual change (%)		-48%	5%	-29%	77%	1%	5%	2%	-1%	-2%
Change since 2007 (%)		-48%	-46%	-61%	-32%	-31%	-27%	-26%	-27%	-29%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.

[154] SunWater email, *Questions on cluster 3.doc*, dated 16 March 2011.
[155] The review of insurance costs is excluded from the scope of this review.

SunWater is forecasting an increase in preventative maintenance as compared to its historical expenditure. Of the direct expenditure, this is primarily driven by an increase in labour expenditure.

SunWater provided a breakdown of historical expenditure into condition monitoring, servicing and weed control, shown in **Table 7-6**. The table shows the historical fluctuations in preventative maintenance activities. A similar breakdown of forecast expenditure has not been provided.

Table 7-6 Dawson Valley – Preventative Maintenance Expenditure

Expenditure ($ 2011 real)	Historical			
	2007	2008	2009	2010
Condition Monitoring	53	56	46	39
Servicing	177	50	52	38
Weed control	39	33	49	27
Total	**269**	**140**	**147**	**104**

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

The expenditure in 2007 is significantly greater than the expenditure in 2008 to 2010. Halcrow understands that the reason for this is the transfer of financial data into SunWater's revised Business Operating Model which came into effect on 1 July 2008. This involved the reclassification of some activities, including some tasks previously coded as refurbishment projects to preventative maintenance codes.[156]

As noted in **Section 3.6.3.2**, Halcrow understands that SunWater's condition monitoring and servicing forecast expenditure is primarily based on forecasts developed by Parsons Brinkerhoff, although it also includes allowances for additional servicing activities.

As part of the review undertaken by Parsons Brinkerhoff, it forecast expenditure of approximately $35,000 per annum ($2010 real) on condition monitoring and servicing for the coming price path period. This is equivalent to approximately $36,100 per annum ($2011 real); it excludes overhead and indirect costs. The condition monitoring and servicing activities costed include meter maintenance, servicing of cranes, inspection of gauging stations, electrical and mechanical inspections and asset condition monitoring. While Halcrow has not been provided with facility O&M manuals for the Dawson Valley Bulk WSS, SunWater has provided a list of preventative maintenance work orders raised in the scheme over the period 2008 to 2010. Halcrow has reviewed the listing and is satisfied that preventative maintenance activities costed by Parsons Brinkerhoff are consistent with the nature and required frequency of activities undertaken on the scheme.

[156] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 13.

Halcrow is generally satisfied that the expenditure forecast developed by Parsons Brinkerhoff is based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken. However, Halcrow notes that this estimate is built up from SunWater's existing work instructions and its current approach to maintenance, which is yet to be optimised. Consequently, there is likely to be scope to achieve efficiency savings in the delivery of servicing and condition monitoring.

Accounting for the forecast expenditure developed by Parsons Brinkerhoff, the remaining expenditure is approximately $40,000 per annum. As noted in **Section 3.6.3.2**, the forecast of preventative maintenance expenditure also includes expenditure related to weed control, and "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves*".[157] SunWater has indicated that the forecast expenditure includes $37,000 per annum for weed control activities. This is equal to the average expenditure over the period 2007 to 2010 (shown in **Table 7-6**). SunWater has indicated that weed control activities primarily relate to weed control around the weirs, undertaken by SunWater staff (rather than contracted out).

Halcrow requested that SunWater provide a breakdown of forecast weed control costs into labour, materials and other costs. However, SunWater indicated that although weed control costs are included within the preventative maintenance costs, they have not been separated at the sub-activity level.[158] Although no detailed information has been provided in relation to the makeup of the expenditure, the allowance does not appear unreasonable in light of historical expenditures. An assessment of prudence and efficiency has not, however, been possible based on the information available to this review.

Assuming, in the absence of supporting information, that the weed control cost are justified, there remains $3,000 per annum which has not been accounted for. In the absence of justification for this amount, an adjustment of the forecast preventative maintenance expenditure by this amount is proposed.

7.2.4 Corrective maintenance

Table 7-7 shows a breakdown of historical and forecast expenditure on corrective maintenance.

As evident from **Table 7-7**, expenditure on corrective maintenance has fallen significantly since 2007. SunWater's 2011 budget is significantly lower than the annual expenditure in the current price path. Expenditure is forecast to remain relatively consistent over the period to 2016. Halcrow notes that the forecast expenditure on labour, materials and contractors is significantly lower than the average expenditure over the period 2007 to 2010.

[157] SunWater email, *RE Preventative Maintenance*, 9 March 2011.
[158] SunWater, '*doc#1079202-Information request by Halcro.doc*', 31 May 2011.

As noted in **Section 3.6.4**, SunWater's forecast expenditure is based on an average of the past four years (including 2011), excluding outliers. SunWater has not provided Halcrow with the calculations in support of its forecast of corrective maintenance, however, a breakdown of the expenditure indicates labour charges of $26,000 relate to staff from the SunWater's Central region. The materials expenditure includes $2,000 for plant usage and $8,000 for 'materials - construction'.

Table 7-7 Dawson Valley – Corrective maintenance expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	26	29	42	40	26	26	26	26	26	26
Materials	46	24	14	13	10	10	10	10	10	10
Contractors	4	5	1	9	2	2	2	2	2	2
Other	3	1	0	0	0	0	0	0	0	0
Total Direct Costs	**79**	**59**	**58**	**62**	**37**	**37**	**38**	**38**	**38**	**38**
Indirects	147	40	56	36	22	22	26	27	26	24
Overheads	34	34	47	44	26	26	26	27	27	26
Total – Corrective Maintenance	**260**	**132**	**161**	**142**	**84**	**85**	**90**	**92**	**91**	**88**
Annual change (%)		-49%	22%	-12%	-41%	1%	5%	2%	-1%	-2%
Change since 2007 (%)		-49%	-38%	-45%	-68%	-67%	-66%	-65%	-65%	-66%

As part of the review, Halcrow obtained a breakdown of corrective maintenance work orders for the period 2009 to 2011 for the Dawson Valley scheme. The expenditure associated with the work orders does not specifically correspond to the expenditure in **Table 7-7**; Halcrow understands this is because some work orders run over different years. A review of the work orders indicates that the corrective maintenance activities undertaken are typical of what might be reasonably expected from the types of assets in the scheme.

As shown in **Table 7-8**, expenditure on corrective maintenance has typically exceeded expenditure on preventative maintenance in the period to 2010. However, in 2011 to 2016, SunWater has forecast that corrective maintenance will be approximately half of preventative maintenance. This is to be expected as SunWater has forecast an increase in preventative maintenance.

Table 7-8 Dawson Valley – Maintenance expenditure

Direct Expenditure ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Preventive maintenance	77	49	63	44	76	77	78	78	78	78
Corrective maintenance	79	59	58	62	37	37	38	38	38	38
Total Maintenance	**156**	**108**	**121**	**107**	**112**	**114**	**115**	**116**	**116**	**116**
Annual change (%)		-31%	12%	-12%	5%	1%	1%	0%	0%	0%
Change since 2007 (%)		-31%	-22%	-31%	-28%	-27%	-26%	-26%	-25%	-25%
Preventative maintenance (%)	49%	45%	52%	41%	67%	67%	67%	67%	67%	67%
Corrective maintenance (%)	51%	55%	48%	59%	33%	33%	33%	33%	33%	33%

Halcrow notes that SunWater is yet to undertake a review of the current mix of preventative and corrective maintenance to assess whether they are appropriately optimised. Consequently, there may be some scope to achieve efficiency in the optimisation of these programs.

7.2.5 Electricity

Expenditure on electricity in the Dawson Valley Bulk WSS is variable, accounting for between 0.5 to 5.4 percent of operating expenditure. SunWater has forecast that electricity costs will be $41,000 per annum in each year of the coming price path which is in line with the 2011 budgeted expenditure.

Section 3.6.5 contains an overview of SunWater's approach to forecasting electricity costs, and the methods by which it seeks to optimise expenditure on electricity. The following paragraphs provide more specific information about electricity costs in the Dawson Valley.

SunWater has noted that electricity costs are driven by the frequency of pumping events and the rules in the ROP for the release of water from the Moura Offstream Storage rather than by customer demand. The pumps for the Moura Offstream Storage are used during defined streamflow events. Rules for pumping and releasing water are contained in the ROP. SunWater has noted that pumping is infrequent and difficult to predict. When pumping does occur, it is usually at maximum capacity.[159] This is evident from **Table 7-9**, which shows that historical expenditure has varied significantly.

[159] SunWater, Background paper QCA review of irrigation prices – electricity costs, February 2010.

Table 7-9 Dawson Valley – Electricity expenditure

Activity ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity	1	48	20	48	41	41	41	41	41	41
Annual change (%)		4700%	-58.3%	140.0%	-14.6%	0.0%	0.0%	0.0%	0.0%	0.0%
Change since 2007 (%)		4700%	1900%	4700%	4000%	4000%	4000%	4000%	4000%	4000%

Source: Expenditure data from SunWater Nogoa Mackenzie Water Supply Scheme NSP, Table, page 7.

The forecast electricity expenditure for the Dawson Valley scheme is based on the average electricity cost over the period 2008 to 2010 (as reported within SAP). The average has been calculated using the nominal expenditure for each year.[160] The average expenditure has then been inflated by 13.29 percent to account for increases in Franchise Tariffs. When queried as to why 2007 costs were excluded when calculating the average, SunWater noted that 2007 was excluded as there was no water in the Dawson Valley.

Halcrow notes that year to date expenditure on electricity in the Dawson Valley is $905 ($ nominal), which is significantly lower than the 2011 budget. SunWater explained that, as the Moura Offstream Storage is full, there has been no need to pump water to it. It is therefore likely that expenditure in 2011 will be significantly lower than the budget.

Noting the significant variability in the requirement to pump water (as reflected in the fluctuation of expenditure), Halcrow is of the opinion that an average expenditure, calculated over a longer term period, is likely to result in a more accurate reflection of actual expenditure.

If 2007 expenditure is included in the calculation of average expenditure, the forecast expenditure would be in the order of $33,000 per annum (calculated on a real basis). While an average based on the kWh of pumping each year would remove the impact of tariff escalation over the period, and provide a more accurate basis upon which to forecast average energy usage, this information has not been made available.

Table 7-10 includes Halcrow's assessment of electricity expenditure.

Table 7-10 Dawson Valley – Electricity expenditure

Activity ($ '000 2011 real)	Price Path				
	2012	2013	2014	2015	2016
SunWater Forecast	41	41	41	41	41
Halcrow Assessment	33	33	33	33	33
Difference	(8)	(8)	(8)	(8)	(8)

[160] Had SunWater adjusted the expenditure to real price base before calculating the average, the forecast electricity would be approximately $2,900 greater per annum.

It is noted that during the second round of stakeholder consultation, stakeholders sought clarification of whether the Moura Offstream Storage benefits all users within the scheme or only those users that purchased entitlements following creation of the asset.[161] SunWater has confirmed that the storage is included in the announced allocation calculation for the scheme, thereby benefitting all customers. Accordingly, it is deemed appropriate that the cost of pumping to the storage is included as part of SunWater's operating expenditure requirements.

7.2.6 Summary of findings on operating expenditure

Although Halcrow has been unable to undertake a detailed review of SunWater's operations expenditure, on the basis of the information provided by SunWater, Halcrow is generally satisfied that the expenditure generally appears to be reasonable, although some minor reductions to SunWater's proposed expenditure on electricity may be appropriate. Minor adjustments are proposed in respect of escalation on materials and contractor costs, and unjustified preventative maintenance costs.

In addition, Halcrow notes that there is likely to be some scope for SunWater to achieve efficiency via the review and optimisation of its preventative and corrective maintenance programs.

In view of the preceding, Halcrow recommends adjustments to the forecast operating expenditure (direct costs) for the Dawson Valley Bulk WSS as shown in **Table 7-11**.

Table 7-11 Dawson Valley – Proposed Adjustments to Operating Expenditure (2012 – 2016)

Item ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
SunWater Proposed Total Direct Costs	**413**	**418**	**419**	**419**	**420**
Adjustments:					
▪ less escalation on materials	0	0	-1	-1	-2
▪ less escalation on contractors	0	-1	-1	-1	-1
▪ less unjustified Preventative Maintenance costs	-3	-3	-3	-3	-3
▪ less adjustment for Electricity costs	-8	-8	-8	-8	-8
Total Reduction	-11	-12	-13	-13	-14
Halcrow Adjusted Direct Costs	**402**	**406**	**406**	**406**	**406**

[161] Based on telephone discussions with the QCA and irrigator representatives on 20 April 2011.

7.3 Renewals Expenditure

7.3.1 Overview

Table 7-12 provides a high level summary of SunWater's renewals program for the five-year regulatory period for Dawson Valley Water Supply Scheme.

Table 7-12 Dawson Valley - Proposed Renewals Program (2012 – 2016)

Facility ($ 000 2011 real)	Financial Year					5-yr Total
	2012	2013	2014	2015	2016	
Dawson River Distribution	4				24	28
Glebe Weir	9					8
Gyranda Weir	12	12	93			117
Moss Pump Station	12	12		105	46	175
Moura Offstream Storage	48		87	21		156
Moura Weir			10	14	18	42
Neville Hewitt Weir	33		10			43
Orange Creek Weir		136				136
Theodore Weir				12		12
Total	**118**	**160**	**199**	**153**	**89**	**719**

Source: SunWater Dawson Valley Water Supply Scheme NSP, Table 4-5, page 30.

In its NSP, SunWater has provided a forecast of expenditure beyond the price path. This is shown in **Figure 7-3**.

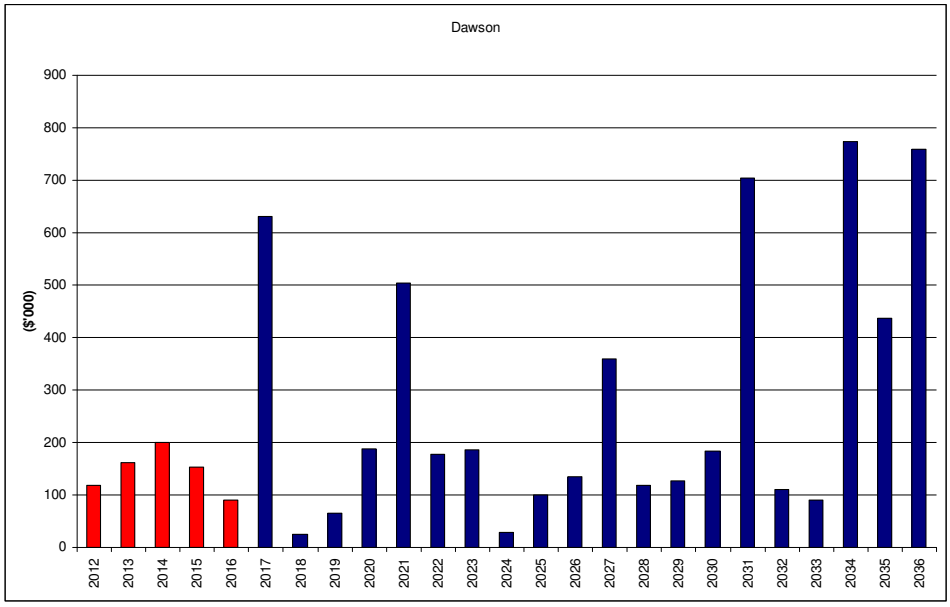


Figure 7-3 Dawson Valley - Renewals Expenditure Program

The review of historical renewals projects sought to understand the factors contributing to the difference between SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure identified in the previous Tier 1 pricing review.

The detailed review of forecast renewals projects included a review of project planning and proposed outcomes to assess the prudence and efficiency of SunWater's proposed renewals expenditure.

7.3.2 Review of historical renewals expenditure

Table 7-13 shows SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure determined during the previous pricing review.

Table 7-13 Dawson Valley - Actual renewals expenditure versus LBC Target expenditure

$'000 nominal	Financial Year				
	2007	2008	2009	2010	2011
Actual renewals Expenditure	157	197	115	126	345
LBC Target Expenditure	135	59	46	212	205
Difference	23	138	70	-85	139

Source: SunWater spreadsheet, *Compare R&E Spend to Annuity 2007_2011.xls*.

With the exception of 2010, SunWater's actual expenditure has exceeded the LBC target expenditure in each year of the current price path. SunWater has forecast that expenditure in 2011 will significantly exceed the LBC target.

As noted in **Section 3.8.2**, SunWater has not been able to provide a list of renewals projects that it intended to deliver during the current price path; consequently it has not been possible to undertake a detailed assessment of SunWater's historical renewals expenditure.

Halcrow did, however, obtain a breakdown of SunWater's historical expenditure on renewals expenditure for the period 2007 to 2011 (until 15 February) for projects greater than $10,000.[162] A review of the budgeted versus actual expenditure for the renewals projects undertaken indicates that most projects were delivered at or below budgeted expenditure, although some projects exceed the original Board approved budget, or were not originally budgeted.

Significant expenditure has included:

- Orange Creek Weir - Install new low level outlet works ($62,559 in 2008);
- Dawson - Provide VHF repeater stations and network ($34,640 in 2008);
- MOS - Dam Safety Documentation EAP, SOP and O&M ($29,069 in 2008);

[162] The listing of actual expenditure on renewals and rehabilitation indicates expenditure significantly lower than that reported in the NSP. However, the listing of expenditure provided only included projects greater than $10,000 in value, which indicates that a significant element of renewals projects were lower than this threshold.

- Install Access Ladders and Platforms - Dawson River Gauging Stations ($45,923 in 2009); and
- Repair flood damage at Neville Hewitt Weir ($36,313 in 2010).

In the absence of any details on these projects, Halcrow is unable to assess the efficiency of the expenditure. However, oOn the basis of the project title description and available overview information in respect of the structures involved, the expenditure does not appear to be excessive.

SunWater's 2011 budget includes significant expenditure in 2011, including:

- Refurbish Piping Failure behind the left bank of the protection Works ($40,275);
- Repair Undercutting of Foundation of Outlet Structure - Outlet Works - Gyranda Weir ($38,838);
- Replace D/S Pipework and Reinstate Apron - Low Level Outlet Works - Orange Creek Weir ($37,048);
- Rectify Electrical Audit Findings (Parsons Brinckeroff 20 June 2009 and Local SW Feb/Mar 2009) - MOSS Pump Station ($35,968); and
- Replace Communications and Control Equipment - Gyranda Weir ($35,480).

SunWater forecast renewals expenditure for the period 2012 to 2016 is generally in line with its historical expenditure on renewals.

7.3.3 Review of forecast renewals expenditure

7.3.3.1 Overview

In order to assess the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow has reviewed a selection of renewals projects in more detail. The projects selected for review include those with significant expenditure forecast for the period 2017 to 2036. The projects selected for review are listed in **Table 7-14**.

Halcrow requested that SunWater provide the following information:

- the project scope and the driver for each project;
- the basis of expenditure forecast (unit rates, quantities etc); and
- condition reports/asset management plans demonstrating the need for the renewals expenditure.

As discussed in **Section 3.8.3**, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects has been provided, however, where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure. This has not been possible in all cases, due to insufficient information on the proposed expenditure.

Table 7-14 Dawson Valley – Selections from Proposed Renewals Program

Halcrow ID	Year	SunWater Description	Project Cost		Total Cost 2012 to 2036 ($000)[1]
			Direct Cost ($000)	Total Cost ($000)	
Gyranda Weir					
LBD/1	2012 and 5 yearly thereafter	Refurbish Gate - seals, guides, corrosion, actuator (Gate 1)	8	12	85
LBD/2	2014 and 2029	Replace Electric Actuator, Iq20F Rotork	35	55	109
Moura Offstream Storage Pump Station					
LBD/3	2016 and 6 yearly thereafter	10DVA05-Refurbish PUN2-MOSS	38	46	185
Moura Offstream Storage					
LBD/4	2014	Repairs to spillway return slopes and batters	47	74	74
Neville Hewitt Weir					
LBD/5	2021	Replace Hydraulic System	248	377	377
Theodore Weir					
LBD/6	2034	Replace Conc/Steel Piled Weir	430	642	642

Note (1): Total cost includes the cost of each recurring project within the period 2012 to 2036.

The following paragraphs include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency. Halcrow's review of each project has only considered the direct costs. Indirect costs and overheads, which have been applied to all projects, are the subject of a separate review.

7.3.3.2 Gyranda Weir

LBD/1 Refurbish Gate - seals, guides, corrosion, actuator

This renewals project is planned for 2012 at a cost of $12,000 ($8,000 direct costs). It involves refurbishment of Gate 1, which is scheduled to reoccur on a ten yearly basis.

Gyranda Weir is a cascading steel sheet pile structure built in 1987. Gyranda Weir has a three-level inlet tower; the first inlet has a 900 x 900mm sluice gate (Gate 1) with invert level at RL 156.32 m AHD; the second a 1060 x 1060 sluice gate with invert level at RL 153.14m AHD; and the third a 1500 x 1500 sluice gate with invert level at 150.08m AHD. The outlet is a 1600 x 1600 mm box culvert.

Extracts from SAP-WMS provided by SunWater indicate that refurbishment of Gate 1 is planned to take place once every ten years at cost of $12,000. Gates 2 and 3 are also scheduled to be refurbished every ten years, however, their refurbishment is scheduled on a ±5 years cycle to Gate 1, with the first

refurbishment to occur in 2017 ($16,000 direct cost for both gates). No information is provided to explain why refurbishment of the gates has been staggered in this way, although it may be for operational reasons (eg. ability to maintain flow control at all times). It is noted that condition assessment of Gates 2 and 3, undertaken in 2009, indicates 'minor defects only'. This assessment is slightly better than the condition assessment of Gate 1, recorded in 2008.

While expenditure to refurbish gates is considered to be prudent, Halcrow notes that, provided there are no operational limitations, there may be some benefit in aligning the refurbishment of Gates 1, 2 and 3 so that they occur in the same year.

LBD/2 Replace Electric Actuator, Iq20F Rotork
This renewals project is planned for 2014 at a cost of $55,000 ($35,000 direct costs). It is scheduled to reoccur on a fifteen yearly basis.

It is understood that the *Iq20F Rotork* electric actuator forms part of the Gyranda Weir gate control. The actuator has been in operation since October 1999. SAP-WMS indicates that the actuator has been assigned a life of 15 years, with replacement scheduled for 2014.

A condition assessment was undertaken in October 2009 which recorded a minor defect for the operation of the actuator. A comment was recorded within SAP-WMS which indicates that a small leak exists when the gate is closed. The actuator was recorded to have used between 50 percent and 75 percent of its refurbished life.

Given that the remaining life correlates broadly to the proposed replacement timing, the planned expenditure is considered prudent. In the absence of further details, the cost is deemed efficient, particularly taking into account, access to the inlet tower.

7.3.3.3 Moura Offstream Storage (MOSS) Pump Station

LBD/3 10DVA05-Refurbish PUN2-MOSS
This renewals project is scheduled for 2016 at a cost of $46,000 ($38,000 direct). It is scheduled to reoccur every six years thereafter.

The Moura Off Stream Storage (MOSS) Pump Station has been in operation since 1999. It is understood that the pump station contains two pumps. Extracts from SAP-WMS indicate that the pump has an asset life of 30 years and is scheduled to be replaced in 2029. Pump 2 is a Flygt submersible pump, described in SAP-WMS as "1 cumec" which would suggest the pump capable at delivering approximately 86ML/day. According to the Dawson Valley *Scheme Operation Manual*, the "*MOSS pumpstation was designed to operate automatically with only the trigger storage elevation requiring changing for the applicable flow period. However, until the equipment issues can be resolved, manual operation is necessary*".[163]

[163] SunWater, Dawson Valley Water Supply Scheme – Scheme Operation Manual, Version 1-1, Undated.

A condition assessment undertaken in October 2009 found that the pump exhibited minor defects only. Based on the comments entered in SAP-WMS, this condition assessment was undertaken following refurbishment in August 2009. It is understood that as part of the refurbishment, the pump was sent to Flygt, and failed seals and bearings were fixed and the motor refurbished.

Halcrow was unable to identify the work orders (orders 5091264 and 5094877) for the refurbishment in extracts of the historical renewals expenditure. However, screen shots from SAP-WMS indicate that the total cost for the pump refurbishment was $31,229 ($2009 nominal).

On the basis of the information provided, Halcrow is satisfied that expenditure to refurbish the pump is prudent. However, noting that the cost of refurbishment of the pump in 2009 was $31,229 (including indirects and overheads), SunWater's proposed expenditure of $38,000 appears high. Based on historical expenditure, an allowance of $30,000 (direct) should be sufficient to undertake the required works.

7.3.3.4 Moura Offstream Storage

LBD/4 Repairs to spillway return slopes and batters
This renewals project is scheduled for 2014 at a cost of $74,000 ($47,000 direct).

The MOSS is located on the right bank of the Dawson River near the town of Moura, just upstream of Moura Weir. It is understood that the MOSS was built to increase the total storage capacity near Moura due to increased demand, specifically for the Queensland Nitrates' plant. The MOSS has earthen embankments and a grassed spillway.

Water from the Dawson River is permitted to be pumped to MOSS during stream flow events in a water-harvesting style of regulation.[164] It is understood that the MOSS has been in operation since 1999. The first repair to the slopes and batters is scheduled for 2014, with a repair frequency of 50 years. SunWater's asset life guide[165] recommends a life for earthworks channels of 150 years.

In 2009, a condition assessment was undertaken which recorded the waterway batter condition as having moderate deterioration with minor refurbishment required to ensure ongoing reliable operations.

The replacement cost of the weir is reported in SAP-WMS as $419,000. Noting the proposed expenditure of $47,000 direct costs, it would appear that cut and fill, compaction and or rock protection works will be required to repair the spillway. However, no information on the scope of the proposed works has been provided.

During the second round of stakeholder consultation, stakeholders sought clarification of whether the MOSS benefits all users within the scheme or only

[164] SunWater, *Dawson Valley Water Supply Scheme – Scheme Operation Manual*, Version 1-1, Undated.
[165] SunWater, *A Guide to SAP PM Asset Hierarchy Development* version 6.5, 20 January 2009.

those users that purchased entitlements following creation of the asset.[166] SunWater has confirmed that the storage is included in the announced allocation calculation for the scheme, thereby benefitting all customers. Furthermore, as the asset is included in the listing of assets to be considered when assessing irrigation charges, it is appropriate for renewals costs associated with the MOSS to be included in SunWater's expenditure requirement.

Whilst Halcrow considers expenditure to rehabilitate spillway slopes, return slopes and batters prudent, due to limited information on the proposed works, Halcrow is unable to comment on the efficiency of expenditure.

7.3.3.5 Neville Hewitt Weir

LBD/5 Replace Hydraulic System

This activity involves a replacement of the hydraulic system at Neville Hewitt Weir. Expenditure of $377,000 ($248,000 direct cost) is proposed in 2021.

Neville Hewitt Weir is filled from both the Dawson River and Mimosa Creek. It is a mass concrete structure, constructed in 1976. The hydraulic system at the weir has been in operation since December 2000. An asset life of 60 years has been assigned to the hydraulic system in SAP-WMS, however, the first replacement is scheduled for 2021. Based on discussions with SunWater, it is understood that replacement was manually entered by SunWater Manager Asset Management in 2009 due to a 'moderate' risk rating of the asset.

The most recent condition assessment was undertaken in 2004. This condition assessment recorded the hydraulic systems to be in 'perfect as new condition'. Halcrow notes that SunWater's mechanical asset guide[167] recommends hydraulic systems are assessed every 12 months, which indicates that the asset is long overdue for a revised condition assessment.

Whilst the proposed timing of the proposed replacement works is at variance to the assigned asset life, Halcrow considers replacement after approximately 20 years (45 years nominally proposed) is more appropriate; accordingly, the proposed expenditure is considered prudent.

In the absence of further information, however, it was not possible to assess whether expenditure is efficient.

7.3.3.6 Theodore Weir

LBD/6 Replace Conc/Steel Piled Weir

This activity involves replacement of a concrete/steel piled anabranch weir located near Theodore Weir. Expenditure of $642,000 ($420,000 direct cost) is proposed in 2034.

[166] Based on telephone discussions with the QCA and irrigator representatives on 20 April 2011.
[167] SunWater, Users Manual for Assessing Mechanical Assets, Version 5.3, 05 January 2009.

Based on the functional location in SAP-WMS and general location information, it is understood that 'conc/steel piled weir' refers to the anabranch weir located near Theodore Weir. This weir incorporates a timber piled Anabranch Weir and is screened by an upstream row of sheet piles. This structure has been in operation since 1929 and is scheduled to be replaced in 2034 at a cost of $642,000. SunWater's asset life guide[168] recommends the life of sheet pile weirs as 75 years, which would have resulted in replacement in 2004.

In October 2009, a condition assessment was undertaken which demonstrated minor defects. 'Perfect, as new' condition was recorded for structural movement, foundations and function. A risk assessment was undertaken in 2005 for structural failure.

A detailed bill of materials for the weir has been provided, which details units and unit rates related to clearing and grubbing, compaction, rockfill, piling, driving of piling, reinforced fabrics, concrete and concrete in slabs.

Given that the replacement has been deferred by 30 years (in comparison to the replacement date based on standard asset life), Halcrow considers planning for the expenditure to be prudent. On the basis of the costing information provided, the expenditure is also considered efficient.

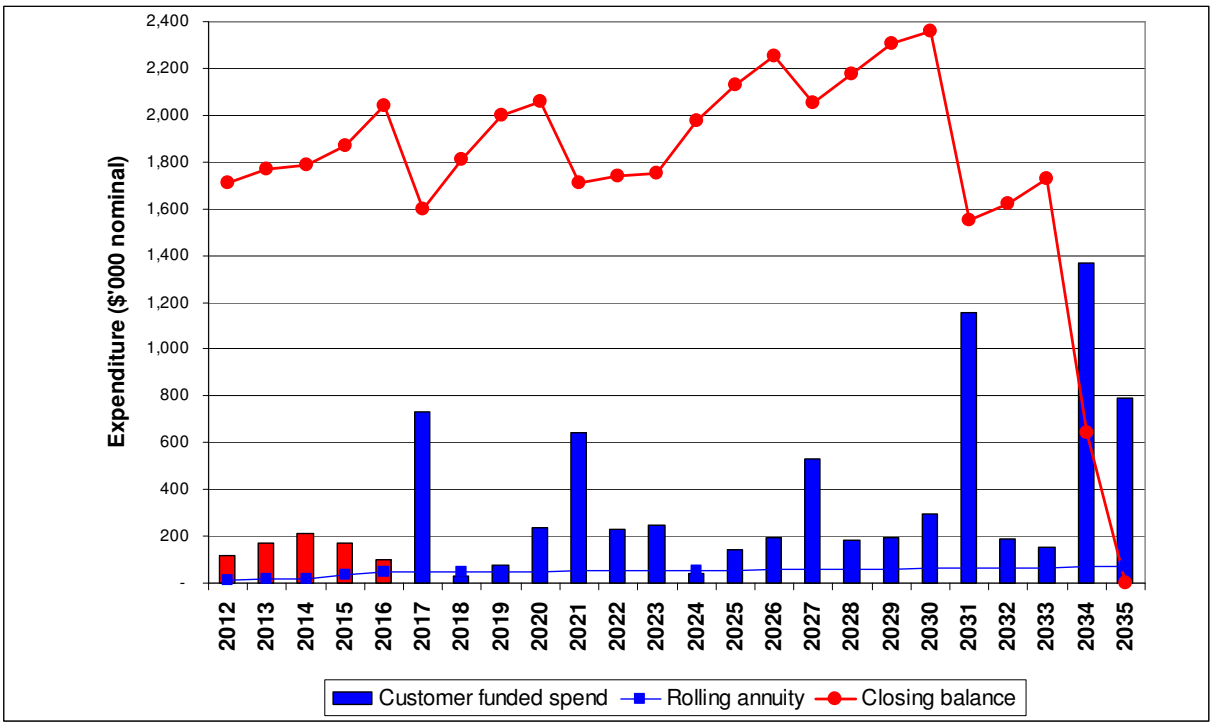
7.3.4 Renewals annuity

SunWater previously established an Asset Refurbish Annuity for the five year period 2006 to 2011 for this scheme. The five year average annual spend was $131,763 (the renewals annuity for the bulk and distribution systems was previously bundled).

SunWater has elected to continue with a renewal annuity approach for the five years to 2016. The total renewal annuity is $130,000 over this period, averaging $26,000 per year in nominal terms. It is noted that the opening balance is $1.622 million.

Figure 7-4 shows the rolling annuity and the annuity closing balance through time. As evident from the graph, SunWater's annuity closing balance is forecast to be significantly in surplus, only reducing following the significant forecast expenditure on renewals projects in 2031, 2035 and 2035. A review of a sample of these expenditures has been discussed in **Section 7.3.3**.

[168] A Guide to SAP PM Asset Hierarchy Development dated 20 January 2009 version 6.5.



Source: SunWater spreadsheet, *Annuity charts – V610 03.xls*

Figure 7-4 Dawson Valley - Renewals Annuity ($ nominal)

7.3.5 Summary of findings on renewals expenditure

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow has reviewed six projects, including those with significant expenditure, covering the period 2012 to 2035.

While in most cases, Halcrow is satisfied that the proposed projects are prudent, with the exception of three projects reviewed, it has not been possible to make an assessment of efficiency. This is primarily due to a lack of sufficiently detailed information on the scope of the proposed works. Of the three projects where efficiency assessments have been made, Halcrow identified one project (LBD/3 MOSS Pump Station) where the expenditure forecast appears excessive.

Table 7-15 summarises proposed adjustments.

Table 7-15 Dawson Valley –Proposed Renewals Program Adjustments

Halcrow Review ID	Year/Adjusted Year	SunWater Description	Project Direct Cost ($2011 real)	
			SunWater Proposed ($000)	Halcrow Adjusted ($000)
Moura Offstream Storage Pump Station				
LBD/3	2016 and 6 yearly thereafter	10DVA05-Refurbish PUN2-MOSS	38	30
Moura Offstream Storage				
LBD/4	2014	Repairs to spillway return slopes and batters	47	#
Neville Hewitt Weir				
LBD/5	2021	Replace Hydraulic System	248	#

Note: # - Expenditure considered prudent, but insufficient information to assess efficiency.

8 Theodore Distribution System (Dawson Valley)

8.1 System Description

The Theodore Distribution System comprises the Theodore and Gibber Gunyah sub-systems. The Theodore sub-system was constructed in 1926 (it was the first irrigation area in Queensland) and the Gibber Gunyah sub-system was constructed in the late 1950s. Consequently, aging infrastructure is a significant management issue.

The Distribution System serves 43 customers and comprises 15,941megalitres (ML) of customer held medium priority Water Access Entitlement (WAE) and 11ML of customer held high priority WAE. SunWater holds 3,405ML of medium priority WAE and 600ML of high priority WAE for distribution losses.

The extent of the infrastructure employed in distributing this allocation is significant. The Gibber Gunyah Irrigation Area consists of a network of open distribution channels, drains and levees to intercept runoff and collect channel overflows. It also includes of a pump station with three pumps. The channels are controlled with manually operated control structures and one automatic overshot gate. The Theodore Irrigation Area also consists of a network of open distribution channels, drains and levees to intercept runoff and collect channel overflows. The Theodore Pump Station has three pumps.[169]

SunWater also operates the 'Fork' Pump Station under an agreement with local irrigators. SunWater operates the pumping station and pays for the power it uses, while local irrigators retain responsibility for its maintenance.[170]

8.2 Operating Expenditure

8.2.1 Overview

With the exception of 2010, SunWater's historical operating expenditure has increased year on year since 2007. Expenditure in 2007 was $833,000; this compares to the 2011 budget of $1,185,000. Expenditure is forecast to increase marginally in the period to 2016. A breakdown of operating expenditure by Activity and Type is provided in **Figure 8-1** and **Figure 8-2**.

[169] SunWater, *Dawson Valley Water Supply Scheme - Scheme Operation Manual*, undated, page 26 to 27.
[170] Ibid, page 28.

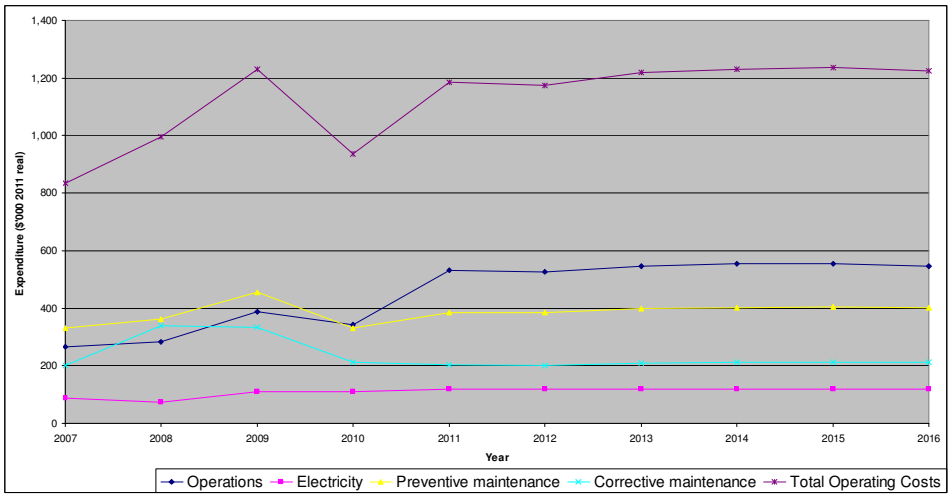


Figure 8-1 Operating Expenditure by Activity for Theodore

As evident from **Figure 8-1**, expenditure on operations and preventative maintenance account for the majority of operating expenditure.

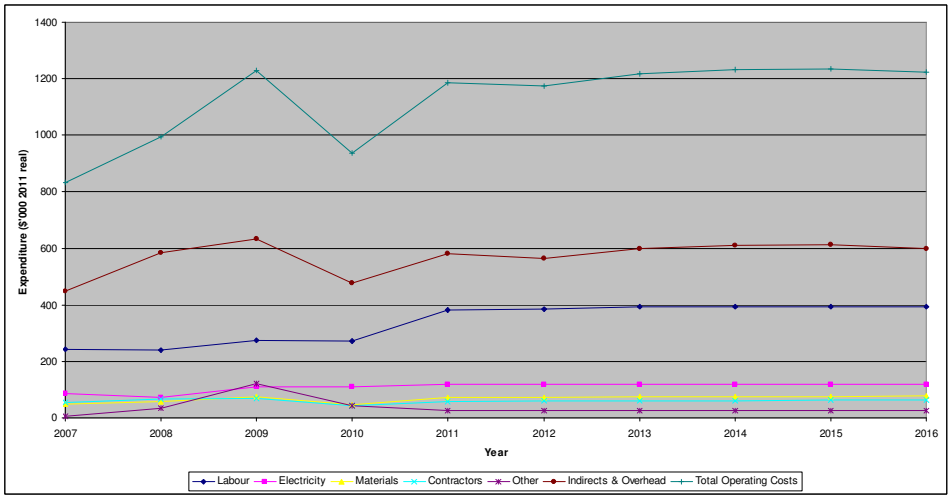


Figure 8-2 Operating Expenditure by Type for Theodore

As shown in **Figure 8-2**, 'Indirects & Overhead' expenditure represents the largest component of operating costs (by Type). Expenditure on 'labour' is the most significant component of the direct expenditure.

Table 8-1 includes a breakdown of historical and proposed operating expenditure for the Theodore Distribution System by Activity, and **Table 8-5** includes a breakdown of historical and proposed operating expenditure by Type.

Table 8-1 Operating Expenditure by Activity for Theodore

Item ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Operations	267	284	388	341	532	525	547	553	554	547
Electricity	87	73	109	109	119	119	119	119	119	119
Preventive maintenance	332	361	455	332	386	384	398	402	405	402
Corrective maintenance	201	339	333	212	203	201	209	212	213	211
Revenue offsets	-55	-62	-56	-58	-55	-55	-55	-55	-55	-55
Operating Costs	833	995	1,229	936	1,185	1,174	1,218	1,231	1,236	**1,224**

Source: Extracted from SunWater Theodore Distribution Water Supply Scheme NSP.

Table 8-2 SunWater Expenditure by Type for Theodore

Activity ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	243	239	276	271	381	386	392	392	392	392
Electricity	87	73	109	109	119	119	119	119	119	119
Materials	49	58	75	47	72	73	74	75	76	77
Contractors	55	67	70	44	59	60	61	62	63	63
Other	6	35	121	44	27	27	27	27	27	27
Indirects & Overhead	447	584	633	478	582	564	600	611	614	600
Revenue offsets	-55	-62	-56	-58	-55	-55	-55	-55	-55	-55
Total Operating Costs	**833**	**995**	**1,229**	**936**	**1,185**	**1,174**	**1,218**	**1,231**	**1,236**	**1,224**

Source: Extracted from SunWater Theodore Distribution Water Supply Scheme NSP.

The following sections provide a detailed review and discussion of the key elements of SunWater's proposed direct operating expenditure by Activity.

8.2.2 Operations

Operational activities for the Theodore Distribution System are identified in the *Dawson Water Supply Scheme – Scheme Operation Manual*.[171] The key operational activities include scheduling and delivery of water, and maintaining supply at the required flow rates.

A breakdown of historical expenditure into key operations sub-activities is shown in **Table 8-3**. A similar breakdown for forecast expenditure has not been provided.

[171] SunWater, *Dawson Valley Water Supply Scheme, Scheme Operation Manual, Version 1-1*, Undated.

SunWater has indicated that the historical data contains some incorrect codings to sub-activities; and that 2007 has the majority of anomalies because many expenses were retrospectively re-categorised to fit into the Business Operating Model structure and this was not a completely precise process. **Table 8-3** shown to provide a general outline of the expenditure associated with sub-activities.

Table 8-3 Theodore – Breakdown of Historical Operations Expenditure

($ '000 2011 real)	Historical Expenditure			
	2007	2008	2009	2010
Customer Management	-	-	-	27
Workplace H&S	-	1	1	-
Environmental Management	-	-	-	2
Water Management	-	-	-	5
Scheme Management	6	36	166	124
Dam Safety	-	-	-	-
Schedule/Deliver	239	247	221	184
Metering	-	-	-	-
Facility Management	-	-	-	-
Other	21	-	-	-
Total	**267**	**284**	**388**	**341**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion down to sub activity.xls*',

As evident from **Table 8-3**, the historical operations expenditure primarily relates to scheme management and scheduling and delivery of water. There appears to have been some variation in scheme management expenditure over the period, however, this may be due to incorrect allocation of expenditure to sub activities.

Table 8-4 provides a breakdown of historical and forecast expenditure on operations at the Theodore Distribution System.

Table 8-4 Theodore – Operations Expenditure

Type ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	95	72	100	110	200	203	206	206	206	206
Materials	2	6	2	1	2	2	2	2	2	2
Contractors	1	0	18	6	0	0	0	0	0	0
Other	5	29	41	30	27	27	27	27	27	27
Total Direct Costs	**103**	**107**	**161**	**147**	**229**	**232**	**235**	**235**	**235**	**235**
Indirects	51	94	117	74	106	94	109	112	113	111
Overheads	112	83	109	120	197	199	203	205	206	200
Total	**267**	**284**	**388**	**341**	**532**	**525**	**547**	**553**	**554**	**547**
Annual change (%)		7%	36%	-12%	56%	-1%	4%	1%	0%	-1%
Change since 2007 (%)		7%	45%	28%	99%	97%	105%	107%	108%	105%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.

In its NSP, SunWater has stated that it undertook a review of work practices in 2010 which resulted in revised work instructions upon which the cost forecasts are based. While SunWater has provided a high level breakdown of operations data, it has not provided the results of its review of work instructions. It has, however, provided some explanations for key movements in the expenditure.

There was a significant increase in expenditure on labour between 2010 and 2011 (from $110,000 to $200,000). SunWater indicated that the 2011 forecast is based on the assumption that costs associated with Water Management, Scheme Management and scheduling and delivery of water will increase as a result of the Dawson Valley headworks being filled. It noted that the water level has been very low for the past four to five years, which contributed to lower than average expenditure.

SunWater has provided an extract of its resource planning tool used to develop labour forecasts for 2012. Halcrow has been able to confirm that the forecast labour expenditure has been built up using the methodology outlined in **Section 3.6.6.** The extract provided indicates that the direct labour charge for operations in the Theodore Distribution System in 2012 is based on approximately 3,216 hours per annum for operations staff from the Central resource centre and the Asset Management resource centre. This accounts for approximately $144,000 per annum of the labour expenditure. This is equivalent to approximately 2.1 FTE staff working on operations.

Labour hours and charges for Corporate Council, Strategy, Health & Safety or Services Delivery resource centres are not shown on the extract of the resource planning tool provided, but account for approximately $56,000 per annum of direct labour expenditure. SunWater has not provided any explanation of how this expenditure has been forecast.

As a comparable breakdown of historical labour expenditure has not been provided, it is not clear what operational activities have driven the significant increase in labour expenditure. Halcrow notes that SunWater has recently completed an organisational review to identify savings which resulted in the centralisation of services, and reductions to staff numbers. However, given the significant increase in labour, the savings from the review are not readily apparent in relation to the Theodore Distribution System.

SunWater has forecast a marginal reduction in 'Other' expenditure, to $27,000 in 2011; expenditure is forecast to remain steady thereafter. Of this expenditure, $21,000 relates to insurance costs, which are excluded from the scope of this review. Local Authority rates account for the remaining $6,000 per annum. SunWater is required by law to pay Local Authority Rates and this expenditure is therefore deemed both prudent and efficient.

8.2.3 Preventative maintenance

8.2.3.1 Overview

In SunWater's reporting system, preventative maintenance consists of three activity types; namely condition monitoring, servicing, and weed control.[172] This section provides an overview of SunWater's historical and forecast expenditure on preventative maintenance for the Theodore Distribution System. Additional discussion of SunWater's approach to forecasting preventative maintenance expenditure is included in **Section 3.6.3**.

Table 8-5 provides a breakdown of historical and forecast expenditure on preventative maintenance by item. The disaggregated cost data provided to Halcrow does not separately identify expenditure associated with condition monitoring, servicing and weed control.

As evident from **Table 8-5**, there was a notable increase in expenditure on materials between 2010 and 2011. SunWater indicated that the 2011 forecast represents the return to normal water availability (water levels in storages have increased substantially from the last 4-5 years).

SunWater is forecasting an increase in direct costs associated with preventative maintenance when compared to its historical expenditure. This is driven by increases in labour, materials and contractors.

[172] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 4.

Table 8-5 Theodore – Preventative Maintenance Expenditure

Expenditure ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	105	99	115	100	114	116	117	117	117	117
Materials	22	22	26	22	39	40	40	41	42	42
Contractors	0	0	51	35	56	57	58	58	59	60
Other	0	0	0	0	0	0	0	0	0	0
Total Direct Costs	**127**	**121**	**193**	**157**	**209**	**212**	**215**	**217**	**218**	**220**
Indirects	65	128	134	67	60	54	62	64	65	64
Overheads	140	112	128	108	116	117	120	121	122	119
Total	**332**	**361**	**455**	**332**	**386**	**384**	**398**	**402**	**405**	**402**
Annual change (%)		8%	26%	-27%	16%	-1%	4%	1%	1%	-1%
Change since 2007 (%)		8%	37%	0%	16%	15%	20%	21%	22%	21%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.

The following paragraphs include a review of the historical and forecast preventative maintenance expenditure including weed control, and condition monitoring and servicing.

8.2.3.2 *Weed control*

SunWater uses three approaches to weed control; these include:

- Acrolein chemical dosing of the water held in the channel system;
- Chemical Weed Control, ie. chemical spraying of weeds using "Round-up" or similar products; and
- Mechanical Weed Control, ie. slashing or burning of weeds.

Chemical spraying and mechanical weed control activities are typically undertaken along channel batters, roads and in drains.

Acrolein is applied to the channel system by SunWater staff; it is not contracted out. Halcrow understands that Acrolein dosing is undertaken using a slug dosing process; in this case, the system is completely closed and drained, and a slug dose of Acrolein is applied as the channel is refilled.

SunWater provided a breakdown of historical expenditure on weed control, as shown in **Table 8-6**. A similar breakdown of forecast expenditure has not been provided.

Table 8-6 Theodore – Preventative Maintenance Expenditure – Weed Control

Expenditure ($'000 2011 real)	Historical			
	2007	2008	2009	2010
Labour	87	85	102	84
Materials	17	21	25	21
Contractors	-	-	51	34
Other	0	-	0	0
Total Direct Costs	**104**	**105**	**178**	**139**
Indirects	54	110	119	56
Overheads	120	96	114	91
Total	**278**	**311**	**410**	**286**

Extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*'.

The breakdown of forecast expenditure provided by SunWater does not separately identify all of the expenditure associated with weed control, although it does identify contract slashing and spraying costs, and materials (Acrolein).

Forecast weed control expenditure - contractors (slashing and spraying)

As noted **Section 3.6.3.3**, slashing and spraying are typically outsourced to contractors. SunWater's forecast expenditure includes an allowance for 'Contractors - weed control' of $56,000 per annum for Theodore Distribution System. SunWater did not incur any expenditure on contractors at Theodore in 2007 and 2008. In 2009 the expenditure was $51,000 and in 2010 expenditure was $34,000.

During interviews with SunWater, it was noted that expenditure forecasts of 'Contractors - weed control' are based on existing slashing contracts. SunWater indicated that contracts typically run for three years, and that they are market tested when due for renewal. As part of this review, Halcrow reviewed a copy of the weed control contract for the Theodore Distribution System. The current contract is dated 16 July 2009, and runs for a period of three years. The contract includes slashing and blanket spraying of the Fork Section, the Gibber Gunnyah Section and the Theodore Section, and is based on a schedule of rates. The contract rate for three slashings and three sprayings is approximately $73,700, which indicates that SunWater's forecast expenditure ($56,000 per annum) is based on two to three slashings and sprayings per year. On the basis of the available information, Halcrow is satisfied that the allowance for 'Contractors - weed control' is both prudent and efficient.

SunWater has also applied an escalation of approximately 1.5 percent in real terms to expenditure on contractors. As discussed in **Section 3.9.3**, from the information provided by SunWater, it is difficult to conclude that an escalation factor of greater than the CPI (assumed at 2.5 percent) should be applied.

Materials - Weed control (Acrolein)

As noted above, Acrolein is applied to the channel system by SunWater staff. SunWater has provided a copy of an *Internal Position Paper - Acrolein*, dated 30 July 2010, which details its approach to forecasting Acrolein usage in the coming price path period.

SunWater has stated that current volumes have been treated as the base line for future consumption. SunWater's historical and forecast use of Acrolein is shown in **Table 8-7**.

Table 8-7 Historical and forecast use of Acrolein

Distribution System	Number of Acrolein Cylinders (200 L) per year					Annual Cost
	2008 Actual	2009 Actual	2010 Actual	2011 Budget	Projected Annual Usage	
Dawson Valley (Theodore)	0.5	1	1	1	2	$12,228

Source: SunWater Internal Position Paper – Acrolein, dated 30 July 2010, page 1.

SunWater has forecast that it will require two cylinders of Acrolein per year to maintain customer standards of service and minimise the fouling of water meters by weeds. It has not provided an explanation of why it has forecast an increase in usage over historical levels. While Halcrow notes the inherent uncertainty in forecasting Acrolein usage, influences that would be expected to increase weed growth have been experienced within the past couple of years without any recorded increase in Acrolein use. On this basis, Halcrow is not satisfied that an increase of usage to two cylinders has been justified.

SunWater's forecast expenditure assumes the cost of a 200L cylinder is approximately $6,150 ($2011 real). Halcrow understands that this is based on its last order of Acrolein in 2010. In an attachment to its *Internal Position Paper - Acrolein*, SunWater provided documentation from its US supplier which indicates that the cost of the product is to reduce by approximately 15 percent, however, this reduction does not appear to be reflected in SunWater's forecast of expenditure. Taking into account the reduction in the unit rate of Acrolein, expenditure would be $5,200 per annum ($2011 real).

In its *Internal Position Paper - Acrolein*, SunWater also noted that the cost of Acrolein has been volatile over the period 2005 to 2009, and that while it expects variation in the price of the chemical to be considerable, in the absence of justification, only CPI should be used to inflate the cost of Acrolein.[173] Halcrow supports this approach but notes that in its NSP, SunWater has proposed that materials should be escalated by four percent per annum in nominal terms (refer to **Section 3.9.3**). This is reflected in the materials costs included in **Table 8-5**.

[173] Halcrow has verified that the forecast expenditure on Acrolein does not include an increase beyond inflation over the period 2012 to 2016 (note, only verified for distribution schemes).

From the information provided to this review, it is not possible to identify the forecast labour expenditure associated with Acrolein dosing (the breakdown of labour expenditure presented in **Table 8-5** also includes condition monitoring and servicing activities). Consequently, it has not been possible to review this expenditure.

8.2.3.3 *Condition Monitoring and Servicing*

The main maintenance issues in the Theodore Distribution system include channel maintenance; pumping station structures; and the Gibber Gunyah sub-system, which is impounded by levee banks (SunWater owned).

SunWater provided a breakdown of historical expenditure on condition monitoring and servicing, shown in **Table 8-8**. A similar breakdown of forecast expenditure has not been provided.

Table 8-8 Theodore – Preventative Maintenance Expenditure – Condition Monitoring and Servicing

Expenditure ($ 000 2011 real)	Historical			
	2007	2008	2009	2010
Labour	18	14	13	16
Materials	5	1	1	2
Contractors	-	-	1	1
Other	-	-	0	0
Total Direct Costs	**23**	**15**	**15**	**18**
Indirects	11	18	15	11
Overheads	20	16	14	17
Total	**54**	**50**	**45**	**46**

Source: Extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*'.

As noted in **Section 3.6.3.2**, Halcrow understands that SunWater's condition monitoring and servicing forecast expenditure is primarily based on forecasts developed by Parsons Brinkerhoff, although it also includes allowances for additional servicing activities.

As part of the review undertaken by Parsons Brinkerhoff, it forecast expenditure of approximately $27,500 per annum ($2010 real) on condition monitoring and servicing for the coming price path period. This is equivalent to approximately $28,500 per annum ($2011 real); it excludes overhead and indirect costs. This compares to direct expenditure of between $18,000 and $23,000 in the years 2007 to 2010.

The condition monitoring and servicing activities costed by Parsons Brinkerhoff include servicing of cranes, condition monitoring and inspection of the Gibber Gunyah and Theodore pump stations. While Halcrow has not been provided with facility O&M manuals for the Dawson Valley Bulk WSS, SunWater has provided a list of preventative maintenance work orders raised in the

Dawson Valley Bulk WSS (including the Distribution System) over the period 2008 to 2010. Halcrow has reviewed the listing and is satisfied that preventative maintenance activities costed by Parsons Brinkerhoff are consistent with the nature and required frequency of activities undertaken on the scheme.

Halcrow is generally satisfied that the expenditure forecast developed by Parsons Brinkerhoff is based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken, however, Halcrow notes that this estimate is built up from SunWater's existing work instructions and its current approach to maintenance, which is yet to be optimised. Consequently, there is likely to be scope to achieve efficiency savings in the delivery of servicing and condition monitoring activities (this is discussed in greater detail in **Section 8.2.4**).

Accounting for the forecast expenditure developed by Parsons Brinkerhoff, and expenditure for weed control reviewed in **Section 8.2.3.2**, the remaining expenditure on preventative maintenance is approximately $112,200 per annum. This includes labour associated with dosing of Acrolein, which cannot be separately identified from the disaggregated cost data provided to this review. It is noted, however, that total labour costs associated with weed control over the period 2007 to 2010average to $59,500 ($2011 real) (refer **Table 8-6**); in absence of more robust information, provides an indication of likely labour costs, although it covers all weed control activities undertaken by SunWater operators.

As noted in **Section 3.6.3.2**, the forecast of preventative maintenance expenditure also includes expenditure related to "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves*".[174] SunWater has indicated that the forecast is based on the average of previous years' expenditure, although no additional information on the nature or make up of this expenditure has been provided. Consequently, Halcrow is unable to make an assessment of whether this element of preventative maintenance is prudent or efficient.

In the absence of justification for the remaining $52,700 per annum, an adjustment of the forecast preventative maintenance expenditure by this amount is proposed.

8.2.4 Corrective maintenance

Table 8-11 shows a breakdown of historical and forecast expenditure on corrective maintenance. Indirects and overheads account for a significant element of the expenditure. SunWater has forecast a reduction in expenditure on corrective maintenance in the coming price path.

[174] SunWater email, *RE Preventative Maintenance*, 9 March 2011.

Table 8-9 Theodore – Corrective maintenance expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	43	68	61	62	67	68	69	69	69	69
Materials	25	31	47	24	31	31	31	32	32	33
Contractors	53	67	0	3	3	3	3	3	3	3
Other	1	7	80	14	0	0	0	0	0	0
Total Direct Costs	**123**	**172**	**189**	**103**	**101**	**102**	**103**	**104**	**104**	**105**
Indirects	26	88	72	41	35	32	37	38	38	37
Overheads	52	79	73	68	67	68	69	70	70	69
Total	**201**	**339**	**333**	**212**	**203**	**201**	**209**	**212**	**213**	**211**
Annual change (%)		69%	-2%	-36%	-4%	-1%	4%	1%	1%	-1%
Change since 2007 (%)		69%	65%	5%	1%	0%	4%	5%	6%	5%

As noted in **Section 3.6.4**, SunWater has stated that its forecast expenditure is based on an average of the past four years (including 2011), excluding the impact of 'outliers'. SunWater has not provided the calculations in support of its forecast of corrective maintenance, however, Halcrow notes that forecast expenditure for labour and materials is approximately in line with the four year average (calculated from 2008 to 2011), while the expenditure on contractors and others is significantly lower than the four year average.

SunWater has provided a breakdown of its corrective maintenance forecast expenditure which indicates labour charges of $67,000 for SunWater's Central region. The materials expenditure includes $15,000 for heavy plant, and $16,000 for materials. No details have been provided in relation to this expenditure.

As part of the review, Halcrow obtained a breakdown of corrective maintenance work orders for the period 2009 to 2011 for Dawson Valley Bulk WSS (including the Theodore Distribution System). The work orders include activities relating to the replacement of Dethridge Wheel bearings, repairs of erosion on channel banks, investigations of leakage and repairs to pumps. The activities undertaken are what might be reasonably expected from the mix of assets within the Distribution System.

Increases in SunWater's preventative maintenance program should ultimately result in a reduction in corrective maintenance as asset reliability increases. However, as shown in **Table 8-10**, the mix of expenditure between preventative and corrective maintenance is not forecast to change over the period 2012 to 2016.

Table 8-10 Theodore – Maintenance expenditure

Direct Expenditure ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Preventive maintenance	127	121	193	157	209	212	215	217	218	220
Corrective maintenance	123	172	189	103	101	102	103	104	104	105
Total Maintenance	**250**	**293**	**381**	**260**	**310**	**314**	**319**	**321**	**323**	**325**
Annual change (%)		17%	30%	-32%	19%	1%	1%	1%	1%	1%
Change since 2007 (%)		17%	52%	4%	24%	26%	27%	28%	29%	30%
Preventative maintenance (%)	51%	41%	51%	61%	68%	68%	68%	68%	68%	68%
Corrective maintenance (%)	49%	59%	49%	39%	32%	32%	32%	32%	32%	32%

As discussed in **Section 3.6.4**, Halcrow understands that SunWater is yet to review its current mix of preventative maintenance and corrective maintenance to determine whether its current approach is optimised. While it is understood that SunWater intends to implement RCM over the coming two to three year period, Halcrow notes that the forecast expenditure in the NSPs do not reflect any savings that might be achieved as a result of its proposed implementation.

8.2.5 Electricity

Electricity costs for the Theodore Distribution System relate to operation of the Theodore, Fork Farmers and Gibber Gunyah pump stations. These pump stations have no balancing storages, so their pump run times are controlled by channel levels and demand for water.[175]

As evident in **Table 8-11,** expenditure on electricity in the Theodore Distribution System has been in the order of $73,000 to $109,000 per annum over the current price path. SunWater has forecast that expenditure will increase to approximately $119,000 in 2011, and remain steady in real terms thereafter.

Table 8-11 Theodore– Electricity expenditure

($ '000 2011 real)[176]	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity	87	73	109	109	119	119	119	119	119	119
Annual change (%)		-15.8%	48.6%	0.1%	9.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Change since 2007 (%)		-69.9%	-55.2%	-55.2%	-51.1%	-51.1%	-51.1%	-51.1%	-51.1%	-51.1%

Source: Extracted from SunWater Emerald Distribution Scheme NSP, Table, page 7.

SunWater indicated that its forecast has been developed using 2010 as a basis, as it considers that 2010 represents an 'average' year. In **Section 3.6.1**, Halcrow has noted that there is a lack of clarity surrounding SunWater's interpretation of an 'average' year, particularly given that the basis for calculating an 'average' year

[175] SunWater, *Dawson Valley Water Supply Scheme - Scheme Operation Manual*, undated, page 67.
[176] It is noted that the assumed usage of 11,166ML/annum is approximately in line with the 2010 usage.

varies across the different expenditure items, activities and schemes. The varying interpretations of what constitutes an average year, particularly where there are varying definitions for expenditure associated with a particular scheme, means that it is very difficult to gain assurance that SunWater's adopted approach in developing forecasts is reasonable.

As shown in **Table 8-12,** the average cost of pumping in 2010 was $9.40/ML. This has been inflated by 13.29 percent, which is the increase in Franchise Tariffs between 2009/10 to 2010/11, to give an average cost of pumping of $10.65/ML.

SunWater's electricity forecast is based on an assumed usage of 11,166ML/annum. This volume assumes that seventy percent of the distribution entitlement (specified in the ROP) is used each year. SunWater noted that this usage (seventy percent) is based on eight years of historical data usage data. The resulting forecast of expenditure on electricity is approximately $119,000 per annum.

Table 8-12 provides a breakdown of electricity usage over the period from 2006 to 2010.

Table 8-12 Theodore – Historical electricity usage

($ '000 2011 real)	2006	2007	2008	2009	2010
kWh	871,881	902,107	516,468	658,033	798,503
ML Pumped	-	13,086	10,186	12,070	16,756
ML Delivered	13,460	11,383	8,648	10,074	11,242
Pumping Cost[1]	92,888	89,853	65,793	100,788	105,716
$/ML	6.90	7.89	7.61	10.00	9.40
$/kWh	0.11	0.10	0.13	0.15	0.13

Source: Extracted/derived from SunWater Spreadsheet *'Basic Pump Station Data 100810.xls Annual Information.'* Note (1) These costs are extracted from electricity bills. Differences between these costs and those reported in **Table 8-11** (which are extracted from SAP) are due to timing differences, credit notes etc.

While the use of a flow driver to forecast electricity expenditure appears reasonable, Halcrow notes that a forecast based on electricity consumption (kWh) would eliminate the impact of the movement in historical expenditure resulting from tariff increases.

As part of the review, Halcrow sought to test the sensitivity of SunWater's forecast by comparing it against average electricity usage over the period since 2006.[177] The average electricity consumption for the years 2006 to 2010 is 749,398 kWh. Applying the relevant franchise tariffs for Theodore and Gibber Gunyah, and assuming the same proportion of peak to off-peak usage as in 2010 (the only years for which peak and off-peak data has been provided), results in an average electricity usage of approximately $112,400 per annum. This is approximately five percent lower than SunWater's forecast. Given the potential variability in electricity use, the usage based forecast is deemed appropriate.

[177] SunWater provided detailed data back to 2006.

8.2.6 Summary of findings on operating expenditure

A definitive assessment of prudence and efficiency has not been possible due to the absence of sufficiently detailed information on SunWater's historical and forecast expenditure. In particular, Halcrow has been unable to verify the forecast of operations costs, or approximately $112,200 per annum of forecast expenditure on preventative maintenance related to activities excluded from the review by Parsons Brinkerhoff review. In the absence of robust information, however, it appears that of this amount, costs in the order of $60,000 relate to labour costs associated with weed control.

Halcrow has identified a number of areas where SunWater's forecast expenditure appears excessive; this includes allowances for Acrolein. In addition, SunWater has also applied an escalation of approximately 1.5 percent in real terms to expenditure on contractors. As discussed in **Section 3.9**, it is difficult to conclude that an escalation factor of greater than the CPI (assumed at 2.5 percent) should be applied.

Halcrow also notes that there is likely to be scope for SunWater to achieve efficiencies via the optimisation of its preventative and corrective maintenance programs. In addition, SunWater is seeking to increase its pumping energy efficiency through development and implementation of a portfolio energy management plan. Halcrow understands that these savings have not been incorporated into the forecast expenditures reported in the NSP.

In view of the preceding, Halcrow recommends adjustments to the forecast operating expenditure (direct costs) for the Theodore Distribution System as shown in **Table 8-13**.

Table 8-13 Theodore – Proposed Adjustments to Operating Expenditure (2012 – 2016)

Item ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
SunWater Proposed Total Direct Costs	**665**	**673**	**675**	**677**	**678**
Adjustments:					
▪ less escalation on materials	-1	-2	-3	-4	-5
▪ less escalation on contractors	-1	-2	-3	-4	-4
▪ less adjustment for Acrolein costs	-2	-2	-2	-2	-2
▪ less unjustified Preventative Maintenance costs	-53	-53	-53	-53	-53
Total Reduction	-57	-59	-61	-63	-64
Halcrow Adjusted Direct Costs	**608**	**614**	**614**	**614**	**614**

8.3 Renewals Expenditure

8.3.1 Overview

Table 8-14 provides a high level summary of SunWater's renewals program for the Theodore Distribution System over the five-year regulatory period.

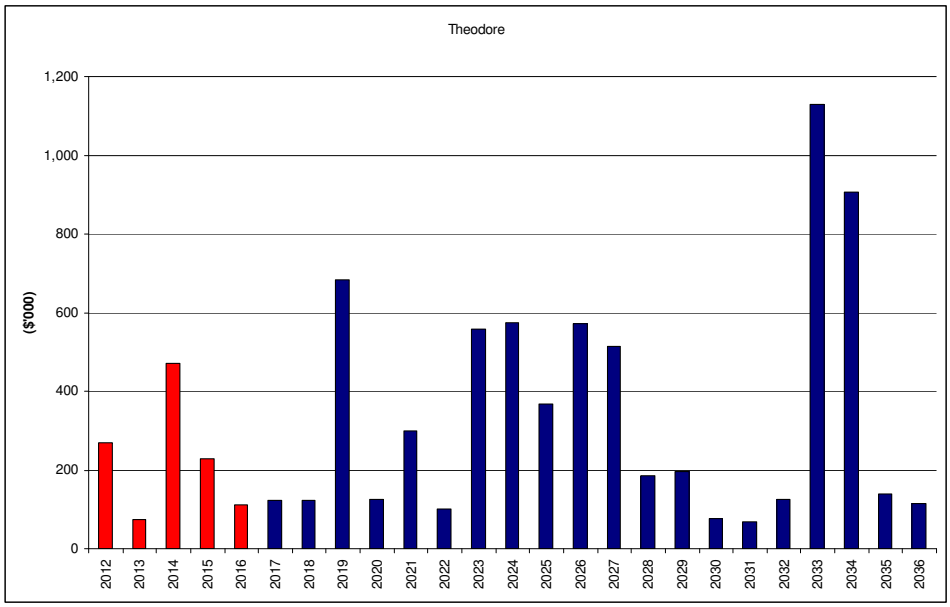
Table 8-14 Theodore - Proposed Renewals Program (2012 – 2016)

Facility ($ 000 2011 real)	Financial Year					5-yr Total
	2012	2013	2014	2015	2016	
Gibber Gunyah Drainage	10					10
Gibber Gunyah Irrigation Dist					14	14
Gibber Gunyah Pump Station	31	73	266	172	51	593
Theodore Drainage	8		17			25
Theodore Irrigation Distrib	148				11	159
Theodore Pump Station	74		188[b]	57	34	353
Total	**271**	**73**	**470**	**229**	**110**	**1,153**

Source: SunWater Theodore Distribution NSP, Table 4-5, page 29.

As noted in **Table 8-14**, the majority of the renewals expenditure to be incurred in the period to 2016 relates to the Gibber Gunyah Pump Station and Theodore Pump Station.

SunWater provided Halcrow with a breakdown of its proposed renewals expenditure by project for the 25 year period to 2036. The breakdown indicates significant renewals expenditure in 2019, 2033 and 2034, as shown in **Figure 8-3**.



Source: SunWater , *NSP Projects Central V4.xls*

Figure 8-3 Theodore - Forecast renewals expenditure

As part of the review of the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow undertook a detailed review of a selection of historical and proposed renewals projects. The detailed review of historical renewals projects sought to understand the factors contributing to the difference between SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure identified in the previous Tier 1 pricing review. The detailed review of forecast renewals projects included a review of project planning and proposed outcomes to assess the prudence and efficiency of SunWater's proposed renewals expenditure.

The following sections detail the results of this review.

8.3.2 Review of historical renewals expenditure

Table 8-15 shows SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure determined during the previous pricing review.[178] With the exception of 2007 and 2008, SunWater's actual expenditure has exceeded the LBC target expenditure in each year of the current price path period.

Table 8-15 Theodore - Actual renewals expenditure versus LBC Target expenditure

$'000 nominal	Financial Year				
	2007	2008	2009	2010	2011
Actual renewals Expenditure	10	72	137	500	1,412
LBC Target Expenditure	84	154	112	197	190
Difference	-74	-81	25	304	1,222

Source: SunWater spreadsheet '*Compare R&E Spend to Annuity 2007_2011.xls*'.

As noted in **Section 3.8.2**, SunWater has not been able to provide a list of renewals projects that it intended to deliver during the current price path; consequently, it has not been possible to undertake a detailed assessment of SunWater's historical renewals expenditure.

Halcrow did, however, obtain a breakdown of SunWater's historical expenditure on renewals expenditure for the period 2007 to 2011 (until 15 February) for projects greater than $10,000.[179] A review of the budgeted versus actual expenditure for the renewals projects undertaken indicates that most projects were delivered at or below budget, although a number of projects were not included in the original Board approved budget.

Significant expenditure in the current price path has included:

[178] It is noted that the Tier 1 review bundled the Emerald distribution system with the Nogoa Mackenzie system. The breakdown of LBC target expenditure has been provided by SunWater.

[179] The listing of actual expenditure on renewals and rehabilitation indicates expenditure significantly lower than that reported in the NSP. However, the listing of expenditure provided only included projects greater than $10,000 in value, which indicates that a significant element of renewals projects were lower than this threshold, or that the list provided to Halcrow was incomplete.

- Theodore Drain 4B - Refurbish eroded earthworks ($38,242 vs budget of $33,312 in 2008).
- 05/06 Group 4 Theodore Channel A after Highway (Theodore New Start) ($27,802 in 2008).
- Install Fencing as per Policy - Theodore Irrigation ($67,249 in 2009; Board budget $30,747, increased to $75,064).
- Install Signs as per Manual - Theodore Irrigation ($28,811 in 2009; Board budget $14,961, increased to $30,342).
- Repair erosion - Drain 4B (Theodore) ($41,194 in 2010; not included in Board budget, but in line with approved budget).
- Investigate and Design Channel D Modernisation Options ($62,530 in 2010; Not in original board budget. Approved budget $75,000).
- 05/06 Group 4 Theodore Channel A after Highway (Theodore New Start) ($39,815 in 2010; Board budget $261,400).

Halcrow has not undertaken a detailed review of these projects, and is therefore unable to provide constructive assessment of either prudence of efficiency; however, on the basis of project descriptions, the projects are generally of a nature and order of cost that would be expected for irrigation system infrastructure.

SunWater's 2011 budget includes significant expenditure in 2011, including:

- Intersafe Gated - Theodore – CBB ($468,820 budgeted) and Intersafe Gated - Gibber Gunyah – CBC ($91,650 budgeted). SunWater indicated that these Intersafe projects were not included in the price path, however its Board decided to undertake the work following a report from Intersafe recommending that SunWater take action to reduce the safety risk to staff. The project was budgeted at the SunWater level ($14.4 million) and costed at the scheme level on implementation. The project is expected to come in on time (30 June 2011) and Budget ($14.4 million).
- Replace Main and Distribution Switchboards - Theodore Pump Station ($237,762 budgeted).

8.3.3 Review of forecast renewals expenditure

In order to assess the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow selected nine renewals projects to review in detail. Of the projects selected for review, four are forecast for the period 2017 to 2036, and the remainder include those projects driving the significant expenditures in 2019, 2026 and 2027.

The projects selected for review are included in **Table 8-16**; they account for approximately 45 percent of the expenditure in the period 2012 to 2016.

Table 8-16 Theodore – Selections from Proposed Renewals Program

Halcrow Review ID	Year	SunWater Description	Direct Cost ($000)	Total Cost ($000)
Gibber Gunyah Pump Station				
LIT/1	2014	Replace Suction Pipe Pump No2	106	152
LIT/2	2015	Replace Suction Pipe Pump No3	96	138
LIT/3	2019	Replace Submersible Pump, Flygt	258	360
Theodore Drainage				
LIT/4	2033	Replace Structure	201	277
Theodore Irrigation Distribution				
LIT/5	2012	11DVAXX DVAXX Replace Siphon CHD TH	140	148
Theodore Pump Station				
LIT/6	2014	Refurbish control - replace PLC, components etc; obsolescence, reliability	59	85
LIT/7	2026	Replace Concrete Structure	146	201
LIT/8	2027	Replace Control Equipment	142	195

Halcrow requested that SunWater provide the following information:

- The project scope and the driver for each project;
- The basis of expenditure forecast (unit rates, quantities etc); and
- Condition reports/asset management plans demonstrating the need for the renewals expenditure.

For renewals projects planned for 2013 and beyond, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects was provided. This is because detailed planning is not currently undertaken until 12 months prior to the scheduled renewals date.

In lieu of this information, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure.

The following paragraphs include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency. Halcrow's review of each project has only considered the direct costs. Indirect costs and overheads, which have been applied to all projects, are the subject of a separate review.

LIT/1 Gibber Gunyah Pump Station Replace Suction Pipe Pump No2 and LIT/2 Gibber Gunyah Pump Station: Replace Suction Pipe Pump No3

These two renewals projects are planned for 2014 and 2015 at the Gibber Gunyah Pump Station. Expenditure of $152,000 ($106,000 direct cost) and $138,000 ($96,000 direct) is forecast in respect of Pump No2 and Pump No3 respectively.

Each pump at the Gibber Gunyah Pump Station has a dedicated suction pipe. SAP-WMS system lists that the suction pipes No2 and No3 have been in operation since June 1957, with an asset life as 80 years. This indicates that replacement of these assets should occur in 2037. Replacement is, however, scheduled for 2014 and 2015. The dimensions of these pipes are unknown, however, based on the SAP-WMS extracts they are understood to be ferrous.

Condition assessments for pipes No2 and No3 undertaken in 2006 indicate that major deterioration has occurred such that the asset is virtually inoperable. The condition assessment revealed extensive cracking and failures on the majority of the pipe lining.

Whilst the condition assessment ratings indicate No2 and No3 suction pipes are virtually inoperable, there is no indication in the scheme submissions or from issues arising during stakeholder consultation[180] that that supply has been limited. The Dawson Valley *Scheme Operation Manual*[181] states that:

"*The first pump can pump 17 ML/d, the second pump 34 ML/d, and the third – the submersible - 67 ML/d. When used together they can supply 118 ML/d, but the channel into which they discharge can only take 105 ML/d*".

The risk assessment undertaken in 2005 notes that wall/joint failure would have insignificant consequences related to WH&S, environment, finance and minor consequences related to production/operations. Overall, a low risk was determined across all categories.

Noting the potential supply limitations to the fifty seven (57) metered customers[182] should failure of two of three suction pipes occur, Halcrow considers it prudent that pipes No2 and No3 are refurbished or replaced. It may, however, be prudent to assess alternative approaches to renewal, including re-lining or the use of alternative materials.

Given the condition of the assets, Halcrow notes that it may more cost efficient to replace the assets at the same time, rather than staggered over years 2014 and 2015. The timing may, however, be proposed to limit the impact on operations.

SunWater is yet to prepare a detailed cost estimate for this project. In the absence of further details, including pipe size and length, it has not been possible to assess the efficiency of the proposed expenditure.

[180] QCA, *Dawson Valley, First Round Consultation – Issues Arising*, 12 May 2010.
[181] SunWater, *Dawson Valley Water Supply Scheme, Scheme Operation Manual, Version 1-1*, Undated.
[182] SunWater, *Dawson Valley Water Supply Scheme, Scheme Operation Manual, Version 1-1*, Undated.

LIT/3 Gibber Gunyah Pump Station: Replace Submersible Pump, Flygt

The Flygt Submersible Pump located at the Gibber Gunyah Pump Station has been in operation since June 1989 and is scheduled to be replaced in 2019. The SAP-WMS system lists the asset as having a life of 30 years. SunWater's asset guide[183] provides information on recommended asset lives for pumps, however, there is no specific information on submersible type pumps presented in this document.

Condition assessment results were not provided, however, the pump failure is rated as a low risk due to the availability of other pumps at the site. It is noted that SunWater's mechanical assets guide[184] recommends the maximum assessment frequency for submersible pumps to be two years.

A detailed cost estimate has not yet been undertaken, however, forecast expenditure is $360,000 ($258,000 direct cost).

It is noted that the historical renewals budget in 2007 allowed a budget of $20,000 (nominal) to overhaul the Flygt pump. No detail was, however, recorded in the historical renewals data apart from a comment that states "*this job was completed under BIL0655*". It is also noted that in the forecast renewals program, an allowance of $44,000 ($32,000 direct) has been included for refurbishment of the Flygt pump every six years.

Given that the pump will reach the end of its asset life in 2019, expenditure is considered prudent. Halcrow is, however, unable to comment whether expenditure is efficient as insufficient information is available in regard to the site layout, pipe size any site-specific access issues.

Assuming that the pump is to be replaced in 2019, Halcrow recommends that the timing of subsequent refurbishments be deferred such that the six year frequency is maintained, ie. refurbishment scheduled for 2022 is deferred to 2025 and so on.

LIT/4 Theodore Drainage: Replace Structure

This renewals project is planned for 2033, at a cost of $277,000 ($201,000 direct costs). It is understood that this structure is a road bridge located at chainage 1,608m along Drain 4B. The asset has been in operation since 1953 and has an asset life of 80 years entered into the SAP-WMS system, with replacement scheduled for 2033. It is understood that structure has WH&S issues due to no guard rails being present. These will be installed in 2014.

A condition assessment was undertaken in 2009 which demonstrated minor defects related to structural integrity, structural movement, foundations and function. There is no comment regarding whether the asset life could be effectively extended by refurbishment rather than replacement.

Given the structure is in reasonable working order (at 70 percent of its estimated life span) and a WH&S upgrade is scheduled in 2014, it is difficult to confirm that

[183] SunWater, *Users Manual for Assessing Mechanical Assets, Version 5.3*, 5 January 2009.
[184] SunWater, *Users Manual for Assessing Mechanical Assets, Version 5.3*, 5 January 2009.

expenditure to replace the structure is prudent; Halcrow notes that there may well be scope to defer this project. Furthermore, given the absence of information regarding the size (span and width) of the bridge, Halcrow is unable to confirm that the cost is efficient.

LIT/5 Theodore Irrigation Distrib: 11DVAXX DVAXX Replace Siphon CHD TH

This renewals project is planned for 2012. It is understood that the siphon is located on Channel D. An extract from SAP-WMS indicates that the siphon has been in operation since July 1953 and has an asset life of 80 years. The estimated replacement date should therefore be 2033. No further information on asset life, monitoring frequency or dimensions was provided.

A condition assessment undertaken in January 2001 rates the structure as Condition 5, which indicates that the asset exhibits major deterioration and is virtually inoperable. A note entered in SAP-WMS states that "*no screen, headwall pipe crossing broken, pipe not too bad, no visible leaks, at maximum capacity*".

SunWater provided a Draft Business Case for the Channel D Rationalisation Project.[185] Halcrow understands the purpose of this business case is a capacity upgrade of Channel D to 100ML/day to supply two new 50ML/day outlets. A request for the two new outlets is in response to a farm rearrangement. SunWater stated "*the existing channel and drainage system adequately services the area in question and meets SunWater's service targets*". SunWater also undertook financial scenario analysis to determine benefit cost ratios for two scenarios. The results of the scenario analysis concluded the net present value for the rationalisation project was negative. SunWater also stated that "*two planning items exist within SAP-WMS… which on their own will not meet the objectives of the proposed rationalisation without significant further budget approvals*". The items are:

- In 2011, Refurbishing and enhancing channel D earthworks 63.5 – 1101m at a cost of $119,625; and
- In 2012 Replace Siphon 1101-1128 m at a cost of $146,371.

SunWater concluded there would be "*little benefit to SunWater in pursuing the rationalisation project further. It should be noted however, that SunWater's relationship with the affected irrigators is likely to be tarnished if the proposed works do not proceed. This report is for review and confirmation of the recommendations*".

From the information provided, it is not clear whether the channel D rationalisation project will proceed. Should the project proceed, then it would be expected that the required new upsized siphon would be a funded by a combination of renewals and new capital works.

The SAP-WMS extracts indicate that a cost estimate for replacement of the siphon has been undertaken, although only a high level breakdown has been provided. SunWater has forecast that replacement of the siphon will cost $148,000 ($140,000 direct cost). It is noted that the historical renewals expenditure originally

[185] SunWater, Theodore Channel D Rationalisation – Project Business Case Review.

scheduled the siphon replacement project to be completed in 2011. After querying why no expenditure had occurred in 2011, SunWater confirmed the work has been deferred until 2012.

Given that a new upsized siphon may in fact need to be installed in combination with other channel works, it is not possible to conclude that expenditure is prudent or efficient.

LIT/6 Theodore Pump Station: Refurbish control - replace PLC, components etc; obsolescence, reliability and LIT/8 Theodore Pump Station: Replace Control Equipment

The Theodore pump station control equipment has been in operation since 1994. An asset life of 15 years is entered into the SAP-WMS system. SunWater's SAP asset hierarchy guide[186] estimates the life of PLC and other electronics to be 10 years, which is five years less than the asset life entered into SAP-WMS. The extract from SAP-WMS provided to Halcrow indicates the control equipment should have been replaced in June 2009. Review of historical renewals expenditure does not reveal whether the control equipment was replaced in 2009 to 2011.

Halcrow subsequently queried SunWater on whether the control equipment has already been replaced. SunWater confirmed that the control equipment was replaced in conjunction with the replacement of the Main and Distribution Switchboards (identified in **Section 8.3.2**). SunWater also confirmed that following Halcrow's query, the refurbishment proposed in 2014 at a cost of $85,000 ($59,000 direct cost) was deleted from the SAP-WMS system on 23 March 2011. It is noted that this occurred after the preparation and submission of the NSPs.

Given the information presented, Halcrow recommends that the proposed refurbishment is rescheduled for 2019 (approximately 7.5 years after installation) and replacement for 2026 (15 years after installation) to coincide with the adopted refurbishment/replacement intervals.

The forecast cost of refurbishment ($59,000 direct cost) and replacement ($142,000 direct cost) are deemed to be efficient.

LIT/7 Theodore Pump Station Replace Concrete Structure

Halcrow understands that this item refers to replacement of a pump station well structure. The structure has been in operation since June 1927 and has an asset life entered into SAP-WMS of 80 years. This aligns with SunWater's asset management hierarchy[187] which estimates the life of concrete structures at 80 years. Based on estimated asset life, this structure should have been replaced in 2007, however, the first scheduled replacement is in 2026. The dimensions of the well structure and site layout are unknown.

No condition assessment details have been provided. A risk assessment was undertaken in 2005 which has a comment entered in SAP-WMS *"well condemned*

[186] SunWater, *A Guide to SAP PM Asset Hierarchy Development* version 6.5, 20 January 2009.
[187] SunWater, *A Guide to SAP PM Asset Hierarchy Development* version 6.5, 20 January 2009.

major refurbishment required". This comment appears to contradict the risk assessment undertaken for structural failure which for all categories states there is low risk.

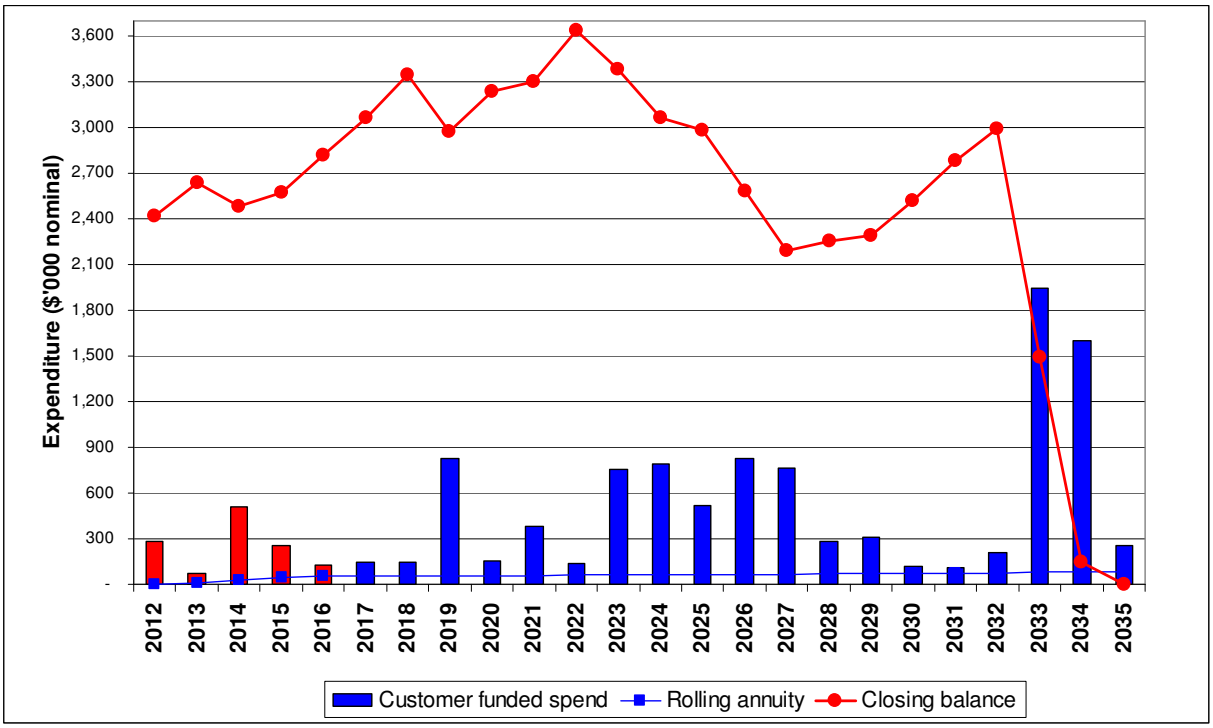
Given that asset life has been exhausted and that fact that the well has been condemned, replacement of the well is considered prudent.

It is not possible to determine whether replacement of the pump well structure at direct cost of $146,000 is efficient as SunWater has not provided any site specific information.

8.3.4 Renewals Annuity

The renewals annuity for the bulk and distribution systems was previously bundled (ie. the bulk and distribution systems were considered collectively). SunWater has adopted a renewals annuity approach for the Theodore Distribution System for the five year period ending 2016. The total renewals annuity is $3.271 million over this period, averaging $645,000 per year in nominal terms. The opening balance is $2,398,000.

Figure 8-4 shows the rolling annuity and the annuity closing balance through time. As evident from the graph, SunWater's annuity closing balance is forecast to be significantly in surplus, only reducing following the significant forecast expenditure on renewals projects in 2033 and 2034. A review of a sample of these expenditures has been discussed in **Section 8.3.4**.



Source: SunWater spreadsheet, *Annuity charts – V610 03.xls*

Figure 8-4 Theodore - Renewals Annuity ($ nominal)

8.3.5 Summary of findings on renewals expenditure

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow has reviewed eight projects covering the period 2012 to 2035.

As previously noted, as detailed planning is not currently undertaken until 12 months prior to the scheduled renewals date, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects beyond 2012 has been provided. Where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure.

While in most cases, Halcrow is satisfied that the proposed projects are prudent, it has not been possible to make as assessment of efficiency. This is primarily due to a lack of sufficiently detailed information on the scope of the proposed works.

Table 8-17 summarises proposed adjustments identified as a result of the review.

Table 8-17 Theodore –Proposed Renewals Program Adjustments

Halcrow Review ID	Year/Adjusted Year	SunWater Description	Project Direct Cost ($2011 real)	
			SunWater Proposed ($000)	Halcrow Adjusted ($000)
Gibber Gunyah Pump Station				
LIT/1	2014	Replace Suction Pipe Pump No2	106	#
LIT/2	2015	Replace Suction Pipe Pump No3	96	#
LIT/new	2016 then 6 yearly Adjusted: 2016 then 2025 (2019 + 6) then 6 yearly	Refurbish Submersible Pump, Flygt	32	32
Theodore Drainage				
LIT/4	2033	Replace Structure	201	-
Theodore Irrigation Distribution				
LIT/5	2012	11DVAXX DVAXX Replace Siphon CHD TH	140	-
Neville Hewitt Weir				
LIT/6	2014 Adjusted: 2019	Refurbish control - replace PLC, components etc; obsolescence, reliability Adjusted: Refurbish in 2019 and Replace in 2026	59	59
LIT/7	2026	Replace Concrete Structure	146	#
LIT/8	2027 Adjusted: 2026	Replace Control Equipment	142	142

Note: # - Expenditure considered prudent, but insufficient information to assess efficiency.

9 Callide Valley

9.1 Scheme Description

9.1.1 Scheme overview

The Callide Valley Bulk Water Supply Scheme (WSS) supplies bulk water for groundwater recharge purposes in the "benefited area" located around the town of Biloela; it forms part of SunWater's Central region. The scheme operates by the controlled release of flows into the Callide Creek, Kroombit Creek and Kariboe Creek.

The scheme has 138 bulk water customers. The scheme comprises 19,970 megalitres (ML) of medium priority Water Access Entitlement (WAE) and 4,313ML of high priority WAE.[188]

Key elements of the bulk supply scheme are:

- Callide Dam;
- Callide Weir;
- Kroombit Dam; and
- Callide Diversion Channel.

These assets are listed in SunWater's Interim Operations Licence (IROL), and SunWater has obligations in relation to their management and operation.

The majority of water used by customers is extracted via groundwater bores, however, there are a small number of customers that draw water directly from the creek systems (these customers hold "in conjunction" licences that allow them to take either bore or surface water). The groundwater table lies between 10 to 20 metres below surface; the cost of pumping is borne by the irrigators.

There are some 250 to 300 production bores which are metered; meters on SunWater bores are read quarterly. There are also a number of DERM production bores which are read six monthly and serviced biannually by SunWater.

The irrigation system operates by releasing water into the natural streams at rates such that water does not flow beyond the limits of the "benefited area". Water then seeps through the ground into the groundwater aquifer.

The status of the aquifer is monitored via a series of some 300 observation bores which are monitored each quarter. Water allocations are based on the observations made.

Water is also supplied from Callide Dam to the Biloela township and to Callide Power Station A and Callide Power Station B & C, although these do not form part of, and are isolated from, the irrigation supply system.

[188] SunWater, *Callide Valley Water Supply Scheme Network Service Plan,* page 13.

A site visit was undertaken to the Callide Valley Bulk WSS on Friday, 11 March 2011. The principal focus of the visit was to meet with SunWater Operations staff and inspect key elements of the Scheme with a view to gaining an understanding of:

- the nature and extent of the scheme and its key components;
- the nature and extent of operations and maintenance activities undertaken in respect of the Scheme; and
- the nature and extent of proposed and recently completed (ie. during the previous price path period) renewals projects; and where possible to assess the need for the proposed renewals projects.

The following sections provide an overview of observations made and learning derived from the site visit to Callide Valley.

9.1.2 Key scheme elements

9.1.2.1 Callide Dam

Callide Dam was constructed in two stages; Stage 1 was completed in 1965 and Stage 2 in 1988 when automatically operated radial gates were added). The impounded lake has a storage capacity in the order of 136,000ML; operators advised that it filled for the first time this year.[189]

The dam is of the rock and earthfill type; it has a maximum height of approximately 37 metres and a crest length of some 2000 metres. The river outlet comprises of a tower with dual inlets, one of which is adjustable, with provision for trashracks (screens) and maintenance bulkheads. There are two DN1200 MSCL outlet pipes in a dry tunnel, one of which is used to service the irrigation area via releases to Callide Creek or the Callide Diversion Channel.

There is a recreational area at Callide Dam which is currently operated and maintained by SunWater.

9.1.2.2 Kroombit Dam

Construction of Kroombit Dam was completed in 1992. It has a main embankment with a central roller compacted concrete (RCC) spillway which is covered by facing concrete. The spillway is flanked by central core rockfill embankments; the maximum height of the dam is 25 metres and the total crest length is 910 metres. The impounded lake has a storage capacity of approximately 14,000ML.[190]

The outlet works are located within the right spillway abutment and comprise a vertical stack of precast concrete units with grooves for trash screens, selective withdrawal baulks and a dome type bulkhead gate. The main outlet is a DN1200 reinforced concrete pressure pipe, with a DN600 butterfly guard valve and a DN450 cone dispersion valve for downstream releases. A low flow outlet comprises a DN200 ductile iron pipeline with a DN200 cone dispersion valve.

[189] SunWater, *Callide Dam Operations and Maintenance Manual (Issue 1, Version 1)*, June 2002.
[190] SunWater, *Kroombit Dam Operations and Maintenance Manual (Draft)*, Undated.

There are no recreational facilities at Kroombit Dam.

9.1.2.3 Callide Diversion Channel

The Callide Diversion Channel, which is used to transfer water from Callide Dam to Kariboe Creek, comprises a constructed earth channel of approximately 20 metres length. It includes several culverts and syphons as well as road and farm access crossings. The channel reserve is fenced; there are also berm drains and overflows, as appropriate, along its length.[191]

The channel is designed to carry a flow of 65ML per day between Callide Dam and Kroombit Creek (it was also used to transfer water to Kroombit Creek prior to the construction of Kroombit Dam) and 43ML per day between Kroombit Creek and Kariboe Creek. It is noted that the channel has a transfer function only; there are no offtakes.

SunWater operators noted that, due to the lack of water, the Callide Diversion Channel has only been operated three (3) times in 30 years, and has not been operated since 2002/03. Consequently, the channel is seen as attracting a high maintenance cost.

9.1.3 Scheme management

9.1.4 Management Resources

The Callide Valley Bulk WSS is serviced by a team of 11 staff located at Biloela, as follows:[192]

- Service Manager;
- 1No Operations Supervisor;
- 3No Operators;
- 1No Mechanical Maintenance Supervisor;
- 1No Fitter;
- 1No Electrical Maintenance Supervisor; and
- 3No Electricians (including an apprentice).

This team also services the Three Moon Creek Bulk WSS and the Awoonga-Callide and Stag Creek Pipelines, which do not form part of the irrigation scheme. The mechanical and electrical staff are engaged principally on operation and maintenance of the commercial pipelines; they do, however, spend a small amount of time servicing gates and other equipment within the Callide Valley and Three Moon Creek Irrigation Schemes. The operations staff also spend some time involved in operation and maintenance of the commercial pipelines.

The Service Manager is also responsible for management of separate teams servicing the Lower Fitzroy Bulk WSS, the Stanwell Pipeline (non-irrigation) and the Dawson Valley Bulk WSS and Theodore Distribution System.

Administrative support is provided by Central Region staff.

[191] SunWater, *Callide Valley Water Supply Scheme; Scheme Operation Manual (Version 1-1)*, Undated.
[192] Some positions are currently vacant.

It is noted that the office and depot facilities currently located in Biloela are being relocated to Callide Dam. Arrangements for the construction of building accommodation are currently in hand.

9.1.5 Operations and Maintenance Planning

The Operations Team at Biloela plan their operations and maintenance activities at Monthly Planning Meetings, which are conducted prior to the start of each month. These meetings are attended by the Service Manager, three (3) Supervisors and a Scheduler (from the Central Region office).

Monthly planning takes into account:

- routine operations and maintenance work;
- any programmed renewals activity; and
- any carry over work from the previous month.

The outcome of the Planning Meetings is a Monthly Planning Schedule which identifies the activities planned for implementation during the forthcoming month. A copy of a Monthly Planning Schedule was sighted during the site visits; it identified activities, resource requirements and planned time for implementation.

Fortnightly "toolbox meetings" are also conducted with the Operations Team; these are used to inform the broader Operations team and update progress against the planned Schedule.

9.2 Operating Expenditure

9.2.1 Overview

SunWater historical operating expenditure has fluctuated significantly since 2007. With the exception of 2008, expenditure on the scheme has increased. Expenditure in 2011 is budgeted at $863,000, and is forecast to increase marginally in the period to 2016. A breakdown of operating expenditure by Activity and Type is provided in **Figure 9-1** and **Figure 9-2**.

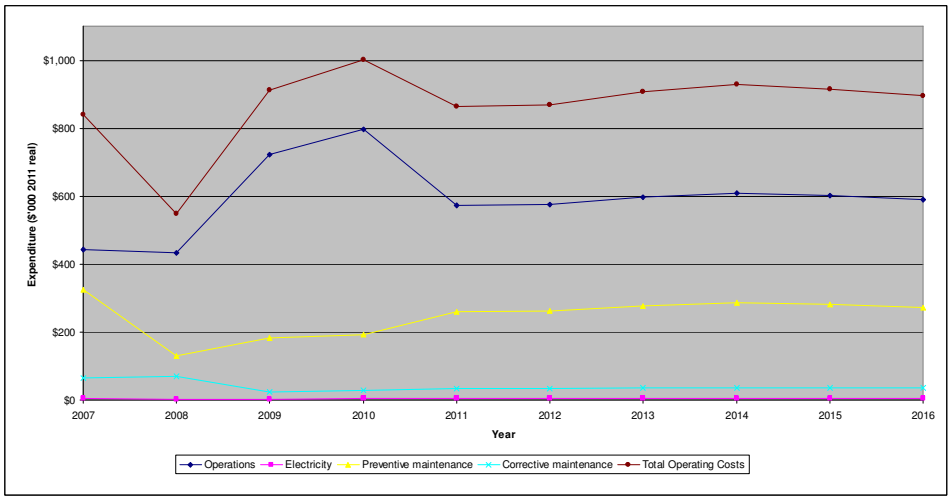


Figure 9-1 Operating Expenditure by Activity for Callide Valley

As evident from **Figure 9-1**, expenditure on 'Operations' accounts for the majority of operating expenditure.

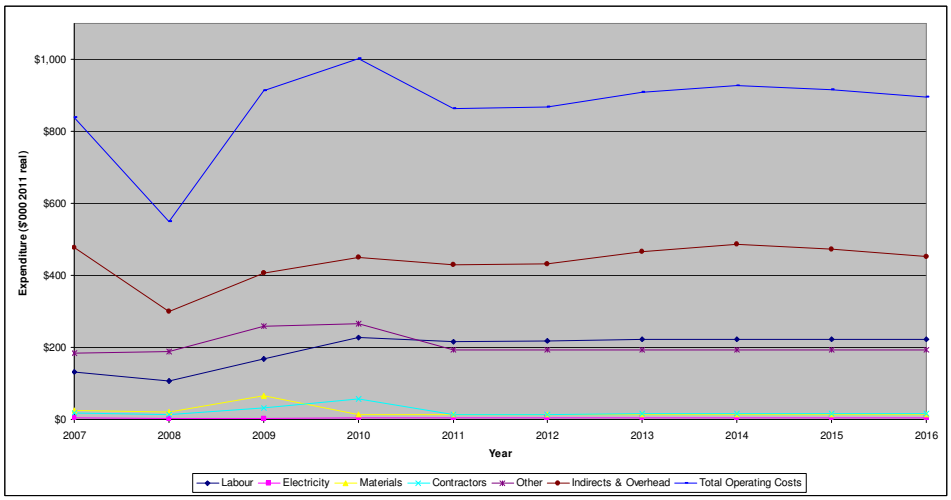


Figure 9-2 Operating Expenditure by Type for Callide Valley

As shown in **Figure 9-2**, 'Indirects & Overhead' expenditure represents the largest component of operating costs (by Type). Expenditure on 'labour' and 'other' are the most significant components of the direct expenditure. Excluding 'Indirects & Overheads', SunWater's operating expenditure is forecast to remain relatively stable in the period 2012 to 2016.

Table 9-1 includes a breakdown of historical and proposed operating expenditure for the Callide Valley Water Supply Scheme by Activity, and **Table 9-2** includes a breakdown of historical and proposed operating expenditure by type.

Table 9-1 Operating Expenditure by Activity for Callide Valley

Item ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Operations	444	433	723	796	572	575	598	609	601	590
Electricity	5	2	3	5	5	5	5	5	5	5
Preventive maintenance	326	130	184	192	260	263	278	286	281	273
Corrective maintenance	66	69	23	28	34	34	36	37	36	35
Revenue offsets	-1	-84	-21	-18	-9	-9	-9	-9	-9	-9
Operating Costs	**839**	**550**	**913**	**1002**	**863**	**868**	**908**	**928**	**915**	**895**

Source: Extracted from SunWater Callide Valley Water Supply Scheme NSP.

Table 9-2 SunWater Expenditure by Type for Callide Valley

Activity ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	131	107	168	228	216	219	222	222	222	222
Electricity	5	2	3	5	5	5	5	5	5	5
Materials	24	20	66	14	13	13	13	14	14	14
Contractors	19	14	31	57	14	14	15	15	15	15
Other	183	189	259	267	194	194	194	194	194	194
Indirects & Overhead	478	301	406	449	429	431	467	487	473	452
Revenue offsets	-1	-84	-21	-18	-9	-9	-9	-9	-9	-9
Total Operating Costs	**839**	**550**	**913**	**1002**	**863**	**868**	**908**	**928**	**915**	**895**

Source: Extracted from SunWater Callide Valley Water Supply Scheme NSP.

The following sections provide a detailed review and discussion of the key elements of SunWater's proposed direct operating expenditure by Activity.

9.2.2 Operations

Operational activities associated with the dam structure at Callide Dam include:

- daily and weekly inspections;
- reading of dam instrumentation, including:
  - hydraulic piezometers (pore water pressure within the dam structure); and
  - seepage weirs (dam leakage); and
  - weather observations.

The radial gates fitted to the spillway are exercised monthly (by manual operation) when the water is lower than gate level. The gates are operated using a float/counterweight system; manual operation involves pumping water into the float chamber to raise the gate. A diesel generator, required for backup purposes in

the event of power outage, is located in a building on the dam crest. This is operated monthly to ensure operational readiness.

Whilst operating, flow rates need to be monitored twice weekly. There are no environmental flow requirements in the Callide Valley Bulk WSS, which is currently operating under an Interim Resource Operations Licence (IROL) as opposed to a Resource Operations Plan (ROP), although this may change.

Water quality monitoring is undertaken at storages on a six monthly basis unless water is being released, in which case, more regular monitoring is undertaken. Monitoring the presence of Blue Green Algae is also undertaken as required. Water quality monitoring is in accordance with the requirements of the IROL.

SunWater is also responsible for the operation of recreational facilities at Callide Dam.

A breakdown of historical expenditure into key operations sub-activities is shown in **Table 9-3**. A similar breakdown for forecast expenditure has not been provided.

Table 9-3 Callide Valley – Breakdown of Historical Operations Expenditure

($ '000 2011 real)	Historical[193]			
	2007	2008	2009	2010
Customer Management	26	10	-	2
Workplace H&S	-	1	-	1
Environmental Management	28	49	26	28
Water Management	20	19	89	102
Scheme Management	226	240	337	393
Dam Safety	52	36	145	172
Schedule/Deliver	12	18	12	37
Metering	-	15	16	15
Facility Management	76	45	34	40
Other	3	0	64	4
Total	**443**	**432**	**723**	**795**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion down to sub activity.xls*',

As evident from **Table 9-3**, the key elements of operations expenditure relate to scheme management, dam safety, and water management.

[193] SunWater has indicated the data contains some incorrect codings to sub-activities; and that 2007 has the majority of anomalies because many expenses were retrospectively re-categorised to fit into the Business Operating Model structure and this was not completely precise. The table is shown here to provide a general outline of the expenditure associated with sub-activities.

Table 9-4 provides a breakdown of historical and forecast expenditure on operations at the Callide Valley Bulk WSS.

Table 9-4 Callide Valley – Operations expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	53	60	115	157	124	126	127	127	127	127
Materials	8	6	46	8	2	2	2	2	2	2
Contractors	14	10	27	54	6	6	6	6	6	7
Other	177	184	255	265	191	191	191	191	191	191
Total Direct Costs	**252**	**260**	**443**	**484**	**323**	**325**	**326**	**327**	**327**	**327**
Indirects	127	95	145	131	118	118	137	161	138	130
Overheads	64	77	135	181	131	132	135	149	137	133
Total	**443**	**432**	**723**	**795**	**572**	**575**	**598**	**637#**	**601**	**590**
Annual change (%)		-2%	67%	10%	-28%	1%	4%	7%	-6%	-2%
Change since 2007 (%)		-2%	63%	80%	29%	30%	35%	44%	36%	33%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'. Note (#) Minor differences in expenditure between this table and the NSP relates to indirects and overheads. The data as reported in the NSP is correct.

In its NSP, SunWater has stated that it undertook a review of work practices in 2010 which resulted in revised work instructions upon which the cost forecasts are based. While SunWater has provided a high level breakdown of operations data, no information on the review of work instructions has been provided. However, SunWater has provided explanations for key movements in the expenditure.

SunWater has noted that the reason for the significant jump in expenditure on labour between 2008 and 2010 at Callide Valley was driven by significant water inflows (resulting in an increase in water delivery activities) from December 2008. A review of storage information for Callide Dam confirms that storage volume was significantly lower in 2007 and 2008 and that the volume of water stored has been increasing since 2008. Callide dam is currently at full capacity.

There has been a reduction in direct costs between 2010 and 2011. SunWater explained that this was due to the realignment of expenditure classified as Operations to Preventative Maintenance. It noted that operations surveillance was moved to Preventative Maintenance as a result of the Parsons Brinckerhoff review. Halcrow notes that SunWater's forecast expenditure on Preventative Maintenance has increased, reflecting this adjustment.

SunWater has indicated that the forecast costs assume that the water management, scheme management and schedule/deliver costs will increase over historical costs on account of the increase in available water.

SunWater has provided an extract of its resource planning tool used to develop labour forecasts for 2012. Halcrow has been able to confirm that the forecast labour expenditure has been built up using the methodology outlined in **Section 3.6.6**. The extract provided indicates that the direct labour charge for operations in the Callide Bulk Water Supply scheme in 2012 is based on 1,954 hours per annum for operations staff from the Central resource centre and the Asset Management resource centre. This accounts for approximately $95,000 per annum of the labour expenditure. This is equivalent to approximately 1.3FTE staff working on operations. This allowance appears reasonable, although more information on the review of work practices and how these have driven allowances for labour hours is required to enable the prudence and efficiency assessment to be undertaken.

Labour hours and charges for Corporate Council, Strategy, Health & Safety or Services Delivery resource centres are not shown on the extract of the resource planning tool provided, but account for approximately $29,000 per annum of direct labour expenditure.

The labour forecast includes real increases of 1.5 percent in 2012 and 2013, which is consistent with its Enterprise Agreement (of an increase of four percent nominal for 2012 and 2013). Labour is forecast to remain steady (in real terms) thereafter.

SunWater has forecast a reduction in Other expenditure, to $191,000 in 2011. Expenditure is forecast to remain steady thereafter. SunWater noted that this is driven by a reduction in insurance costs of $50,000 due to the increase in asset value from other service contracts (the insurance premium calculation is based on the asset value for all SunWater assets).[194] Insurance accounts for $130,000 per annum, Local Authority rates, $42,000 per annum and Land Tax $17,000 per annum.

Although Halcrow has been unable to undertake a detailed review of SunWater's operations expenditure, on the basis of the information and explanations provided by SunWater, Halcrow is generally satisfied that the expenditure appears to be reasonable. However, a definitive assessment of prudence and efficiency has not been possible from the information provided.

9.2.3 Preventative maintenance

Table 9-5 provides a breakdown of historical and forecast expenditure on corrective and preventative maintenance.

[194] SunWater email, *Questions on cluster 3.doc*, dated 16 March 2011.

Table 9-5 Callide Valley – Preventative Maintenance Expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	67	32	50	63	82	84	85	85	85	85
Materials	8	6	9	5	9	9	9	9	9	9
Contractors	1	4	4	2	7	7	7	7	8	8
Other	5	2	2	2	2	2	2	2	2	2
Total Direct Costs	**81**	**43**	**66**	**72**	**100**	**102**	**103**	**103**	**103**	**104**
Indirects	164	51	64	52	79	79	91	97	92	86
Overheads	82	36	55	68	82	82	84	85	85	83
Total	**326**	**130**	**184**	**192**	**260**	**263**	**278**	**286**	**281**	**273**
Annual change (%)		-60%	42%	4%	36%	1%	6%	3%	-2%	-3%
Change since 2007 (%)		-60%	-44%	-41%	-20%	-20%	-15%	-12%	-14%	-16%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.

As evident from **Table 9-5**, SunWater is forecasting an increase in preventative maintenance as compared to its historical expenditure. Of the direct expenditure, this is primarily driven by an increase in labour expenditure. SunWater explained that this increase was due to the realignment of expenditure classified as Operations to Preventative Maintenance. It noted that operations surveillance was moved to Preventative Maintenance as a result of the review by Parsons Brinckerhoff (discussed in **Section 3.6.3.2**). A review of the analysis by Parsons Brinkerhoff indicates that this accounts for approximately $12,800 per annum ($2011 real). Halcrow notes that SunWater's forecast expenditure on Operations has decreased, reflecting this adjustment.

SunWater provided a breakdown of historical expenditure into condition monitoring, servicing and weed control, as shown in **Table 9-6.** While a similar breakdown has not been provided for forecast expenditure, the table shows the historical fluctuations in preventative maintenance activities.

Table 9-6 Callide Valley – Preventative Maintenance Expenditure

($ 000 2011 real)	Historical			
	2007	2008	2009	2010
Condition Monitoring	59	69	98	147
Servicing	203	25	35	19
Weed control	64	35	51	26
Total	**326**	**130**	**184**	**192**

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*'..

The expenditure in 2007 is significantly greater than the expenditure in 2008 to 2010. Halcrow understands that the reason for this is the transfer of financial data into SunWater's revised Business Operating Model which came into effect on 1 July 2008. This involved the reclassification of some activities, including some tasks previously coded as refurbishment projects, to preventative maintenance codes.[195]

As noted in **Section 3.6.3.2**, Halcrow understands that SunWater's condition monitoring and servicing forecast expenditure is primarily based on forecasts developed by Parsons Brinkerhoff, although it also includes allowances for additional servicing activities.

As part of the review undertaken by Parsons Brinkerhoff, it forecast expenditure of approximately $55,250 per annum ($2010 real) on condition monitoring and servicing for the coming price path period. This is equivalent to approximately $57,100 per annum ($2011 real). This excludes overhead and indirect costs.

As part of the review, Halcrow sought to confirm that the maintenance activities costed by Parsons Brinkerhoff were consistent with the maintenance activities and frequencies identified in SunWater's facility Operation and Maintenance Manuals. For Kroombit Dam the maintenance activities costed were generally consistent with the maintenance schedules in the *Operations and Maintenance Manual*,[196] although the Parsons Brinkerhoff review includes maintenance activities additional to those included in the Operation and Maintenance Manual. The *Operation and Maintenance Manual* [197] for Callide Dam does not list the preventative maintenance schedules and work instructions in such a way as to enable these to be cross checked against the work instructions costed by Parsons Brinkerhoff. However, based on discussions during the site visit to the scheme, Halcrow understands key maintenance activities undertaken in respect of the radial gates fitted to the Callide Dam spillway include maintenance of protective coating, ie. corrosion protection (note that the gates are faced with stainless steel); the trunnion bearings; the gate seals (along all edges); and wire ropes (that form part of the operating mechanism).

Halcrow is generally satisfied that the expenditure forecast developed by Parsons Brinkerhoff is based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken. However, Halcrow notes that this estimate is built up from SunWater's existing work instructions and its current approach to maintenance, which is yet to be optimised. Consequently, it there is likely to be scope to achieve efficiency savings in the delivery of servicing and condition monitoring activities. These savings are not currently reflected in the expenditure presented in the NSP. Furthermore, as the breakdown of forecast expenditure provided to this review splits out expenditure into labour, materials, contractors, rather than into condition monitoring, servicing and weed control, it has not been possible to confirm that the forecast expenditure is in fact based on the forecast developed by Parsons Brinkerhoff.

[195] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 13.
[196] SunWater, *Callide Valley Water Supply Scheme; Kroombit Dam – Operations and Maintenance Manual*, Draft, Undated.
[197] SunWater, *Callide Valley Water Supply Scheme; Callide Dam – Operation and Maintenance Manual*, Issue 1, Version 1 (Original Issue), June 2002.

As noted in **Section 3.6.3.2**, the forecast of preventative maintenance expenditure also includes expenditure related to weed control, and "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves*".[198] Excluding the cost estimates developed from the Parsons Brinkerhoff review, SunWater's forecast expenditure includes an additional allowance for preventative maintenance activities of approximately $43,000 per annum.

During site visits to the Callide Valley Bulk WSS, SunWater noted that weed control is not undertaken in river systems, which comprise the majority of the Callide Valley Scheme. It is, however, necessary to undertake weed control in respect of Callide Dam and the Callide Diversion Channel.

Weed control along the Diversion Channel is undertaken using either mechanical or chemical control methods. Weed control is only required when the channel is running water; minimal maintenance, mainly weed spraying, is required to enable the channel to operate. Weed growth around structures is controlled on an ongoing basis.

SunWater has not provided any detailed information on the forecast expenditure for weed control activities other than to state that it is based on an 'average year,' and that chemical costs typically account for $3,500 per annum. Average expenditure on weed control (including indirects and overheads) over the period 2007 to 2010 was approximately $44,000 per annum. Excluding overheads and indirect costs, average (direct) expenditure was $14,000 per annum.[199] From the information provided by SunWater, it is not clear how much of the $43,000 per annum preventative maintenance forecast relates to weed control versus "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valves*".[200]

This indicates that SunWater's forecast of preventative maintenance expenditure also includes approximately $29,000 per annum of expenditure related to "*additional servicing, calibration and adjustment of equipment such as pumps, motors, regulator gates, meters and valve*".[201] No information has been provided on the nature of this expenditure, or the method by which SunWater has forecast preventative maintenance activities for the coming price path. Consequently, Halcrow is unable to make an assessment of its prudence and efficiency and proposes that the forecast preventative maintenance expenditure is adjusted by this amount.

With the exception of this additional expenditure, Halcrow is generally satisfied that SunWater's forecast (direct) expenditure on preventative maintenance expenditure is prudent. However, as indicated above, there is likely to be scope for SunWater to achieve efficiency savings in the delivery of servicing and condition monitoring activities.

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[198] SunWater email, *RE Preventative Maintenance*, 9 March 2011.
[199] SunWater has provided a breakdown of historical preventative maintenance expenditure into labour, materials, contractors, other, overheads and indirects.
[200] SunWater email, *RE Preventative Maintenance*, 9 March 2011.
[201] SunWater email, *RE Preventative Maintenance*, 9 March 2011.

9.2.4 Corrective maintenance

Table 9-7 shows a breakdown of historical and forecast expenditure on corrective maintenance. Annual expenditure on corrective maintenance fell during the period 2007 to 2010. SunWater's 2011 budget includes a slight increase in expenditure over 2010 levels, after which time it is forecast to remain approximately steady.

Table 9-7 Callide Valley – Corrective maintenance expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	12	16	3	9	10	10	10	10	10	10
Materials	7	8	10	1	3	3	3	3	3	3
Contractors	4	0	0	1	1	1	1	1	1	1
Other	0	3	2	0	1	1	1	1	1	1
Total Direct Costs	**24**	**27**	**15**	**11**	**15**	**15**	**15**	**15**	**15**	**15**
Indirects	29	25	4	7	9	9	11	11	11	10
Overheads	13	18	4	10	10	10	10	10	10	10
Total – Corrective Maintenance	**66**	**69**	**23**	**28**	**34**	**34**	**36**	**37**	**36**	**35**
Annual change (%)		6%	-67%	20%	22%	1%	5%	3%	-2%	-2%
Change since 2007 (%)		6%	-65%	-58%	-49%	-48%	-45%	-44%	-45%	-46%

As noted in **Section 3.6.3.2**, SunWater's forecast expenditure is based on an average of the past four years (including 2011), excluding outliers. SunWater has not provided Halcrow with the calculations in support of its forecast of corrective maintenance, however, a breakdown of the expenditure indicates labour charges of $10,000 relate to staff from the SunWater's Central region. The materials expenditure includes $1,000 for plant usage.

As part of the review, Halcrow obtained a breakdown of corrective maintenance work orders for the period 2009 to 2011 for Callide Valley. The expenditure associated with the work orders is different to that that identified in **Table 9-7**, however, Halcrow understands this is because some work orders run over multiple years. The corrective maintenance activities undertaken are typical of what might be reasonably expected from the operation of the scheme, and include repairs to switchboards and pumps, and maintenance on houses at Callide Dam. The work orders also include maintenance activities on the public amenities at Callide Dam.

Based on discussions during the site visit to Callide Valley Bulk WSS, Halcrow understands that corrective maintenance activities undertaken in respect of the Callide Diversion Channel include repair of channel washouts, ie. where surface water washes out the channel bank; maintenance of catch drains and berm drains; cleaning of screens at syphons (in excess of 20No); maintenance of channel structures; and maintenance (repair/replacement) of fences along the length of the channel.

Supply point meters are maintained (repaired) by SunWater staff. Due to aging meters and the unavailability of spare parts, meters are being maintained using parts reclaimed from old meters. The cost of a new meter is in the order of $3,500 per unit. Introduction of the proposed National Metering Standards will result in significant replacement costs (which are not allowed for in the expenditure forecasts).

Halcrow notes that it is difficult to accurately forecast corrective maintenance expenditure. SunWater's approach, which uses historical expenditure to forecast expenditure, is considered appropriate.

Table 9-8 shows historical and proposed direct expenditure on corrective and preventative maintenance. Halcrow notes that SunWater is yet to undertake a review of the current mix of preventative and corrective maintenance to assess whether they are appropriately optimised. Consequently, there may be some scope to optimise the proposed expenditure on maintenance.

Table 9-8 Callide Valley – Maintenance expenditure

Direct Expenditure ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Preventive maintenance	81	43	66	72	100	102	103	103	103	104
Corrective maintenance	24	27	15	11	15	15	15	15	15	15
Total Maintenance	**104**	**70**	**81**	**83**	**115**	**116**	**118**	**118**	**119**	**119**
Annual change (%)		-33%	16%	2%	39%	1%	1%	0%	0%	0%
Change since 2007 (%)		-33%	-22%	-21%	10%	12%	13%	14%	14%	14%
Preventative maintenance (%)	77%	62%	81%	87%	87%	87%	87%	87%	87%	87%
Corrective maintenance (%)	23%	38%	19%	13%	13%	13%	13%	13%	13%	13%

9.2.5 Electricity

Electricity costs for the Callide Valley Bulk WSS mostly relate to outlet works, spillway gate actuation and site lighting. Expenditure on electricity in the Callide Valley Bulk WSS is immaterial, accounting for 0.3 to 0.6 percent of operating expenditure. As evident in **Table 9-9** SunWater has adopted consistent expenditure on electricity at $5,000 for the 2011 budget and forecast price period until 2016.

Table 9-9 Callide Valley – Electricity expenditure

$ '000 2011 real	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity	5	2	3	5	5	5	5	5	5	5
Annual change (%)		-60.0%	50.0%	66.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Change since 2007 (%)		-60.0%	-40.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Expenditure data from SunWater Nogoa Mackenzie Water Supply Scheme NSP, Table, page 7.

The 2011 budget ($5,472) is based on actual electricity expenditure in 2010 ($4,830 nominal), inflated by 13.29 percent to account for the increase in franchise tariffs. Noting that the expenditure is not material, the method adopted to forecast electricity costs for the scheme appears appropriate.

As part of the second round consultation process, stakeholders sought clarification of whether electricity costs had been appropriately apportioned between medium and high priority users, in particular the high priority allocation of the Biloela township.[202] Although Halcrow requested that SunWater provide a breakdown of the electricity expenditure, showing that used by the high priority allocation for the Biloela township, SunWater indicated that electricity costs are recorded at service level only. Consequently, it was unable to provide any greater detail on the makeup of the electricity expenditure. However, it noted that most of the electricity is for dam operations and that it proposes to allocate operational expenditure of this nature by aggregate mega-litres of allocation.[203] Without a breakdown of electricity, it has not been possible to assess whether this allocation is appropriate. However, it is noted that electricity accounts for less than one percent of annual operating expenditure.

More detailed discussion on SunWater's approach to forecasting electricity costs, and methods by which it seeks to optimise expenditure on electricity is included in **Section 3.6.5**.

9.2.6 Recreation costs

The recreational area at Callide Dam includes lawns, picnic shelters, toilets and a boat ramp. Disused third party buildings and other structures on land owned by SunWater are a sailing club shed, a motor sports shed and a native fishstocking pond.[204]

SunWater currently owns and maintains the recreational area at Callide Dam. This essentially involves:

[202] QCA, *Deep diving issues v2(380342_1).docx*, 19 April 2011.
[203] SunWater, '*doc#1079292-Information request by HALCRO.doc*', 31 May 2011.
[204] SunWater, *Callide Valley Water Supply Scheme – Scheme Operation Manual*, Version 1-1, Undated.

- mowing of the grounds, which is undertaken under contract;
- cleaning of toilet blocks and other facilities, which is undertaken by SunWater staff; and
- periodic maintenance, which is undertaken by SunWater.

SunWater is currently in the process of handing over the recreation area, including areas that are no longer maintained by SunWater, to the Banana Shire Council. SunWater lodged a Development Application with Banana Shire Council on 19 November 2010.[205] The purpose of this application was to reconfigure SunWater land at Callide Dam, allowing SunWater to retain land critical to ongoing operations whilst consolidating the recreational facilities on a separate parcel of land. During the site visit, SunWater Operations staff noted that the handover is a time consuming process that is expected to be complete later in 2011.

There are three (3) SunWater owned houses at Callide Dam; these remain from the dam construction period. These houses are listed for disposal; it is understood that a single new house is to be constructed for SunWater use.

Expenditure by Type for recreational facilities at Callide Dam is listed in **Table 9-10**. The total operating costs have reduced from $60,000 in 2007 to $7,000 in 2010. Forecast operating expenditure is $5,000 per annum. This represents a 92 percent reduction in operating costs for the price period. It is understood that the reason operating costs have been able to be reduced significantly is due to the decline in visitors attracted to Callide Dam recreation area. This has allowed SunWater to close parts of the recreation area during periods when demands are low.

Table 9-10 Callide Valley – Recreation Costs

Real ($'000)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour Direct	13	8	1	2						
Other Direct	32	13	2	1	5	5	5	5	5	5
Total Direct	**45**	**21**	**3**	**3**	**5**	**5**	**5**	**5**	**5**	**5**
Indirect				2						
Overhead	15	9	1	2	0	0	0	0	0	0
Total Operating Cost	**60**	**30**	**3**	**7**	**5**	**5**	**5**	**5**	**5**	**5**
Renewals						**0**	**0**	**23**	**0**	**0**

There is only one instance in the 2012-2016 price path where forecast renewals expenditure associated with the recreation area is scheduled. In 2014 a total of $23,000 will be expended to replace the town water supply local isolator at cost of $6,000 and the town water supply pump and motor at a cost of $17,000.

[205] Banana Shire Council, Media Release: Callide Dam, 7 December 2010.

While review of the specific handover agreements between the Banana Shire Council and SunWater is beyond the scope of this review, should hand over take place, then the renewals forecast may need to be adjusted to account for this.

9.2.7 Summary of findings on operating expenditure

While a definitive assessment of prudence and efficiency has not been possible, in general, Halcrow is satisfied that SunWater's expenditure appears reasonable. The exception to this is approximately $29,000 per annum of forecast expenditure on preventative maintenance related to activities excluded from the review by Parsons Brinkerhoff review which Halcrow has been unable to verify.

In addition, it is noted that SunWater's operations expenditure includes a minor allowance for the operation and maintenance of the recreation facilities at Callide Dam. It is understood that SunWater is currently in discussions with the Banana Shire Council to hand over these assets. Should hand over take place, then the expenditure associated with these facilities should be removed from SunWater's forecast expenditure.

As discussed in preceding sections, Halcrow also notes that there is likely to be scope for SunWater to achieve efficiencies via the optimisation of its preventative and corrective maintenance programs. These savings are not currently reflected in the forecast expenditures reported in the NSP.

In view of the preceding, Halcrow recommends adjustments to the forecast operating expenditure (direct costs) for the Callide Valley Bulk WSS as shown in **Table 9-11**.

Table 9-11 Callide Valley – Proposed Adjustments to Operating Expenditure (2012 – 2016)

Item ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
SunWater Proposed Total Direct Costs	**445**	**449**	**450**	**450**	**450**
Adjustments:					
▪ less escalation on materials	0	0	-1	-1	-1
▪ less escalation on contractors	0	-1	-1	-1	-1
▪ less unjustified Preventative Maintenance costs	-29	-29	-29	-29	-29
Total Reduction	-29	-30	-31	-31	-31
Halcrow Adjusted Direct Costs	**416**	**419**	**419**	**419**	**419**

9.3 Renewals Expenditure

9.3.1 Overview

Table 9-12 provides a high level summary of SunWater's renewals program for the five-year regulatory period for Callide Valley Bulk WSS.

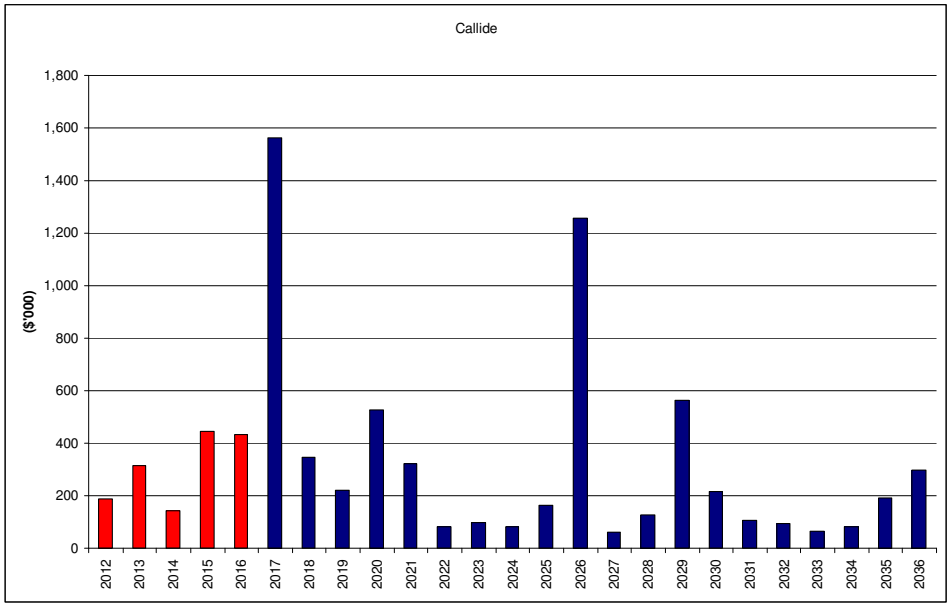
Table 9-12 Callide Valley - Proposed Renewals Program (2012 – 2016)

Facility ($ 000 2011 real)	Financial Year					5-yr Total
	2012	2013	2014	2015	2016	
Callide Creek Weir		12				12
Callide Dam	26	291	124	376	409	1,226
Callide Diversion Channel	54					54
Kroombit Dam	27	12	18	67	25	149
Service Contract	82					82
Total	**189**	**316**	**142**	**444**	**434**	**1,525**

Source: SunWater Callide Valley Water Supply Scheme NSP, Table 4-6, page 29.

As noted in **Table 9-12**, the majority of the renewals expenditure to be incurred in the period to 2016 relates to Callide Dam.

SunWater provided Halcrow with a breakdown of its proposed renewals expenditure by project for the 25 year period to 2036. The breakdown indicates significant renewals expenditure in 2017 and 2026.



Source: SunWater , *NSP Projects Central V4.xls*

Figure 9-3 Callide Valley - Forecast Renewals Expenditure

As part of this review, Halcrow undertook a review of historical renewals to understand the factors contributing to the difference between SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure identified in the previous Tier 1 pricing review.

The detailed review of forecast renewals projects included a review of project planning and proposed outcomes to assess the prudence and efficiency of SunWater's proposed renewals expenditure.

9.3.2 Review of historical renewals expenditure

Table 9-13 shows SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure determined during the previous pricing review.

Table 9-13 Callide Valley- Actual renewals expenditure versus LBC Target expenditure

$'000 nominal	Financial Year				
	2007	2008	2009	2010	2011
Actual renewals Expenditure	80	75	47	177	244
LBC Target Expenditure	103	256	239	278	180
Difference	- 22	- 181	- 192	- 101	64

Source: SunWater spreadsheet, *Compare R&E Spend to Annuity 2007_2011.xls*.

As is evident from **Table 9-13**, SunWater's actual expenditure has been lower than the LBC target expenditure in each year of the current price path. However, it has forecast that in 2011, its renewals expenditure will be greater than the LBC target.

As part of this review, Halcrow sought to compare SunWater's actual historical expenditure against its planned 2007 to 2011 expenditure. The aim of this exercise was to gain an insight into the ability of SunWater to effectively plan and deliver its renewals program. However, as noted in **Section 3.8.2**, SunWater has indicated that the renewals program is not, and was never intended to be a capital works program. Furthermore, it did not keep a record of the list of renewals projects that it intended to deliver during the current price path. Consequently, Halcrow has been unable to make any detailed assessment of SunWater's historical renewals expenditure.

Halcrow did, however, obtain a breakdown of SunWater's historical expenditure on renewals expenditure for the period 2007 to 2011 (until 15 February) for projects greater than $10,000.[206] A review of the budgeted versus actual expenditure for the renewals projects undertaken in the Callide Valley Bulk WSS indicates that most projects were delivered close to or below the budgeted expenditure.

[206] The listing of actual expenditure on renewals and rehabilitation indicates expenditure significantly lower than that reported in the NSP. However, the listing of expenditure provided only included projects greater than $10,000 in value, which indicates that a significant element of renewals projects were lower than this threshold.

Summary information has been provided in respect to some twenty four (24) projects undertaken in respect of the Callide Valley Scheme during the period 2007 to 2011. A representative selection of these projects, as identified in **Table 9-14**, has been assessed as part of Halcrow's review.

Table 9-14 Historical Renewals Expenditure – Selected Projects

Project	Expenditure	Year	Comments/Assessment
Callide Gauging Stations – Install Air Compressors	$12,300	2008	▪ Required for operation of gauging stations; expenditure deemed prudent. ▪ Units installed at 3No sites; expenditure deemed efficient.
Callide Dam Inlet Tower – Install Fall Arrest System to Ladder	$22,300	2008	▪ Fall arrest system required on steep ladder for OH&S compliance; expenditure deemed prudent. ▪ Expenditure deemed efficient, particularly given that access gained and work undertaken over water.
Replace Hoist Ropes – Callide Inlet Tower	$29,400	2010	▪ Hoist ropes used to raise and lower trash racks and bulkheads on the inlet tower had reached the end of their useful life (in compliance with safety requirements); expenditure deemed prudent. ▪ Expenditure deemed efficient, particularly given that access gained and work undertaken over water.
Undertake Comprehensive Risk Assessment – Kroombit Dam	$52,000	2010	▪ Dam risk assessment undertaken in accordance with statutory compliance requirements; expenditure deemed prudent. ▪ Expenditure consistent with other reviews (for size and complexity of installation); expenditure deemed efficient.
Replace Switchboard – Main Switch House – Callide Dam	$92,700	2011	▪ Existing switchboard of 1970s vintage; in view of asset life and technology changes; proposed expenditure deemed prudent. ▪ Significant switchboard; expenditure deemed efficient.

Note: Reported expenditure includes indirect and overhead costs.

SunWater's forecast renewals expenditure for the period 2012 to 2016 is significantly greater than historical expenditure on renewals indicating an increase in renewals activities when compared to the current price path period.

9.3.3 Review of forecast renewals expenditure

9.3.3.1 Overview

More than seventy (70) projects have been identified for implementation at Callide Dam during the forecast period, some twenty seven (27) for implementation in respect of the Callide Diversion Channel, and one project identified in respect of the Callide Valley Service Contract (as a whole).

In order to assess the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow selected 10 renewals projects to review in detail. Of the projects selected for review, five are forecast for the period 2017 to 2036, and they include the projects driving the significant expenditures in 2017, 2026 and 2029.

The projects selected for review are identified in **Table 9-15**. The projects selected account for approximately 52 percent of the expenditure in the period 2012 to 2016.

Table 9-15 Callide Valley – Selections from Proposed Renewals Program

Halcrow Review ID	Year	SunWater Description	Project Cost		Total Cost 2012 to 2036 ($000)[1]
			Project Direct Cost ($000)	Total Project Cost ($000)	
Callide Dam					
LBC/1	2013	Replace Switchboard - Bldg Serv Elec Serv Bldg	39	62	62
LBC/2	2014 and 2022	14CVA-Refurbish Spillway Gate 1	9	12	24
LBC/3	Five yearly from 2015	10CVA01-Undertake 5yr Dam Safety Callide	36	91	438
LBC/4	2015	12CVA-Replace Inlet Screens	107	134	134
LBC/5	2015	Replace Ladders, Platforms, Handrails & Safety	56	88	88
LBC/6	2016	Replace Standby Diesel Alternator	178	275	275
LBC/7	2017	14CVA-Refurbish Electrical Installation	882	942	942
LBC/8	2026	Refurbish 1200Dia Outlet Pipe Lhs	485	733	733
LBC/9	2029	Major Refurbishment	368	562	562
Callide Diversion Channel					
LBC/10	2012	12CVA-Refurbish Channel Earthworks	37	42	42
Service Contract					
LBC/11	2012	12CVAXX Address Height Safety Risks CVA	53	82	82

Note (1): Total cost includes the cost of each recurring project within the period 2012 to 2036.

Halcrow requested that SunWater provide the following information in relation to each project selected for review.

- the project scope and the driver for each project;
- the basis of expenditure forecast (unit rates, quantities etc); and
- condition reports, asset management plans, or options reports demonstrating the need for the renewals expenditure.

While SunWater provided extracts from SAP to substantiate the forecast renewals expenditure, very little detail on the nature and scope of the projects has been

provided. Similarly, in most cases, a breakdown of the forecast expenditure has not been provided. Halcrow notes that this is because detailed planning on proposed projects (including options assessment) is only undertaken 12 months in advance of the planned project date. The limited available data to demonstrate the prudence and efficiency of the expenditure has limited the ability of Halcrow to undertake a detailed review. However, where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure. This has not been possible in all cases, due to insufficient information on the proposed expenditure.

The following sections include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency. Halcrow's review of each project has only considered the direct costs. Indirect costs and overheads, which have been applied to all projects, are the subject of a separate review.

During the site visit to the Callide Valley Bulk WSS, inspections were focussed (to the extent possible) on these selection of projects.

9.3.3.2 Callide Dam

LBC/1 Replace Switchboard – Building Services Electrical Services Building
This activity involves replacement of an existing switchboard in the electrical services building; this is the primary electrical control facility at the dam. Expenditure of $62,000 ($39,000 direct) is proposed in 2013.

During the site visits, it was noted that switchboards at the site are typically 1970s vintage; in view of asset life and technology changes, the proposed expenditure is considered prudent.

Whilst the scope of work is not definitive, and SAP extracts have not been provided for this project, the proposed expenditure is considered to be appropriate for a relatively basic switchboard.

LBC/2 14CVA-Refurbish Spillway Gate 1
This project is one of six (6) projects to be undertaken on the six (6) spillway gates of Callide Dam. This minor refurbishment work is scheduled to be undertaken in 2014 at a cost of $12,000 ($9,000 direct), with an equivalent allowance for all six (6) spillway radial gates. The condition of the gates was assessed as good, with only some minor issues, during the 2010 5 Yearly Dam Safety Inspection.[207]

The expenditure forecast allows for the work to be repeated for Gate 1 in 3032 and Gates 2-6 in 2034. The reason for this timing discrepancy is not apparent, however, the SAP extract provided by SunWater indicates that this activity is scheduled to recur every 18 years; this would result in the next minor refurbishment being required in 2032 (as proposed for Gate 1).

[207] SunWater, *Final Report; Callide Dam; Five Yearly Comprehensive Dam Safety Inspection*, April 2010.

It is considered that the cost allowance of $9,000 (direct) allows for relatively minor refurbishment work (eg. minor patching work to gate coating, bearing inspection/renewal, replacement of a section of seal or similar), particularly considering the required access arrangements, ie. via the spillway.

On the basis of the available information, it appears that the expenditure is both prudent and efficient.

LBC/3 10CVA01-Undertake 5yr Dam Safety Callide

Scheduled for 2015 and then at 5 yearly intervals, this work is required for statutory compliance purposes. SunWater provided a copy of its schedule for Dam Safety Conditions.[208] The schedule details the reviewed review dates for annual inspections, five yearly inspections, and safety reviews for SunWater's referable dams. The schedule confirms that a five year safety study of Callide Dam is required by 1 May 2015, with a 20 year Safety Review to take place by 1 May 2019. Halcrow is satisfied that the expenditure is prudent, as SunWater is required by law to undertake the five yearly safety inspection of Callide Dam.

SunWater provided a copy of the report produced as part of the 2010 safety review, *Callide Dam Five Yearly Comprehensive Dam Safety Inspection*, April 2010. The five yearly reviews involve a comprehensive assessment of the following items:[209]

- a current failure impact assessment;
- the audit of existing documentation on the dam;
- a detailed review of structural, hydraulic, hydrologic and geotechnical design aspects;
- the review of historical operational performance;
- the review of surveillance reports;
- a comprehensive inspection of the dam, and
- a comparison of the standards used for building and upgrading the dam against current standards.

It is noted that forecast cost in 2015 is $91,000 ($36,000 direct); whilst the total cost including indirect and overhead costs varies in future years ($88,000 in 2020, $86,000 in 2025, $86,000 in 2030 and $87,000 in 2035), the direct cost remains consistent. The cost of the last review, undertaken in 2010, was in the order of $60,300 ($2010), ie. $62,100 in real terms (which was marginally less than budgeted), however, the proportion of indirect and overhead costs is unknown.

In the absence of a breakdown of the historical costs and given the consistent nature of these programmed reviews, it is assumed that the direct cost has remained consistent in real terms and is deemed to be efficient.

LBC/4 12CVA-Replace inlet screens

Replacement of the inlet screens (trash racks) is proposed in 2015; it is understood that this work was initially scheduled for 2012, however, has been deferred on the

[208] SunWater document, *PRODUCTION-#838872-v2-Dam_Safety_Conditions_-_Submission_Date_Summary.xls*
[209] SunWater, *Dam Safety Reviews for Referable Dams (DS07)*, August 2009

basis of condition assessment undertaken by divers.[210] The trash racks were submerged at the time of inspection, so were not visible to enable any assessment of size or condition; it is, however, understood from interviews with SunWater Asset Planning staff, that the trash racks comprise some ten or twelve panels of approximate dimensions 5 metres by 3 metres.

At an estimated total replacement cost of $134,000 ($107,000 direct), this equates to approximately $10,000 per screen. Site replacement of the screens will require:

- shut down of the outlet works (including required notification to customers);
- transport to/from the inlet tower by boat/barge; and
- engagement of divers to remove the existing screens and install the replacements.

On this basis, the proposed expenditure is considered prudent and efficient.

LBC/5 Replace Ladders, Platforms, Handrails and Safety

It is understood that this activity involves the replacement of access and safety equipment/facilities on structures at Callide Dam in 2015 at a cost of $88,000 ($56,000 direct). Operators indicated that replacement of ladders, platforms and handrails on the inlet tower is required, however, a review of historical expenditure reveals that this work was initially scheduled to be undertaken in 2009 (Project No 09CVA06, which incurred costs of $34,200 ($nominal, including indirect and overhead costs)), with completion deferred to 2011 (Project No 10CVA04, with approved budget of $22,000 ($nominal, including indirect and overhead costs)).

Whilst the maintenance of ladders, platforms and handrails can generally be considered prudent on the basis that they are required to maintain safe work environments, details of the actual location and scope of the proposed works has not been provided for review. Accordingly, in this case, the expenditure cannot be considered prudent.

Similarly, in the absence of clear definition, it is not possible to assess the efficiency of the forecast expenditure.

LBC/6 Replace Standby Diesel Alternator

This activity provides for the replacement of the Standby Diesel Alternator at Callide Dam. Expenditure of $275,000 ($178,000 direct cost) is proposed in 2016.

Based on the SAP extract provided by SunWater, an asset life of 40 years has been assigned to the alternator, with an estimated replacement date of 2028. During interviews, SunWater Asset Planning staff indicated that the alternator was assessed as being in good condition during the 5 Yearly Dam Safety Inspection undertaken in 2010.[211] It is consequently not apparent why this item has been scheduled for replacement in 2016.

[210] Reference made by SunWater Asset Planning staff to the SunWater report, *Final Report; Callide Dam; Five Yearly Comprehensive Dam Safety Inspection*, April 2010.
[211] SunWater, *Final Report; Callide Dam; Five Yearly Comprehensive Dam Safety Inspection*, April 2010.

The existing alternator equipment was assessed during the site visits; no operational problems were identified by Operations staff who suggested that the unit would more likely require maintenance rather than replacement in the nominated timeframe.

It is understood that the proposed expenditure is based on the 2008 Bill of Materials. Indicative cost for replacement of the unit, which is rated at 200kVA, is in the order of $100,000-$120,000,[212] although this would exclude allowance for SunWater staff inputs. A review of the cost breakdown provided by SunWater[213] reveals that contractor, material and plant direct costs appear reasonable,[214] however, given that the equipment is apparently to be supplied and installed under contract, the allowance for SunWater labour appears excessive. A total direct cost in the order of $150,000 is considered appropriate.

On the basis of the above discussion Halcrow recommends that an allowance of $150,000 (direct) be provided for replacement of the alternator in 2028, ie. the proposed expenditure should be reduced and deferred.

LBC/7 Refurbish Electrical Installation

This work is scheduled to be undertaken in 2017 at a cost of $942,000 ($882,000). SunWater Operations staff were unsure of the nature of this work, however, reference SAP extracts provided by SunWater indicates that it involves the replacement of power supply cabling and cableways. The extent of the work is not apparent from the information available.

Review of the SAP extracts indicates that, based on average asset lives and date of installation, replacement of the cabling was originally scheduled for the year 2000 whilst the replacement of cableways and pits was scheduled for the year 2045 (assumed asset lives of 35 years and 80 years respectively). A condition assessment undertaken in 2005 assigns a remaining life of 10 years for both asset components. A further condition assessment is now scheduled for 2016; full replacement is currently scheduled for 2017.

Given that refurbishment (replacement) has been planned on the basis of SunWater's adopted asset lives, and that a further condition assessment is to be undertaken prior to implementation, the proposed expenditure is considered prudent. There is, however, insufficient information available to enable assessment as to whether the expenditure is efficient.

LBC/8 Refurbishment DN1200 Outlet Pipe (Left Hand Side)

The Callide Dam outlet comprises two (2) DN1200 MSCL outlet pipes in a dry tunnel, one of which is used to service the irrigation area. Refurbishment of the pipelines is scheduled to be undertaken in 2026 at a cost of $733,000 ($485,000 direct); reference to the SAP extracts provided by SunWater, indicates that asset

[212] Rawlinsons, *Australian Construction Handbook, Edition 28*, 2010.
[213] SunWater, Spreadsheet titled '*Halcrow - Cluster 3 - WMS.xls', SAP-WMS extract*, provided by email to Halcrow on 17 March 2011.
[214] Based on recent cost estimate for a similar installation.

replacement is scheduled at this time based on a 60 year estimated life, although it appears that refurbishment is now proposed.

Halcrow notes that the adopted asset life is at variance to the recommendations presented in SunWater's SAP Guideline Document,[215] which identifies estimated asset lives of 80 years for Mild Steel Cement Lined (MSCL) pipe and 50 years for Mild Steel Un-lined (MSUL) pipe. It is understood from SunWater's Operations staff that the outlet pipe was cement lined in-situ following installation, however, this should not impact materially on asset life.

Adopted asset life for mild steel cement lined pipe is more typically in the order of 100-120 years, except when in highly aggressive environments; the later is not considered applicable for the asset being considered. Within the planned timeframe, it is expected that recoating of the external surfaces of the pipework and (potentially) repair of the internal cement lining may be required. This would be expected to cost in the order of 25-30 percent of the cost of replacing the pipework.

At an approximate length of 300 metres for the two pipes, the proposed expenditure amounts to a cost of approximately $1,600 (direct cost) per metre for refurbishment works. The cost of new DN1200 pipeline installation, albeit more typically in buried situations, would be in the order of $4,000-$5,000 per metre; accordingly, the proposed expenditure is at the upper bound of the cost expected for refurbishment works. The relatively high SunWater labour component identified SunWater's cost breakdown[216] is expected to relate to the need to manage supply during execution of the works.

Whilst it is acknowledged that SunWater's planning processes will involve condition assessment prior to proceeding with the scheduled work; on that basis it is considered that the proposed expenditure is both prudent and efficient.

LBC/9 Major Refurbishment – Spillway Gates

This activity is scheduled to occur in 2029 at a total cost of $562,000 ($368,000 direct) for all six (6) spillway radial gates. This correlates to expenditure in the order of approximately $60,000 (direct) for each gate. The SAP extract provided by SunWater indicates that this activity is scheduled to recur every 18 years, which is the same frequency at which minor refurbishment of the gates is scheduled to occur.

The question arises as to the relative timing of minor and major refurbishments of the spillway gates. Under the current proposal, there is a planned 15 year period between minor and major refurbishment, with only a further 3 years (nominal) until the next minor refurbishment. It is considered more appropriate to schedule minor and major refurbishments at more regular intervals; alternate minor and major refurbishments at 9 year nominal intervals would be considered more appropriate. Halcrow would normally expect minor refurbishment to be

[215] SunWater, *A Guide to SAP PM Asset Hierarchy Development Version 6.5*, 20 January 2009, page 71.
[216] SunWater, Spreadsheet titled '*Halcrow - Cluster 3 - WMS.xls', SAP-WMS extract*, provided by email to Halcrow on 17 March 2011.

undertaken at intervals of 5-10 years and major refurbishment at intervals of 15-20 years.

In the absence of detailed information, it is assumed that a major refurbishment will comprise (as necessary):

- preparation for and renewal of protective coating to all surfaces of the gate;
- inspection/replacement of trunnion bearings;
- replacement of wire ropes; and
- replacement of seals.

Inspection of the gates reveals that the provision of access to enable the work to be undertaken will attract significant costs; as previously noted, access will need to be via the spillway and extensive scaffolding (or similar equipment) will be required.

On the basis of the discussion outlined above, Halcrow considers the proposed expenditure for major refurbishment of the spillway gates to be both prudent and efficient, however, further consideration should be given the proposed relative timing of both minor and major refurbishments.

9.3.3.3 *Callide Diversion Channel*

LBC/10 Refurbish Channel Earthworks

This activity involves minor refurbishment, ie. re-profiling, of the channel earthworks and refurbishment/grading of the channel berm roads. Expenditure of $42,000 ($37,000 direct) is proposed in 2012.

During site inspections, Operators suggested that this activity was programmed on a time (cyclic) basis; it is noted from the SAP extracts provided by SunWater that the channel was rated as Condition 3, ie. in need of minor refurbishment to ensure ongoing reliable operation, in early 2007.

Whilst the channel has been operated only three (3) times during the last 30 years,[217] there will have been some erosion and/or collapse of the channel formation due to the impacts of weather and (potentially) wildlife. It is noted that some corrective maintenance was carried out in early 2011 to repair damage caused by overland flows.

Based on the contracted element of the cost and assuming that the works would be undertaken using a tracked excavator or similar equipment, the estimated cost would allow for some 20 days of plant operation. This equates to refurbishment of approximately 1 kilometre of channel per day, which is considered reasonable.

Halcrow's primary concern relates to the likelihood that the channel will be operated in the short to medium term; whilst the channel must be maintained in an operable condition, it may be possible to defer the work if channel operation is not

[217] As advised by SunWater Operations staff (refer **Section 9.1.2.3**).

imminent. Given, however, that Callide Dam has recently filled for the first time, the likelihood of operation in the near future has been increased.

9.3.3.4 Service Contract

LBC/11 Assessment of Height Safety Risks

It is understood that this activity will involve the assessment of height safety risks across the whole of the Callide Valley Scheme. Expenditure of $82,000 ($53,000 direct) is proposed in 2012.

Review of the SAP extracts provided by SunWater reveals that the expenditure is required to address the risk of falls from vertical ladders, to be implemented across the district over three years. Given that this activity is clearly driven by need to comply with occupational health and safety requirements, it is considered to be prudent.

It is noted that expenditure of $22,300 ($ nominal, including indirect and overhead costs) was incurred to install a fall arrest system to a ladder on the Callide Dam Inlet Tower in 2008. On this basis, the allowance of $82,000 ($53,000 direct) would provide for three (3) or four (4) additional installations; from observations made during the site visit, there is potential for at least this number of installations at Callide and Kroombit Dams.

This proposed expenditure is considered to be both prudent and efficient.

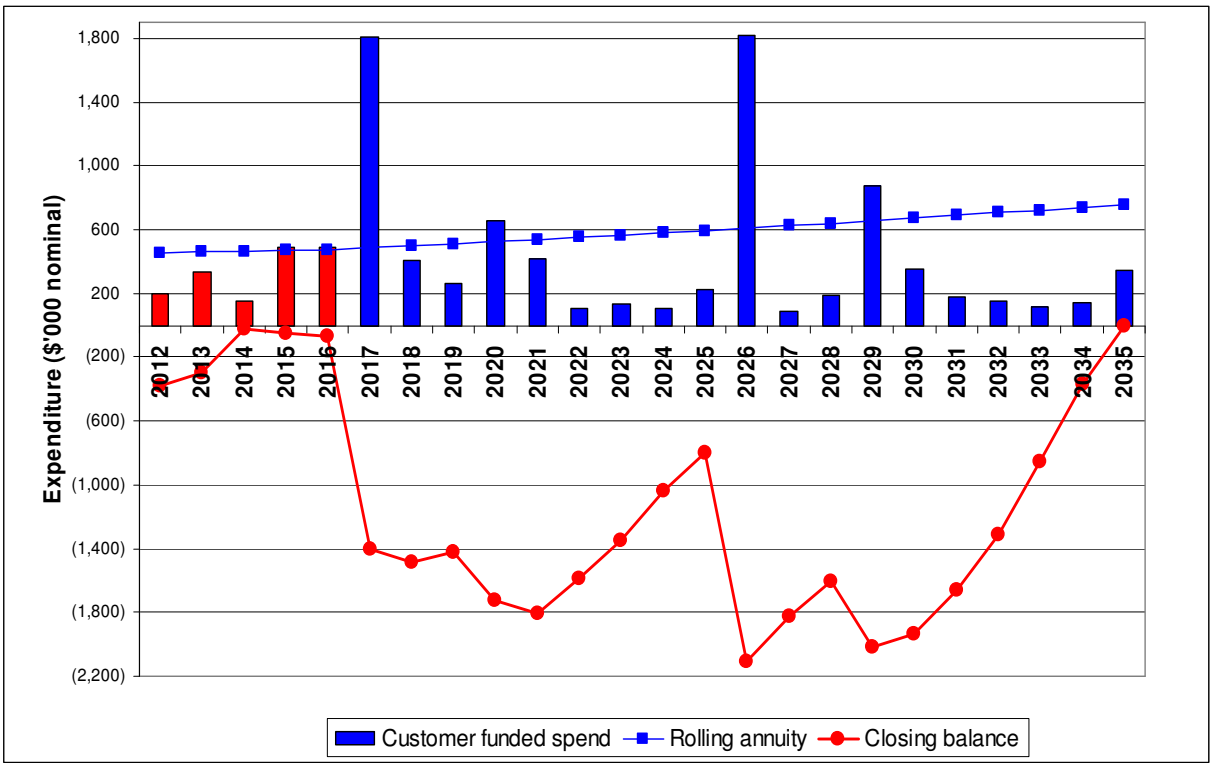
9.3.4 Renewals annuity

SunWater previously established an Asset Refurbish Annuity for the previous five year period 2006 to 2011 for this scheme. The five year average spend was $130,704.

SunWater has elected to continue with a renewal annuity approach for the five years to 2016. The total renewal annuity is $2.325 million over this period, averaging $465,000 per year in nominal terms.

The renewals annuity for the period 2012 to 2016 appears significantly higher than for the previous five-year period, largely because significant expenditures in 2017, 2020, 2026 and 2029 occur earlier in the annuity calculation. Also, the opening balance for the regulatory period is -$575,000. A review of a sample of these expenditures has been discussed in **Section 9.3.3**.

Figure 9-4 shows the rolling annuity and the annuity closing balance through time.



Source: SunWater spreadsheet, *Annuity charts – V610 03.xls*

Figure 9-4 Callide Valley - Renewals Annuity ($ nominal)

9.3.5 Summary of findings on renewals expenditure

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow has reviewed 11 projects covering the period 2012 to 2035.

As noted previously, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects beyond 2012 has been provided. Where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure. In addition, during the site visit to the Callide Valley Bulk WSS, inspections were focussed (to the extent possible) on the selected projects.

On the basis of the review undertaken, Halcrow is generally satisfied that the proposed expenditure is prudent and efficient. However, for two of the projects reviewed it has not been possible to make an assessment of efficiency. In addition, Halcrow recommends that the forecast expenditure to replace the standby diesel generator at Callide Dam (project LBC/6) be reduced and deferred.

Table 9-16 summarises proposed adjustments.

Table 9-16 Callide Valley –Proposed Renewals Program Adjustments

Halcrow Review ID	Year/Adjusted Year	SunWater Description	Project Direct Cost ($2011 real)	
			SunWater Proposed ($000)	Halcrow Adjusted ($000)
Callide Dam				
LBC/5	2015	Replace Ladders, Platforms, Handrails & Safety	56	-
LBC/6	2016 Adjustment: 2028	Replace Standby Diesel Alternator	178	150
LBC/7	2017	14CVA-Refurbish Electrical Installation	882	#
LBC/9	2029 Adjustment: Coordinate timing of major and minor refurbishments (9 year intervals)	Major Refurbishment	368	562

Note: # - Expenditure considered prudent, but insufficient information to assess efficiency.

In addition, it is noted that SunWater is currently in negotiations with Banana Shire Council to handover the recreational facilities at Callide Dam. While review of the specific handover agreements between the Banana Shire Council and SunWater is beyond the scope of this review, should hand over take place, then the renewals forecast may need to be adjusted to account for this.

10 Three Moon Creek

10.1 Scheme Description

The Three Moon Creek Bulk Water Supply Scheme (WSS) is located near the town of Monto. It forms part of SunWater's Central region. The scheme has several key assets including the Cania Dam, Youlambie Weir, Anabranch Weir, Monto Weir, Bazley Weir, Avis Weir and Mulgildie Weir. These assets are listed in SunWater's Interim Resource Operating Licence (IROL), and SunWater has obligations in relation to their management and operation.

The scheme has 90 bulk water customers. The scheme comprises 14,561 megalitres (ML) of medium priority Water Access Entitlement (WAE) and 580 ML of high priority WAE.[218]

Water supplied by SunWater in the Three Moon Creek Bulk WSS is used for[219]

- agricultural irrigation via groundwater reserves of crops, dairy and piggery; and
- urban water supply to the townships of Monto and Mulgildie.

During the site visit and meeting with SunWater Operators in respect of the Callide Valley Bulk WSS, SunWater noted that the Three Moon Creek Bulk WSS is similar in operation to the Callide Valley Bulk WSS in that both are essentially groundwater recharge systems. There are a limited number of surface water extractors.

The Scheme is serviced by Cania Dam, which has recently filled for the first time. Operation of the scheme nominally involves both a summer and a winter release, however, last year was the first summer release. There are minimal downstream (ie. downstream of the Scheme) releases.

10.2 Operating Expenditure

10.2.1 Overview

SunWater historical operating expenditure has fluctuated significantly since 2007. Expenditure in 2011 is budgeted at $320,000, and is forecast to increase marginally in the period to 2016. A breakdown of operating expenditure by Activity and Type is provided in **Figure 10-1** and **Figure 10-2**.

[218] SunWater, *Three Moon Creek Water Supply Scheme Network Service Plan,* page 13.
[219] SunWater (2011), Scheme Information http://sunwater.com.au/schemes accessed 24 February 2011.

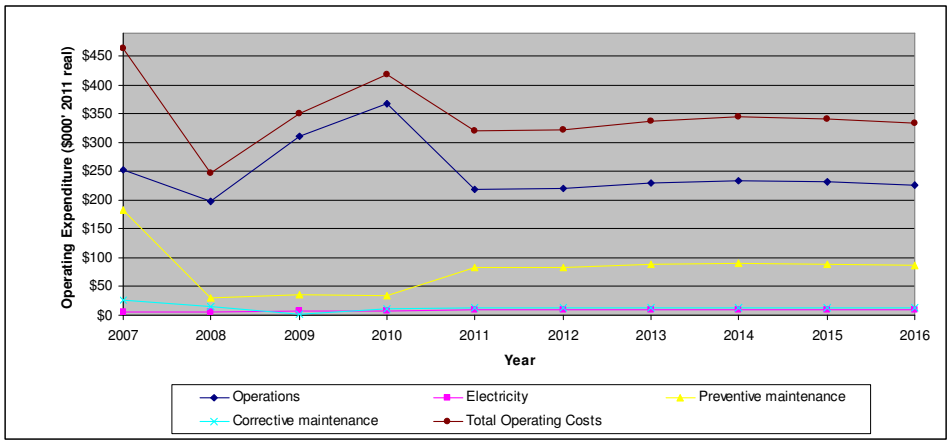


Figure 10-1 Operating Expenditure by Activity for Three Moon Creek

As evident from **Figure 10-1**, expenditure on 'Operations' accounts for the majority of operating expenditure.

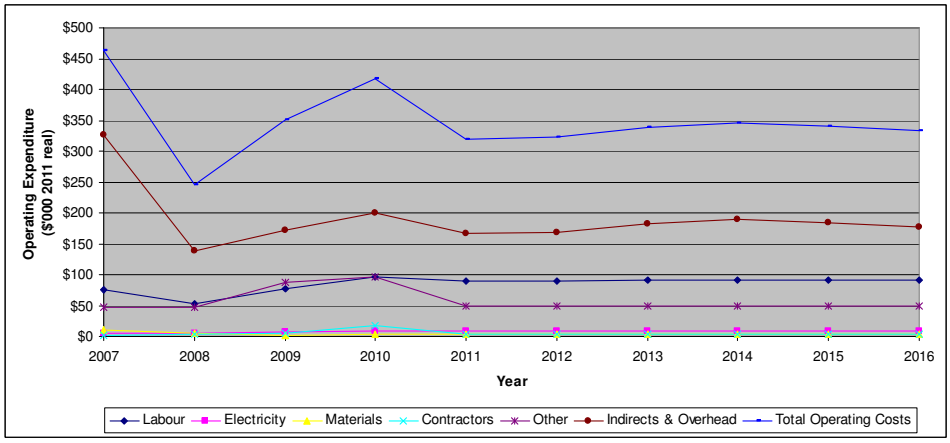


Figure 10-2 Operating Expenditure by Type for Three Moon Creek

As evident from **Figure 10-2**,'Indirects & Overhead' expenditure represents the largest component of operating costs (by Type). Expenditure on 'labour' and 'other' account for significant components of the direct expenditure. Excluding 'Indirects & Overheads', SunWater's forecast operating expenditure is relatively stable in the period to 2016.

Table 10-1 includes a breakdown of historical and proposed operating expenditure for the Nogoa Mackenzie WSS by Activity, while **Table 10-2** includes a breakdown of historical and proposed operating expenditure by Type.

Table 10-1 Operating Expenditure by Activity for Three Moon Creek

Item ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Operations	253	198	311	368	218	220	230	234	231	226

Electricity	6	6	7	8	9	9	9	9	9	9
Preventive maintenance	183	30	35	33	83	83	88	90	89	86
Corrective maintenance	26	16	1	12	13	13	13	14	14	13
Revenue offsets	-4	-4	-3	-3	-2	-2	-2	-2	-2	-2
Operating Costs	**463**	**246**	**351**	**418**	**320**	**323**	**338**	**345**	**341**	**333**

Source: Extracted from SunWater Three Moon Creek Water Supply Scheme NSP, Table 4-2, page 25.

Table 10-2 SunWater Expenditure by Type for Three Moon Creek

Activity ($'000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	75	52	77	96	89	90	92	92	92	92
Electricity	6	6	7	8	9	9	9	9	9	9
Materials	11	5	2	3	4	4	4	4	4	4
Contractors	2	3	6	17	3	3	4	4	4	4
Other	47	47	88	96	50	50	50	50	50	50
Indirects & Overhead	326	138	172	200	167	168	182	189	184	177
Revenue offsets	-4	-4	-3	-3	-2	-2	-2	-2	-2	-2
Total Operating Costs	**463**	**246**	**351**	**418**	**320**	**323**	**338**	**345**	**341**	**333**

Source: Extracted from SunWater Three Moon Creek Water Supply Scheme NSP, Table 4-3, page 26.

The following sections provide a detailed review and discussion of the key elements of SunWater's proposed direct operating expenditure by Activity.

10.2.2 Operations

Operational activities associated with the Three Moon Creek Water Supply Scheme include scheduling and delivery of water, reading meters and observation bores, water quality monitoring, compliance reporting, site inspections and environmental management. Operational activities for the scheme are identified in the *Three Moon Creek Water Supply Scheme – Scheme Operation Manual*,[220] and the *Cania Dam – Operation and Maintenance Manual*.[221]

In accordance with the IROL, one or two releases are made from Cania Dam per annum to fill the weirs and recharge groundwater aquifers. The releases are usually made over a three month period during the winter or summer season. The scheme is operated manually.

Operations staff are required to undertake weekly monitoring of the embankments and spillway of Cania Dam. The IROL for the scheme lists the volumetric and

[220] SunWater, *Three Moon Creek Water Supply Scheme – Scheme Operation Manual*, undated.
[221] SunWater, *Three Moon Creek Water Supply Scheme: Cania Dam – Operation and Maintenance Manual, Version 1, Issue 1*, 27 August 2003.

quality monitoring that SunWater is obligated to undertake. Monitoring the presence of Blue Green Algae is also undertaken as required. SunWater's compliance officer is responsible for ensuring that SunWater's monitoring requirements are met.[222]

A significant element of the operational activities undertaken on the scheme relates to collecting and reporting of data relating to water supply, the environment and safety. SunWater uses a range of systems to collect and report data in the required formats. Reporting requirements are identified in a number of documents and are summarised in the *Scheme Operation Manual*.[223]

A breakdown of historical expenditure into key operations sub activities is shown in **Table 10-3**. A similar breakdown for forecast expenditure has not been provided.

Table 10-3 Three Moon Creek – Breakdown of Historical Operations Expenditure

($ '000 2011 real)	Historical			
	2007	2008	2009	2010
Customer Management	13	4	3	6
Workplace H&S	14	2	1	9
Environmental Management	33	25	28	39
Water Management	22	16	57	52
Scheme Management	77	88	122	175
Dam Safety	44	23	71	70
Schedule/Deliver	50	28	12	8
Metering	-	10	15	9
Facility Management	-	3	1	-
Other	-	-	-	-
Total	**253**	**198**	**311**	**368**

Source: Data extracted from SunWater spreadsheet '*Extract LBC Data Conversion down to sub activity.xls*',

As evident from **Table 10-3**, the key elements of operations expenditure relate to scheme management, dam safety, water management and environmental management.

Table 10-4 provides a breakdown of historical and forecast expenditure on operations at the Three Moon Creek Bulk WSS.

Table 10-4 Three Moon Creek – Operations Expenditure

Type	Historical	Budget	Price Path

[222] SunWater, *Three Moon Creek Water Supply Scheme – Scheme Operation Manu*al, undated, page 34.
[223] SunWater, *Three Moon Creek Water Supply Scheme – Scheme Operation Manu*al, undated.

($ '000 2011 real)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	39	41	69	84	58	58	58	58	58	51
Materials	7	0	0	0	0	0	0	5	2	0
Contractors	2	3	3	15	3	3	3	4	4	4
Other	43	44	86	94	48	48	48	48	48	48
Total Direct Costs	**91**	**88**	**159**	**193**	**109**	**110**	**109**	**115**	**112**	**103**
Indirects	117	61	73	76	50	50	58	65	59	55
Overheads	45	49	79	99	59	59	61	65	63	60
Total	**253**	**198**	**311**	**368**	**218**	**220**	**228**	**244#**	**234#**	**218**
Annual change (%)		-22%	57%	18%	-41%	1%	4%	7%	-4%	-7%
Change since 2007 (%)		-22%	23%	46%	-14%	-13%	-10%	-3%	-7%	-14%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.
Note (#) Minor differences in expenditure between this table and the NSP relates to indirects and overheads. Halcrow understands that the NSP is correct.

As evident from **Table 10-4**, operations costs increased significantly over the period between 2007 and 2010, with direct expenditure forecast to remain above 2007 levels (in real terms) in the period to 2016. Halcrow requested that SunWater provide an explanation for the increase in costs over the years, together with quantification of each factor identified. In response, SunWater indicated that, *"the 2007 data is not very reliable as the Business Operating Model was implemented from 1 July 2008. Indirect cost allocation in the 2007 data (which amount for most of the variation in costs) are not reliable.*"[224] No other explanation was provided by SunWater in relation to the change in expenditure.

In its NSP, SunWater has stated that it undertook a review of work practices in 2010 which resulted in revised work instructions upon which the cost forecasts are based. While SunWater has provided a high level breakdown of operations data, no information relating to the review of work instructions has been provided. However, SunWater has provided explanations for key movements in the expenditure.

There has been a significant reduction in direct costs between 2010 and 2011. SunWater explained that this was due to the realignment of expenditure classified as Operations to Preventative Maintenance. It noted that operations surveillance was moved to Preventative Maintenance as a result of the Parsons Brinckerhoff review. Halcrow notes that SunWater's forecast expenditure on Preventative Maintenance has increased, although this does not account for all of the reduction in Operations.

In addition, it is likely that the labour expenditure has been reduced due to SunWater's SLFI (cost savings) review, which has resulted in the centralisation of services, and reductions to staff numbers. However, SunWater has indicated that

[224] SunWater, *'doc#1079202-Information request by HALCRO.DOC'*, 31 May 2011.

the impact of the SLFI (cost savings) review on the Three Moon Creek scheme is a reduction in Indirect and Overhead costs from 2011 (ie. it has not specifically identified reductions in labour expenditure as a result of the SLFI review).

The average expenditure on labour over the period 2007 to 2010 was $58,000, which is in line with forecast expenditure.

SunWater has provided an extract of its resource planning tool used to develop labour forecasts for 2012. Halcrow has been able to confirm that the forecast labour expenditure has been built up using the methodology outlined in **Section 3.6.6**. The extract provided indicates that the direct labour charge for operations in the Three Moon Creek Bulk WSS in 2012 is based on approximately 874 hours per annum for operations staff from the Central resource centre and the Asset Management resource centre. This accounts for approximately $45,500 per annum of the labour expenditure, and is equivalent to approximately 0.6 FTE staff working on operations. This allowance appears reasonable, although more information on the review of work practices and how these have driven allowances for labour hours is required to enable the prudence and efficiency assessment to be undertaken.

Labour hours and charges for Corporate Council, Strategy, Health & Safety or Services Delivery resource centres are not shown on the extract of the resource planning tool provided, but account for approximately $12,000 per annum of direct labour expenditure. No information has been provided in relation to this expenditure.

The labour forecast includes real increases of 1.5 percent in 2012 and 2013, which is consistent with its Enterprise Agreement (of an increase of four percent nominal for 2012 and 2013). Labour is forecast to remain steady (in real terms) thereafter.

SunWater has forecast a reduction in Other expenditure, to $48,000 in 2011. Expenditure is forecast to remain steady thereafter. SunWater noted that this is driven by a reduction in insurance costs due to the increase in asset value from other service contracts (the insurance premium calculation is based on the asset value for all SunWater assets).[225] Insurance accounts for $35,000 per annum. Local Authority rates, $12,000 and Land Tax at $1,000. SunWater is required by law to pay Local Authority rates and Land Tax and this expenditure is therefore considered appropriate.

Although Halcrow has been unable to undertake a detailed review of SunWater's operations expenditure, on the basis of the information and explanations provided by SunWater, Halcrow is generally satisfied that the expenditure appears to be reasonable. However a definitive assessment of prudence and efficiency has not been possible from the information provided.

[225] SunWater email, *Questions on cluster 3.doc*, dated 16 March 2011.

10.2.3 Preventative maintenance

Table 10-5 provides a breakdown of historical and forecast expenditure on corrective and preventative maintenance.

Table 10-5 Three Moon Creek – Preventative Maintenance Expenditure

Expenditure ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	32	7	8	9	27	28	28	28	28	28
Materials	2	1	4	1	2	2	2	2	2	2
Contractors	0	0	3	3	0	0	0	0	0	0
Other	4	1	2	1	2	2	2	2	2	2
Total Direct Costs	**39**	**10**	**17**	**14**	**32**	**32**	**33**	**33**	**33**	**33**
Indirects	105	11	9	8	24	24	28	29	28	26
Overheads	38	8	9	10	27	27	28	28	28	28
Total	**183**	**30**	**35**	**33**	**83**	**83**	**88**	**90**	**89**	**86**
Annual change (%)		-84%	16%	-6%	154%	1%	6%	2%	-2%	-3%
Change since 2007 (%)		-84%	-81%	-82%	-55%	-54%	-52%	-51%	-51%	-53%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.

As evident from **Table 10-5**, SunWater is forecasting a significant jump in preventative maintenance as compared to its historical expenditure. Of the direct expenditure, this is primarily driven by an increase in labour expenditure. SunWater explained that the increase in labour was due to increased water availability (Cania Dam was at very low levels during prior years). The increased water availability resulted in more servicing of water meters and increased weed control around weirs and structures. SunWater noted that with a full dam, two releases will be made from Cania Dam each year with a winter and summer release therefore requiring additional preventive maintenance.[226]

SunWater provided a breakdown of historical expenditure into condition monitoring, servicing and weed control, as shown in **Table 10-6**. While a similar breakdown has not been provided for forecast expenditure, the table shows the historical fluctuations in preventative maintenance activities.

[226] SunWater email dated 24 March 2011.

Table 10-6 Three Moon Creek – Preventative Maintenance Expenditure

Expenditure ($ 2011 real)	Historical			
	2007	2008	2009	2010
Condition Monitoring	24	17	19	19
Servicing	152	9	5	6
Weed control	8	4	11	7
Total	**183**	**30**	**35**	**33**

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM North -610.03.PSV*'.

The expenditure in 2007 is significantly greater than the expenditure in 2008 to 2010. Halcrow understands that the reason for this is the transfer of financial data into SunWater's revised Business Operating Model, which came into effect on 1 July 2008. This involved the reclassification of some activities, including some tasks previously coded as refurbishment projects to preventative maintenance codes.[227]

As noted in **Section 3.6.3.2**, Halcrow understands that SunWater's condition monitoring and servicing forecast expenditure is primarily based on forecasts developed by Parsons Brinkerhoff, although it also includes allowances for additional servicing activities.

As part of the review undertaken by Parsons Brinkerhoff, it forecast expenditure of approximately $24,500 per annum ($2010 real) on condition monitoring and servicing for the coming price path period. This is equivalent to approximately $25,400 per annum ($2011 real), and this excludes overhead and indirect costs.

Halcrow is generally satisfied that the expenditure forecast developed by Parsons Brinkerhoff is based on appropriate drivers, taking into account both the nature and frequency of the activities to be undertaken. However, Halcrow notes that this estimate is built up from SunWater's existing work instructions and its current approach to maintenance, which is yet to be optimised. Consequently, it is likely that there is scope to achieve efficiency savings in the delivery of servicing and condition monitoring activities, which are not currently reflected in the expenditure presented in the NSP. Furthermore, as the breakdown of forecast expenditure provided to this review splits out expenditure into labour, materials, contractors, rather than into condition monitoring, servicing and weed control, it has not been possible to confirm that the forecast expenditure is in fact based on the forecast developed by Parsons Brinkerhoff.

Accounting for the forecast expenditure developed by Parsons Brinkerhoff, the remaining expenditure is approximately $6,600 per annum. As noted in **Section 3.6.3.2**, the forecast of preventative maintenance expenditure also includes expenditure related to weed control, and "*additional servicing, calibration and*

[227] Parsons Brinckerhoff, *Provision of Services for Costing SunWater's Work Instructions*, October 2010, page 13.

adjustment of equipment such as pumps, motors, regulator gates, meters and valves".[228] SunWater has indicated that this is based on the average of previous years' expenditure, although no additional information on the nature or make up of this expenditure has been provided. While Halcrow is unable to comment in detail on the prudence and efficiency of this expenditure, it is noted that Cania Dam has been operating at or close to capacity since January 2011. The increased water availability is likely to result in additional servicing of water meters and increased weed control around weirs and structures. On this basis, the additional expenditure does not appear unreasonable, however, in they absence of appropriate justification, adjustment of the forecast preventative maintenance expenditure by this amount is proposed.

10.2.4 Corrective maintenance

Table 10-7 shows a breakdown of historical and forecast expenditure on corrective maintenance. As shown in the table, the expenditure has fluctuated, although this has primarily been driven by changes in indirects and overheads. SunWater's 2011 budget includes a slight increase in expenditure over 2010 levels, after which time it is forecast to remain approximately steady.

Table 10-7 Three Moon Creek – Corrective Maintenance Expenditure

($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Labour	3	3	0	4	4	4	4	4	4	4
Materials	1	4	-2	1	1	1	1	1	1	1
Contractors	0	0	0	0	0	0	0	0	0	0
Other	0	1	0	0	0	0	0	0	0	0
Total Direct Costs	**5**	**8**	**-2**	**4**	**5**	**5**	**5**	**5**	**5**	**5**
Indirects	17	4	0	3	3	3	4	4	4	4
Overheads	4	4	2	4	4	4	4	4	4	4
Total	**26**	**16**	**1**	**12**	**13**	**13**	**13**	**14**	**14**	**13**
Annual change (%)		-38%	-95%	1365%	8%	1%	5%	2%	-1%	-2%
Change since 2007 (%)		-38%	-97%	-55%	-51%	-51%	-48%	-47%	-48%	-49%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.

As evident from **Table 10-7**, SunWater is forecasting that direct expenditure (on labour, material, contractors and other) will remain in line with historical expenditure.

As noted in **Section 3.6.4**, SunWater's forecast expenditure is based on an average of the past four years (including 2011), excluding outliers. SunWater has not provided Halcrow with the calculations in support of its forecast of corrective

[228] SunWater email, *RE Preventative Maintenance*, 9 March 2011.

maintenance, however, a breakdown of the expenditure indicates labour charges of $4,000 relate to staff from the SunWater's Central region.

As part of this review, SunWater provided a report listing all of the work instructions relating to corrective maintenance activity raised in the period 2009 to 2011. The breakdown indicates that expenditure on corrective maintenance is marginally lower than that reported in **Table 10-7**, however, Halcrow understands this is because some work orders run over multiple years. The corrective maintenance activities undertaken are typical of what might be reasonably expected from the assets in the scheme.

Table 10-8 shows historical and proposed expenditure on corrective and preventative maintenance. As evident from the table, SunWater's overall expenditure on maintenance is forecast to increase significantly when compared to historical expenditure.

Table 10-8 Three Moon Creek – Maintenance Expenditure

Direct Expenditure ($2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Preventive maintenance	39	10	17	14	32	32	33	33	33	33
Corrective maintenance	5	8	-2	4	5	5	5	5	5	5
Total Maintenance	**44**	**18**	**15**	**19**	**37**	**37**	**38**	**38**	**38**	**38**
Annual change (%)		-58%	-18%	25%	95%	1%	1%	0%	0%	0%
Change since 2007 (%)		-58%	-66%	-57%	-16%	-15%	-14%	-14%	-14%	-14%
Preventative Maintenance (%)	89%	56%	113%	76%	86%	86%	86%	86%	86%	86%
Corrective Maintenance (%)	11%	44%	-13%	24%	14%	14%	14%	14%	14%	14%

Source: Historical data extracted from SunWater spreadsheet '*Extract LBC Data Conversion extra activity detail and preventative maint split.xls*', forecast expenditure data from SunWater spreadsheet '*IM Central -610.03.PSV*'.

As noted in **Section 3.6.4**, it is commonly accepted that there is an optimum mix of preventative and corrective maintenance. The optimum mix represents the most economical combination of preventative and corrective maintenance activities to achieve a desired set of outcomes. While Halcrow understands that SunWater intends to move to a RCM approach to maintenance planning in order to optimise the mix of preventative and corrective maintenance activities, the forecast expenditure in the NSP does not reflect this approach. Consequently, there may be some scope for SunWater to optimise its proposed corrective and preventative maintenance programs.

10.2.5 Electricity

Electricity costs for the Three Moon Creek Bulk WSS are immaterial, historically accounting for 1.3 to 2.4 percent of operating expenditure. Electricity costs have increased from approximately $6,000 in 2007 to approximately $8,000 in 2010. As shown in **Table 10-9**, SunWater has forecast that expenditure on electricity will remain steady, at $9,000, which is the 2011 budgeted expenditure.

Table 10-9 Three Moon Creek – Electricity Expenditure

Activity ($ '000 2011 real)	Historical				Budget	Price Path				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity	6	6	7	8	9	9	9	9	9	9
Annual change (%)		0.0%	16.7%	14.3%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Change since 2007 (%)		0.0%	16.7%	33.3%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%

Source: Expenditure data from SunWater Nogoa Mackenzie Water Supply Scheme NSP, Table, page 7.

The 2011 budget ($9,048) is based on actual electricity expenditure in 2010 ($7,987 nominal), inflated by 13.29 percent to account for the increase in franchise tariffs. The method adopted to forecast electricity costs for the scheme appears appropriate.

More detailed discussion on SunWater's approach to forecasting electricity costs, and methods by which it seeks to optimise expenditure on electricity is included in **Section 3.6.5**.

10.2.6 Summary of findings on operating expenditure

While Halcrow has been unable to undertake a detailed review of SunWater's operations expenditure, on the basis of the information provided by SunWater, Halcrow is generally satisfied that the expenditure appears to be reasonable. Some minor adjustments are, however, proposed in respect of escalation on materials and contractor costs, and unjustified preventative maintenance costs.

As discussed in preceding sections, Halcrow notes that there is likely to be some scope for SunWater to achieve efficiency via the review and optimisation of its preventative and corrective maintenance programs.

In view of the preceding, Halcrow recommends adjustments to the forecast operating expenditure (direct costs) for the Three Moon Creek Bulk WSS as shown in **Table 10-10**.

Table 10-10 Three Moon Creek – Proposed Adjustments to Operating Expenditure (2012 – 2016)

Item ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
SunWater Proposed Total Direct Costs	**156**	**159**	**159**	**159**	**159**
Adjustments:					
▪ less escalation on materials	0	0	0	0	0
▪ less escalation on contractors	0	-1	-1	-1	-1
▪ less unjustified Preventative Maintenance costs	-7	-7	-7	-7	-7
Total Reduction	-7	-8	-8	-8	-8
Halcrow Adjusted Direct Costs	**149**	**151**	**151**	**151**	**151**

10.3 Renewals Expenditure

10.3.1 Overview

Table 10-11 provides a high level summary of SunWater's renewals program for the five-year regulatory period for Three Moon Creek Bulk WSS.

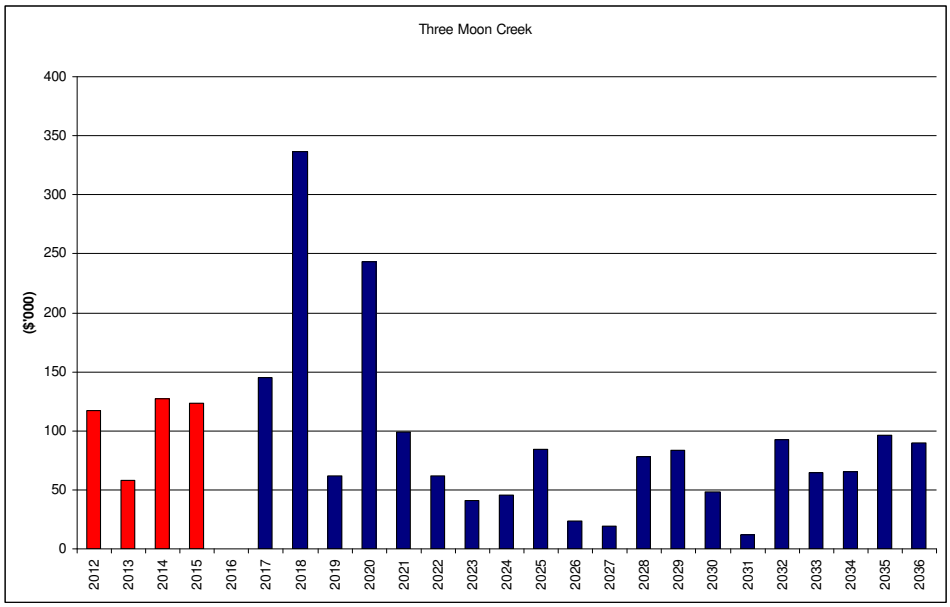
Table 10-11 Three Moon Creek - Proposed Renewals Program (2012 – 2016)

Facility ($2011 real)	Financial Year					5-yr Total
	2012	2013	2014	2015	2016	
Avis Weir		16	22			38
Bazley Weir			6			6
Cania Dam	94	23	99	80		296
Mulgildie Weir	22			25		47
Service Contract				6		6
Three Moon Ck Groundwater Dist	1	9				10
Youlambie Recharge Weir		11		12		23
Total	**117**	**58**	**127**	**124**		**426**

Source: SunWater Three Moon Creek Water Supply Scheme NSP, Table 4-5, page 28.

As noted in **Table 10-11**, the majority of the renewals expenditure to be incurred in the period to 2016 relates to Cania Dam.

SunWater provided Halcrow with a breakdown of its proposed renewals expenditure by project for the 25 year period to 2036. The breakdown indicates significant renewals expenditure in the period 2017 to 2020.



Source: SunWater , *NSP Projects Central V4.xls*

Figure 10-3 Three Moon Creek - Forecast Renewals Expenditure

As part of the review of the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow undertook a detailed review of a selection of historical and proposed renewals projects.

The detailed review of historical renewals projects sought to understand the factors contributing to the difference between SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure identified in the previous Tier 1 pricing review.

The detailed review of forecast renewals projects included a review of project planning and proposed outcomes to assess the prudence and efficiency of SunWater's proposed renewals expenditure.

The following sections detail the results of this review.

10.3.2 Review of historical renewals expenditure

Table 10-12 shows SunWater's actual expenditure on renewals against the Lower Bound Cost (LBC) target expenditure determined during the previous pricing review. As evident from the table, SunWater's actual expenditure has been generally been lower than the LBC target expenditure.

Table 10-12 Three Moon Creek - Actual Renewals Expenditure vs. LBC Target Expenditure

$'000 nominal	Financial Year				
	2007	2008	2009	2010	2011
Actual renewals Expenditure	4	56	81	29	52
LBC Target Expenditure	47	54	55	71	133
Difference	-44	2	26	-42	-82

Source: SunWater spreadsheet, *Compare R&E Spend to Annuity 2007_2011.xls.*

As noted in **Section 3.8.2**, SunWater has not been able to provide a list of renewals projects that it intended to deliver during the current price path; consequently, it has not been possible to undertake a detailed assessment of SunWater's historical renewals expenditure.

Halcrow did, however, obtain a breakdown of SunWater's historical expenditure on renewals expenditure for the period 2007 to 2011 (until 15 February) for projects greater than $10,000.[229] A review of the budgeted versus actual expenditure for the renewals projects undertaken indicates that a number of projects significantly exceeded the original budget, or were not originally budgeted.

Significant expenditure in the current price path has included:

- Cania Dam Inlet Tower - Install missing links on safety rail system ($21,179 in 2008). Maintenance of safety railing is required for OH&S compliance; the cost in part reflects the need to undertake work over water.
- Inspection - 5 Year Dam Safety - Cania Dam ($42,354 versus budget of $30,825 in 2009 and $23,219 versus budget of $18,000 in 2010). SunWater noted that actual expenditure was greater than budgeted expenditure as SunWater's Chief Engineer was included in the inspection teams to update his knowledge of the dam portfolio to be able to respond in an emergency situation. At a total of approximately $65,000 (nominal), the cost of the review is consistent with other 5 Year Dam Safety Reviews.
- Peer Review Comprehensive Risk Assessment - Cania Dam ($26,064 in 2010; project not included in original Board approved budget). SunWater's comprehensive risk assessment program has been in place since 2006. SunWater noted that its Board changed the methodology adopted for the risk assessment to include an external peer review, which resulted in increased costs and some delays to the program. The expenditure is in line with normal expectations.

SunWater's 2011 budget includes significant expenditure in 2011, including

[229] The listing of actual expenditure on renewals and rehabilitation indicates expenditure significantly lower than that reported in the NSP. However, the listing of expenditure provided only included projects greater than $10,000 in value, which indicates that a significant element of renewals projects were lower than this threshold, or that the list provided to Halcrow was incomplete.

- Replace Switchboards 2 (Hydraulic) and 3 - Cania Dam ($21,542 budgeted); and
- Complete Asbestos Audit on Whole of Scheme and Remove Some - Three Moon Creek ($11,921 budgeted).

10.3.3 Review of forecast renewals expenditure

10.3.3.1 Overview

In order to assess the prudence and efficiency of SunWater's proposed renewals expenditure, Halcrow selected a number of renewals projects to review in detail, including projects scheduled for the period 2017 to 2036.

The projects selected for review are included in **Table 10-13**; they account for approximately 30 percent of total expenditure in the scheme until 2036.

Table 10-13 Three Moon Creek – Selections from Proposed Renewals Program

Halcrow Review ID	Year	SunWater Description	4. Project Cost		Total Cost 2012 to 2036 ($000)[1]
			Project Direct Cost ($000)	Total Project Cost ($000)	
Cania Dam					
LBT/1	2012	12TMC03-Refurb Ladders & Platforms-Inlt	11	20	20
LBT/2	2012 and 25 yearly thereafter	12TMCXX Refurbish Pipework Int/Ext Paint	33	48	97
LBT/3	22. 2014 and 5 yearly thereafter	09TMC-Study: 5 Year Dam Safety	15	25. 43	216
LBT/4	2018	Replace Cables & Cableways	206	309	309

Source: *Halcrow - Cluster 3 - WMS.xls* [230], Three Moon Creek NSP[231], *Halcrow Selections of Forecast R&R* [232]
Note (1): Total cost includes the cost of each recurring project within the period 2012 to 2036.

Halcrow requested that SunWater provide the following information:

- the project scope and the driver for each project;
- the basis of expenditure forecast (unit rates, quantities etc); and
- condition reports/asset management plans demonstrating the need for the renewals expenditure.

As discussed in **Section 3.8.3**, very little detailed information on the scope, drivers, options assessed, or cost estimates for the projects has been provided. Where possible, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure,

[230] SunWater, spreadsheet titled '*Halcrow - Cluster 3 - WMS.xls*', SAP-WMS extract, provided by email to Halcrow on 17 March 2011.
[231] SunWater, *Three Moon Creek Water Supply Scheme Network Service Plan.*
[232] Information extracted from SunWater spreadsheets titled *NSP Projects North V4.xls* and *NSP Projects Central V4.xls.*

although this has not been possible in all cases due to insufficient information on the proposed expenditure.

The following sections include a review of the information provided by SunWater to substantiate the proposed projects, together with the assessment of prudence and efficiency. Halcrow's review of each project has only considered the direct costs. Indirect costs and overheads, which have been applied to all projects, are the subject of a separate review.

10.3.3.2 Cania Dam

LBT/1 12TMC03-Refurb Ladders & Platforms-Inlt

This renewals project is scheduled for 2012 at a cost of $20,000 ($11,000 direct cost). It is understood that this activity involves refurbishment of ladders, hand rails and a fall arrest system that have been in operation on the inlet structure at Cania Dam since 1982. The original cost of these items was $20,000. The asset life of the items, as entered into SAP-WMS, is 60 years; replacement of the ladders, hand rails and fall arrest system is scheduled for 2042.

The most recent condition assessment of the assets was undertaken in November 2008. It indicates that they exhibited moderate deterioration with minor refurbishment required to ensure ongoing reliable operations. The condition assessment found significant deterioration associated with the external coating and metal work which was corroded. A risk assessment was undertaken in April 2005 which determined risk to be low in all categories.

On the basis that SunWater is required to maintain ongoing safe working environments, the condition assessment supports expenditure proposed in 2012. Expenditure is therefore considered both prudent and efficient.

LBT/2 12TMCXX Refurbish Pipework - Interior/Exterior Paint

This renewals project is scheduled for 2012 at a cost of $48,000 ($33,000 direct cost). Based on the SAP-WMS extracts, it is understood that this project involves refurbishment of the internal and external paintwork on pipes at the outlet works excluding the Town Water Supply. According to the SAP-WMS system, the pipework has been in operation since 1982 and is expected to have an asset life of 80 years, with replacement scheduled to occur in 2063. Refurbishment of the internal and external paintwork is programmed into the SAP-WMS system to occur every 24 years.

Based on the identifier 'PIPEF' in the SAP-WMS system, the pipeline is understood to be ferrous. Halcrow was unable to determine the dimensions of the pipework, although based on the *Cania Dam Operation and Maintenance Manual*,[233] the pipework is understood to be combination of various sizes in the order of DN750 to DN2100.

[233] SunWater, *Three Moon Creek Water Supply Scheme: Cania Dam – Operation and Maintenance Manual, version 1, Issue 1*, 27 August 2003.

The most recent condition assessment undertaken in December 2008 indicates minor defects only. The assessment noted some of the external coated areas had been patch painted. No assessment was made of the interior of the pipe in 2008, however, in a condition assessment undertaken in February 2004, the interior of the pipe was recorded as 'perfect as new condition'.

Whilst expenditure appears efficient, an assessment of prudence (specifically the timing) has not been possible in the absence of an assessment of the interior of the pipe.

LBT/3 09 TMC-STUDY: 5 Year Dam Safety

Cania Dam is classified as a referable dam under the *Water Act 2000*. SunWater provided a copy of its schedule for Dam Safety Conditions.[234] The schedule details the review dates for annual inspections, five yearly inspections, and safety reviews. The schedule confirms that a five year safety study is required by 1 December 2014, with a 20 year Safety Review also to take place by 1 December 2019.

Expenditure of $43,000 ($15,000 direct) has been scheduled into the renewals program every five-years from 2015. SunWater provided an extract from SAP-WMS extract which demonstrates that the study is planned to be undertaken in-house. SunWater's direct labour costs to undertake the work is $15,000 with indirects and overheads accounting for $30,000 of the planned expenditure.

The most recent 5 year Dam Safety report was completed in 2010. The work was completed over two years at a total cost in the order of $65,000 (nominal) including indirect and overhead costs.

Expenditure is considered prudent due to the statutory requirements for dam safety reporting. Halcrow considers that a direct cost of $15,000 is efficient although a slightly higher allowance, in the order of $20,000 (direct costs) may well be justified given the cost of other 5 yearly dam safety reviews.

LBT/4 Replace Cables & Cableways

This renewals project is scheduled for 2018 at a cost of $309,000 ($206,000 direct costs).

The electrical cables and cableways have been in operation at Cania Dam since 1982. Extracts from SAP-WMS indicate that an asset life of 35 years has been assigned to these assets, with the cables and cableways scheduled for replacement in 2017. Halcrow was not provided with the exact location and dimensions of the cabling and cableways.

The most recent condition assessment was undertaken in September 2004 which indicated the cabling was in a 'perfect as new condition'. A risk assessment undertaken in 2005 concluded that failure of the cables and cableways would have minor to insignificant consequences associated with WH&S, environment, financial, production/operations and stakeholder relations. Overall risks in all

[234] SunWater document, *PRODUCTION-#838872-v2-Dam_Safety_Conditions_- _ Submission _Date _Summary.xls.*

categories were rated as low. SunWater's asset management hierarchy[235] does not provide any further details on cabling and cableways asset lives. SunWater's electrical assets guide[236] recommends, however, that cables resistance measurements and visual inspections should be undertaken at a maximum interval of five years. Cableways should also be visually inspected every five years.

Whilst it is acknowledged that there is no evidence of the monitoring of resistivity as recommended by SunWater's electrical assets guide[237] and a condition assessment has not recently been conducted, programming for replacement on the basis of asset life is considered prudent at this stage, subject to further condition assessment prior to implementation. In the absence of more detailed information, however, it is not possible to assess whether the expenditure is efficient.

10.3.4 Renewals annuity

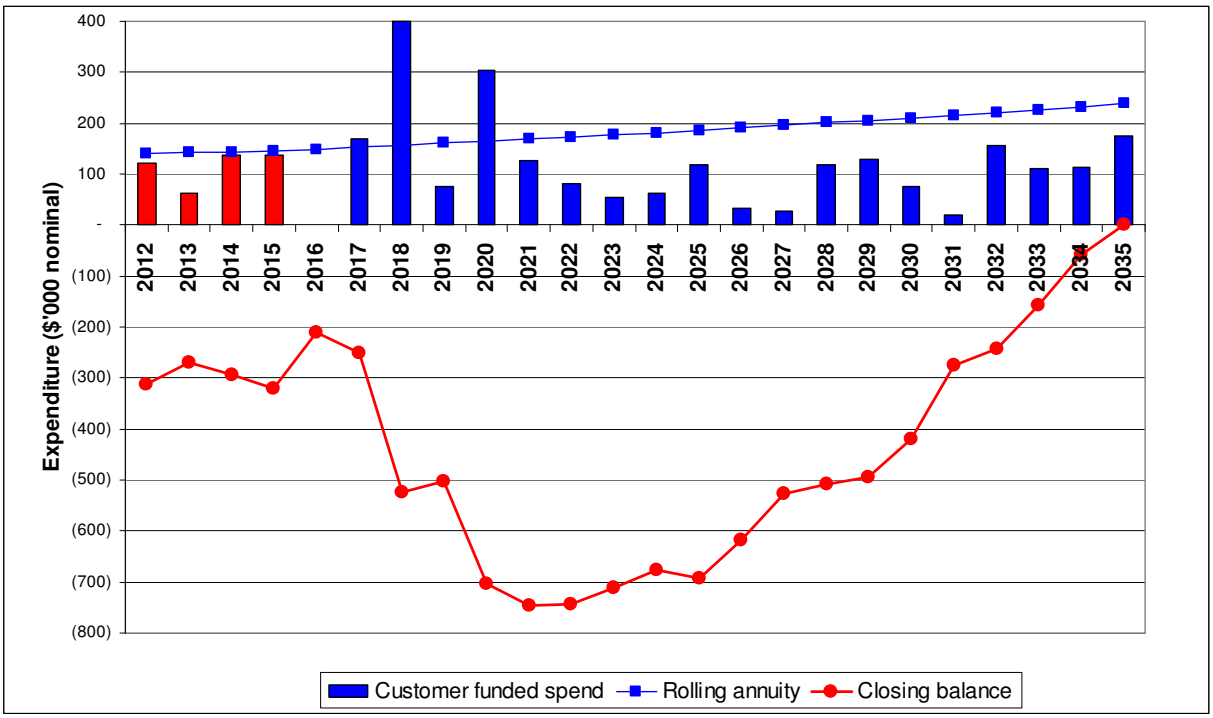
SunWater previously established an Asset Refurbish Annuity for the previous five year period 2006 to 2011 for this scheme. The five year average spend was $88,163.

SunWater has elected to continue with a renewal annuity approach for the five years to 2015/16. The total renewal annuity is $721,000 over this period, averaging $144,000 per year in nominal terms.

The renewals annuity for the period 2012 to 2016 appears significantly higher than for the previous five-year period, largely because significant expenditures in 2018 and 2020 occur earlier in the annuity calculation. Also, the opening balance is -$296,000. A review of a sample of these expenditures has been discussed in **Section 10.3.4**.

Figure 10-4 shows the rolling annuity and the annuity closing balance through time.

[235] SunWater, A Guide to SAP PM Asset Hierarchy Development, 20 January 2009 version 6.5.
[236] SunWater, Users Manual for Assessing Electrical Assets, 27 October 2008, Version 5.2.
[237] Ibid.



Source: SunWater spreadsheet, *Annuity charts – V610 03.xls*

Figure 10-4 Three Moon Creek - Renewals Annuity ($ nominal)

10.3.5 Summary of findings on renewals expenditure

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow sought to undertake a detailed review of a selection of forecast renewals projects. Projects were selected from the period 2012 to 2016, as well as from the period 2017 to 2036.

On the basis of the review undertaken, Halcrow is generally satisfied that the proposed expenditure is prudent and efficient. However, in the absence of more detailed information it has not been possible to make an assessment of prudence for the Refurbishment of Pipework and Cania Dam (LBT/2); or to make an assessment of efficiency for the Replacement of Cables & Cableways at Cania Dam (LBT/4).

Table 10-14 summarises proposed adjustments.

Table 10-14 Three Moon Creek –Proposed Renewals Program Adjustments

Halcrow Review ID	Year/Adjusted Year	SunWater Description	Project Direct Cost ($2011 real)	
			SunWater Proposed ($000)	Halcrow Adjusted ($000)
Cania Dam				
LBT/2	2012 and 25 yearly thereafter Adjustment: prudence of timing should be the subject of further assessment	12TMCXX Refurbish Pipework Int/Ext Paint	33	33
LBT/3	2014 and 5 yearly thereafter	09TMC-Study: 5 Year Dam Safety	15	20
LBT/4	2018	Replace Cables & Cableways	206	#

Note: # - Expenditure considered prudent, but insufficient information to assess efficiency.

11 Summary Observations and Conclusions

11.1 Observations

11.1.1 General

Halcrow has undertaken a review of the prudence and efficiency of SunWater's proposed operating expenditure (excluding indirect and overhead costs) and the renewals and rehabilitation capital expenditure for the five (5) bulk water supply schemes and two (2) irrigation distribution systems that together comprise the Biloela cluster of schemes. An overview of the proposed expenditure was presented in the respective Network Service Plans (NSPs) prepared by SunWater.

The review has involved a desktop review of information provided by SunWater in support of its NSPs; meetings with SunWater staff; site visits to Nogoa Mackenzie Bulk Water Supply Scheme, Emerald Distribution Scheme and the Callide Valley Bulk Water Supply Scheme; meetings with irrigator representatives; and the detailed review of a selection of renewals and rehabilitation projects from each scheme in the Biloela cluster.

While SunWater has sought to provide information in response to the requests made as part of this review process, the information has been insufficiently disaggregated to enable a detailed review of cost information. This has hindered the ability of Halcrow to adequately assess the prudence and efficiency of the proposed expenditure.

In the absence of this information, Halcrow has sought to draw on its experience and expertise in order to make an assessment of the prudence and efficiency of SunWater's expenditure.

11.1.2 Operating expenditure

In general, SunWater's annual operating budgets and the operating expenditure forecasts presented in its NSPs have been developed on the basis of an 'average year'. The exception to this is preventative maintenance expenditure (condition monitoring and servicing), which has been developed using a bottom up approach.

SunWater has explained that the forecasts are based on a four year average, with adjustments to exclude the impact of 'spurious data' and to account for known changes. However, SunWater has not defined the parameters which constitute an 'average year' or maintained records of the adjustments to exclude spurious data. Furthermore, it is noted that SunWater has not always adopted a four year average to forecast expenditure.[238] While there may be strong justification for adopting different approaches, without documentation to substantiate the assumptions adopted, assessment of the prudence and efficiency of the forecast expenditure has been difficult.

[238] For example, in some cases expenditure from 2010 has been used as the basis for forecasting expenditure (eg. electricity use at Theodore).

Halcrow would typically expect to see documentation in place detailing all assumptions used in the development of expenditure forecasts. This information would enable a detailed review of key assumptions used in the development of operating expenditure forecasts, including sensitivity checks of the assumptions adopted by SunWater.

Halcrow has, however, sought to review SunWater's expenditure forecasts with the information that has been made available to this review. On the basis of the review undertaken, Halcrow is generally satisfied that the forecast operating expenditure presented by SunWater in its NSPs for the Biloela schemes is reasonable.

Halcrow notes that SunWater' has recently completed an organisational review to identify savings; the review resulted in the centralisation of services, and reductions to staff numbers. It has noted that the savings from the review have been factored into the NSP. While SunWater has provided extracts of resource plans used to forecast SunWater's labour expenditure, similar information has not been provided for historical expenditure, and savings in direct labour costs at a scheme level are not readily observable in SunWater's expenditure forecasts.

Halcrow has identified a number of areas where there is likely to be scope for SunWater to achieve efficiencies in its proposed operating expenditure. This includes the scope for efficiency via optimisation of the mix of preventative and corrective maintenance by moving towards an RCM approach. The forecast mix of preventative and corrective maintenance varies from 45:55 in the Lower Fitzroy Scheme to 87:13 in the Callide Valley Scheme; it is anticipated that there is opportunity for adjustment in both directions dependant upon the nature and age profile of the assets in each case.

In addition, Halcrow notes that SunWater is seeking to increase its pumping energy efficiency through development and implementation of a portfolio energy management plan. Halcrow understands that these savings have not been incorporated into the forecast expenditures reported in the NSP.

Halcrow has also identified a number of areas where SunWater's expenditure forecasts appear excessive. This includes expenditure on electricity for some of the schemes reviewed, and allowances for Acrolein.

SunWater's forecast labour expenditure for 2012 has been inflated by four percent per annum (in nominal terms) in accordance with its Enterprise Bargaining Agreement (EBA). It has assumed that salaries and wages will rise in line with inflation after 2012. This approach is considered reasonable, and given historical trends, may actually understate actual movement in salaries and wages.

For contractors and materials, SunWater's forecast expenditure assumes inflation of four percent per annum (in nominal terms). Based on the information provided to this review, it is difficult to conclude that an escalation factor greater than CPI (ie. 2.5 percent) should be applied.

11.1.3 Renewals expenditure

As part of this review, Halcrow sought to undertake a review of SunWater's historical renewals expenditure. The aim of the review was to understand the reasons behind any variations in planned and actual renewals and rehabilitation expenditure. This information is useful in informing the assessment of SunWater's forecast renewals program in that it provides an insight into its ability to plan, manage and deliver work programs to time and budget.

SunWater has, however, not been able to provide the list of renewals projects that it intended to deliver during the current price path; consequently, it has not been possible to undertake a detailed assessment of SunWater's historical renewals expenditure.

SunWater's forecast renewals expenditure has been derived in two ways.

For renewals projects scheduled for the next twelve months (ie. 2012), the forecast expenditure is based on planning estimates developed as part of the preparation of planning orders. Once these planning orders have been approved by the Board, they become part of the annual budget.

For renewals projects scheduled for beyond 2012, the forecast expenditure is based on replacement values of the assets. The replacement values for each asset are recorded in the 'bill of materials' within SAP. The replacement value of the assets (as recorded in the 'bill of materials') was last updated in 2008, when an asset revaluation was undertaken.

Renewals projects are programmed on the basis of standard refurbishment and replacement timelines for each class of asset, with actual timing adjusted on the basis of condition and risk.

In order to make an assessment of the prudence and efficiency of SunWater's forecast renewals expenditure, Halcrow sought to undertake a detailed review of a selection of forecast renewals projects. Projects were selected from the period 2012 to 2016, as well as from the period 2017 to 2036.

In reviewing renewals expenditure, Halcrow has based its assessment on direct costs. The review of indirect and overhead costs is subject to separate assessment, and is excluded from the scope of this review. Halcrow would typically expect indirect and overhead costs on renewal and enhancement works to be in the order of 15-20 percent, and it is on this basis that the assessment of efficiency has been undertaken.

On the basis of the review undertaken, Halcrow is generally satisfied that the proposed expenditure is prudent and efficient. However, for a number of projects reviewed, Halcrow has made recommendations to expenditure forecasts which appear excessive' or have not been adequately justified. In some cases, a rescheduling of periodic work is also been recommended.

The following general observations have been made in respect of the forecast renewals expenditure:

- Halcrow understands that SunWater's approach to long term renewals planning is to adopt standard asset lives and servicing (refurbishment) intervals. Halcrow notes that in some cases, planned intervals are less than the nominated standards. Whilst Halcrow acknowledges that the final timing is based on condition and risk assessments, for a number of renewals projects reviewed it was noted that the timing of refurbishment or renewal had been brought forward without the support of a recent condition or risk assessment.
- SunWater does not always include cyclic activities (eg. periodic minor refurbishment of equipment) in its forward forecasts; this will impact on the long term adequacy of the renewals annuity.
- Detailed cost planning has not been undertaken for expenditure items that occur beyond 2012. Halcrow recommends that SunWater undertakes planning for a longer forward horizon to better inform expenditure requirements over the price path.
- Where renewals projects use contractors, SunWater's labour costs appear high.

11.2 Conclusions

11.2.1 Operating expenditure

Notwithstanding the constraints presented by the available information in enabling a detailed assessment of prudence and efficiency, on the basis of the assessment that has been undertaken, Halcrow recommends adjustments to the forecast operating expenditure across the price path period. In general, adjustments have been proposed to reflect:

- the rate of inflation in excess of CPI that has been applied in respect of expenditure on materials and contractors;
- preventative maintenance costs for which adequate justification has not yet been provided by SunWater;
- specific forecasts in respect of Acrolein purchase and electricity costs that have been assessed as being excessive; and
- one case where a minor amount of expenditure has been identified as not being related to the irrigation service.

Table 11-1 presents a summary of the recommended adjustments in respect of each scheme.

Table 11-1 Proposed Adjustments to Operating Expenditure (2012 – 2016)

Scheme/System Direct Operating Costs ($ 000 2011 real)	Financial Year				
	2012	2013	2014	2015	2016
Nogoa Mackenzie Bulk WSS					
SunWater Proposed	1006	1021	1023	1026	1028
Total Reduction	-7	-10	-12	-15	-17
Halcrow Recommended	**999**	**1011**	**1011**	**1011**	**1011**
Emerald Distribution System					
SunWater Proposed	1094	1107	1113	1120	1127
Total Reduction	-166	-172	-178	-90	-97
Halcrow Recommended	**928**	**935**	**935**	**1030**	**1030**
Lower Fitzroy Bulk WSS					
SunWater Proposed	120	121	121	122	123
Total Reduction	-5	-5	-5	-6	-7
Halcrow Recommended	**115**	**116**	**116**	**116**	**116**
Dawson Valley Bulk WSS					
SunWater Proposed	413	418	419	419	420
Total Reduction	-11	-12	-13	-13	-14
Halcrow Recommended	**402**	**406**	**406**	**406**	**406**
Theodore Distribution System					
SunWater Proposed	665	673	675	677	678
Total Reduction	-57	-59	-61	-63	-64
Halcrow Recommended	**608**	**614**	**614**	**614**	**614**
Callide Valley Bulk WSS					
SunWater Proposed	445	449	450	450	450
Total Reduction	-29	-30	-31	-31	-31
Halcrow Recommended	**416**	**419**	**419**	**419**	**419**
Three Moon Creek Bulk WSS					
SunWater Proposed	156	159	159	159	159
Total Reduction	-7	-8	-8	-8	-8
Halcrow Recommended	**149**	**151**	**151**	**151**	**151**

11.2.2 Renewals expenditure

Notwithstanding the constraints presented by the available information in enabling a detailed assessment of prudence and efficiency, on the basis of the assessment that has been undertaken, Halcrow recommends adjustments to the forecast renewals and rehabilitation expenditure across the 25 year forecast period. In general, adjustments have been proposed to reflect:

- reductions where the expenditure forecasts appear excessive;
- removal of the forecast expenditure where the proposed work has not been adequately justified;
- rescheduling of periodic work; and
- identification of specific projects where it has not been possible to make an informed assessment of efficiency.

It should be noted that that extrapolation of the proposed adjustments across the whole of the Renewals and Rehabilitation program is not considered appropriate. It is also noted that the proposed adjustments will impact on calculation of the proposed annuity, particularly where forecast expenditure is either considered not to be prudent, is reduced or deferred.

Details of the recommended adjustments for each scheme are reflected in the respective sections of this report (**Section 4** to **Section 10**)

Appendix A Benchmarking

A Benchmarking

While it is noted that the effectiveness of benchmarking is often limited by the identification of suitable comparators, and the availability of sufficiently detailed and consistent data in the public domain, it is a tool which can be used to provide insight into the relative performance of an organisation.

Halcrow has undertaken a high level benchmarking analysis to compare SunWater's financial performance against a selection of comparator rural water service providers.

Identifying suitable comparators for the purposes of this review has been challenging due to the varying operating environments, regulatory approaches, history, geographies and climates, and water resource management issues in each jurisdiction. The benchmarking analysis has compared SunWater to State Water in NSW and Goulburn Murray Water and Southern Rural Water in Victoria.

The high-level benchmarking analysis has drawn upon the National Water Commission's *Performance Report for Rural Water Service Providers for 2008/09*. It is noted that the data provided by the rural water service providers is currently unaudited. Consequently, it is possible that costs have been treated differently by the different agencies. It for this reason that the benchmarking has been used for indicative purposes only, rather than in the assessment of efficiency.

Furthermore, only one year of data (2008/09) has been reviewed. Consequently, trends in expenditure cannot be observed.

Benchmarking was undertaken on the following three Performance Report categories, to align with water supply services offered by SunWater:

- Aggregated Data at Service Provider Level;
- Regulated River Supply Service; and
- Gravity Irrigation.

Surface water drainage diversion data has not been reported by SunWater and was not able to be compared to other service providers.

The results of the review are included below. All data presented is for 2008-2009.

A.1 Aggregated Data at Service Provider Level

A.1.1 Operation and maintenance expenditure as percentage of current asset replacement cost

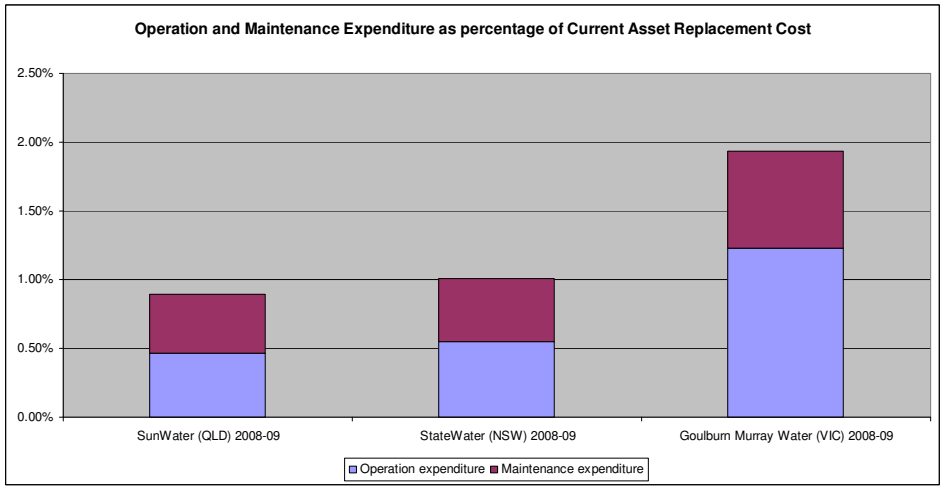


Figure A-1 Provider Operation and Maintenance Expenditure as Percentage of Current Asset Replacement Cost

SunWater's operation and maintenance expenditure as percentage of current asset replacement cost is similar to State Water (NSW) and equal to approximately half of Goulbourn Murray Water (VIC).

A.1.2 Asset Replacement Cost per carrier km

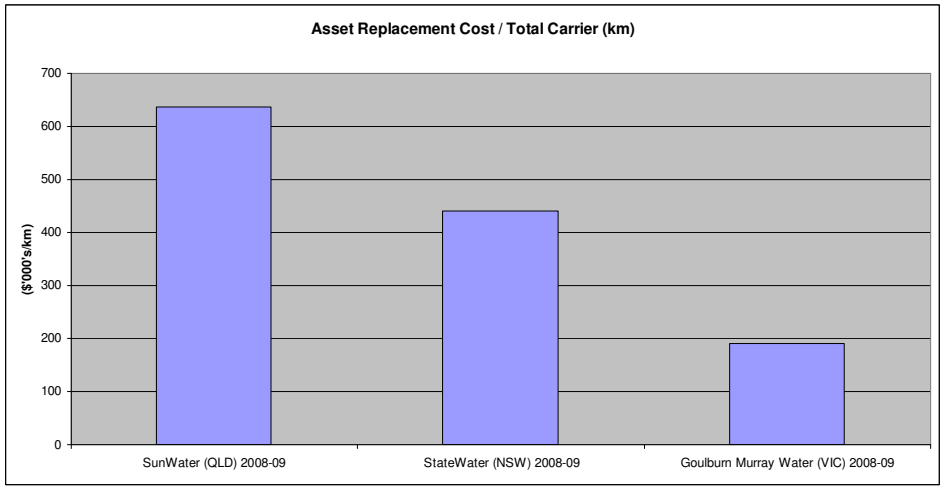


Figure A-2 Provider Asset Replacement Cost per Total Carrier km

SunWater has the highest asset cost per kilometre of network compared to State Water (NSW) and Goulbourn Murray Water (VIC).

A.1.3 Combined operation expenditure and maintenance expenditure per total carrier km

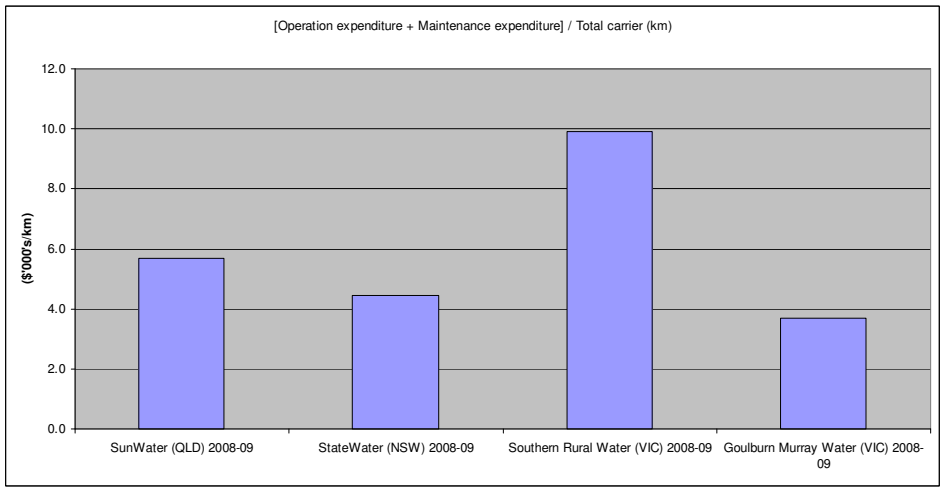


Figure A-3 Provider Operation Expenditure and Maintenance Expenditure per Total Carrier km

SunWater's expenditure is equal to approximately $5,700 per kilometre. This is approximately 28 percent greater than State Water and 53 percent more than Goulburn Murray Water. However, it is approximately 57 percent of Southern Rural Water.

A.2 Regulated River Benchmarking

A.2.1 *Operation and maintenance expenditure as percentage of current asset replacement cost for available regulated river schemes*

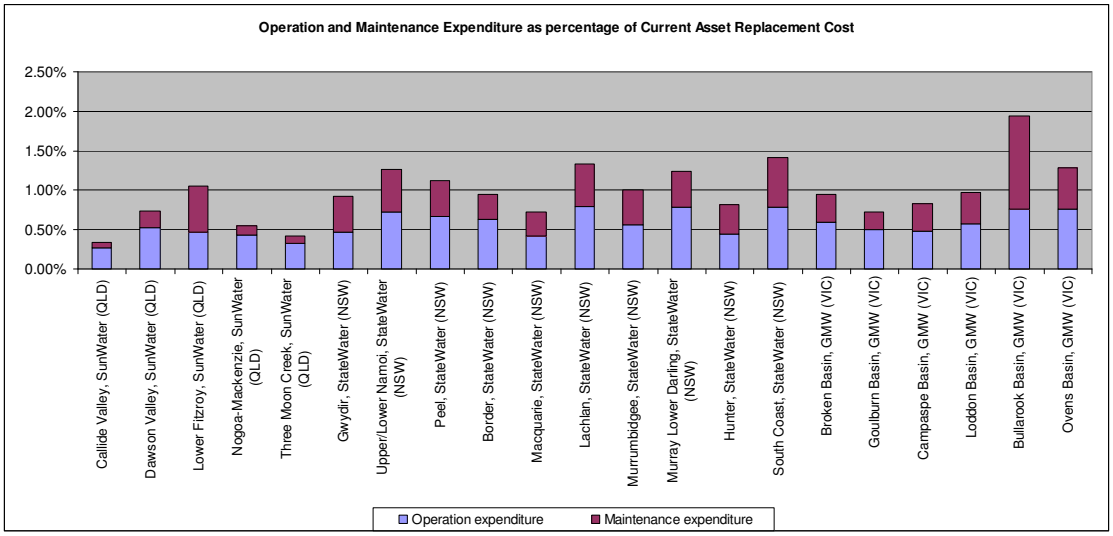


Figure A-4 Regulated River Operation and Maintenance Expenditure as Percentage of Current Asset Replacement Cost

The following is observed:

- Callide Valley has the lowest O&M expenditure as percentage of current asset replacement cost of the 21 regulated river schemes across three States.
- Lower Fitzroy has the highest O&M expenditure as percentage of current asset replacement of the Biloela bulk water supply schemes.
- In general, SunWater's Biloela bulk water supply schemes have a lower O&M expenditure as percentage of current asset replacement cost.

A.2.2 Operation and maintenance expenditure divided by long term annual supply expectation (ML)

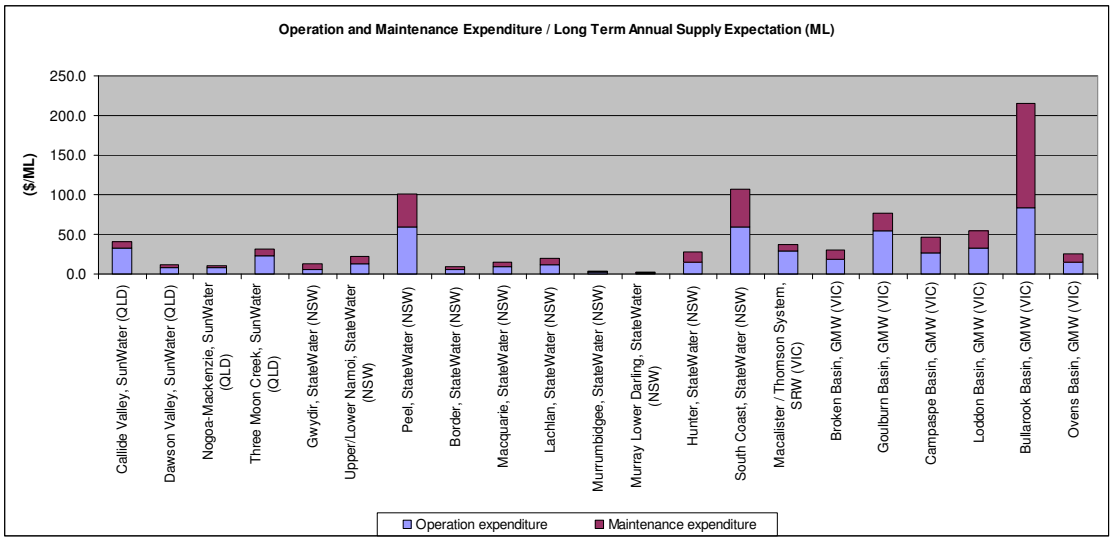


Figure A-5 Operation and Maintenance Expenditure divided by Long Term Annual Supply Expectation (ML)

The following is observed:

- In general, the proportion of O&M expenditure per long term expected ML for SunWater Biloela schemes is similar to State Water (NSW) schemes (excluding Peel), and significantly lower than Victorian schemes.
- Callide Valley and Three Moon Creek have the largest O&M expenditure per long term expected ML of the Biloela schemes.

A.3 Gravity Irrigation Benchmarking

A.3.1 Gravity Irrigation Operation and Maintenance Expenditure as Percentage of Current Asset Replacement Cost

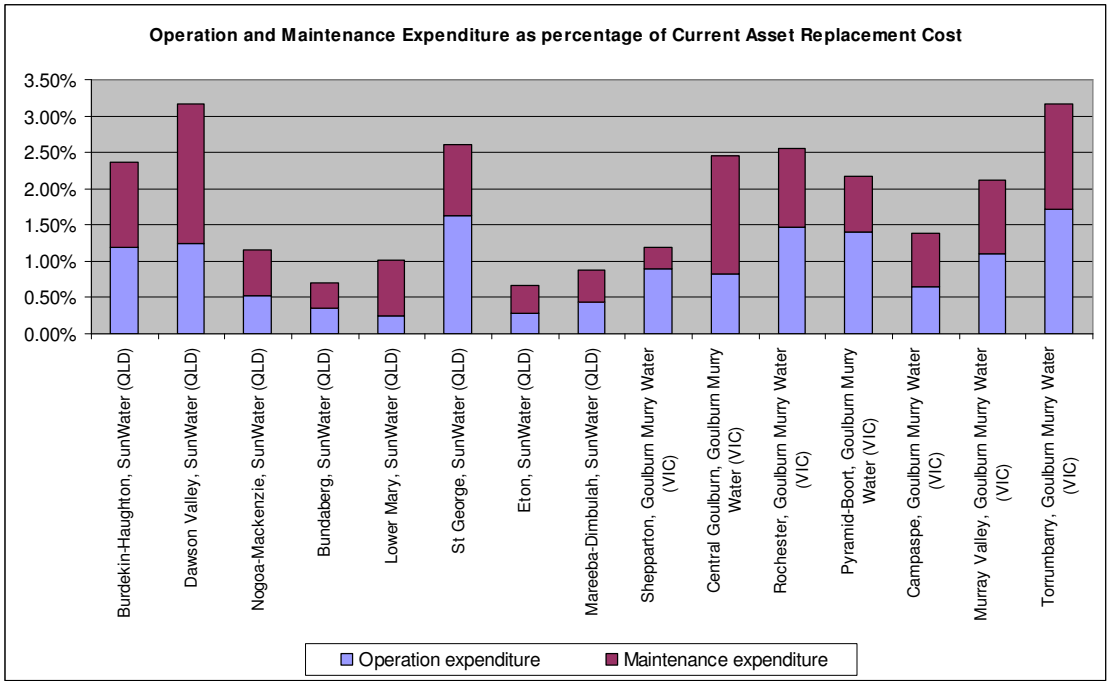


Figure A-6 Gravity Irrigation Operation and Maintenance Expenditure as Percentage of Current Asset Replacement Cost

The following observations are made:

- The Theodore distribution scheme within Dawson Valley has the highest O&M expenditure as percentage of current asset replacement cost of the 15 gravity irrigation schemes with available data.
- The Emerald distribution scheme within Nogoa-Mackenzie has lower than average O&M expenditure as percentage of current asset replacement cost.

A.3.2 Operation and maintenance expenditure divided by long term annual supply expectation (ML)

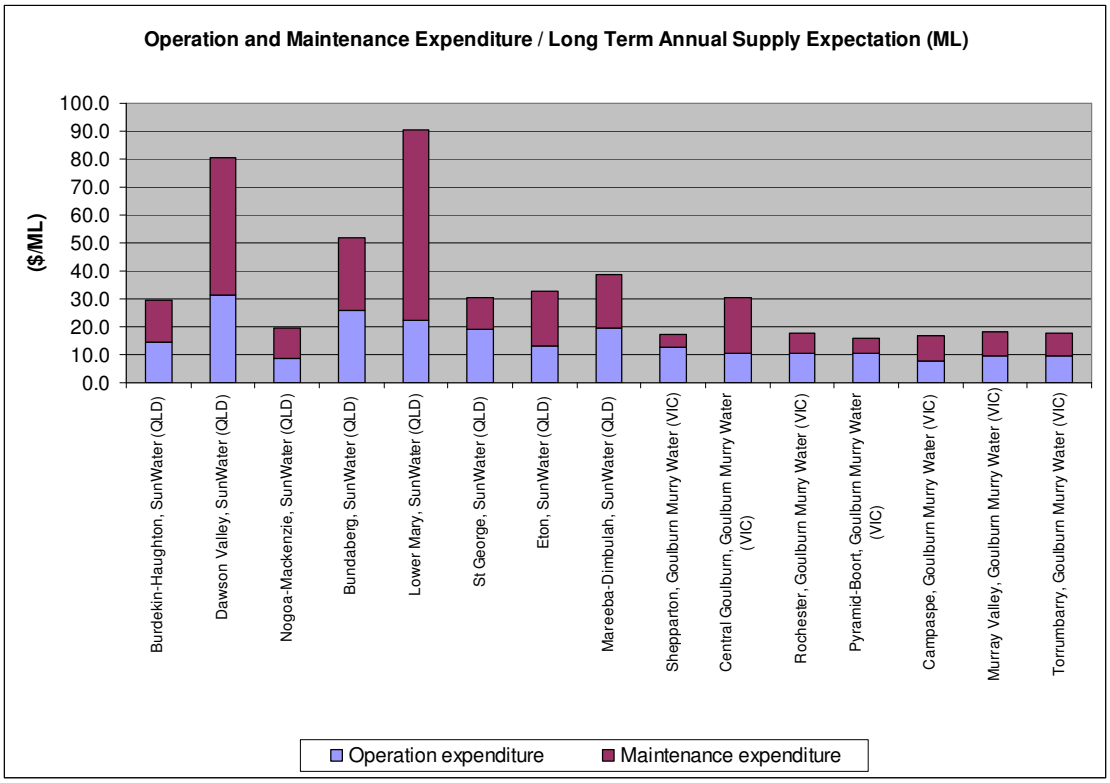


Figure A-7 Gravity Irrigation Operation and Maintenance Expenditure/Long Term Annual Supply Expectation (ML)

The following observations are made:

- The Theodore distribution in Dawson Valley has the second highest proportion of O&M expenditure to long term annual supply expectation of the 15 distribution schemes reviewed. The highest, Lower Mary, is also a SunWater scheme.
- In general, SunWater gravity irrigation schemes have a higher proportion of O&M expenditure to long term annual supply expectation (ML) Goulbourn Murray Water Schemes.

A.3.3 Asset replacement cost per total carrier km

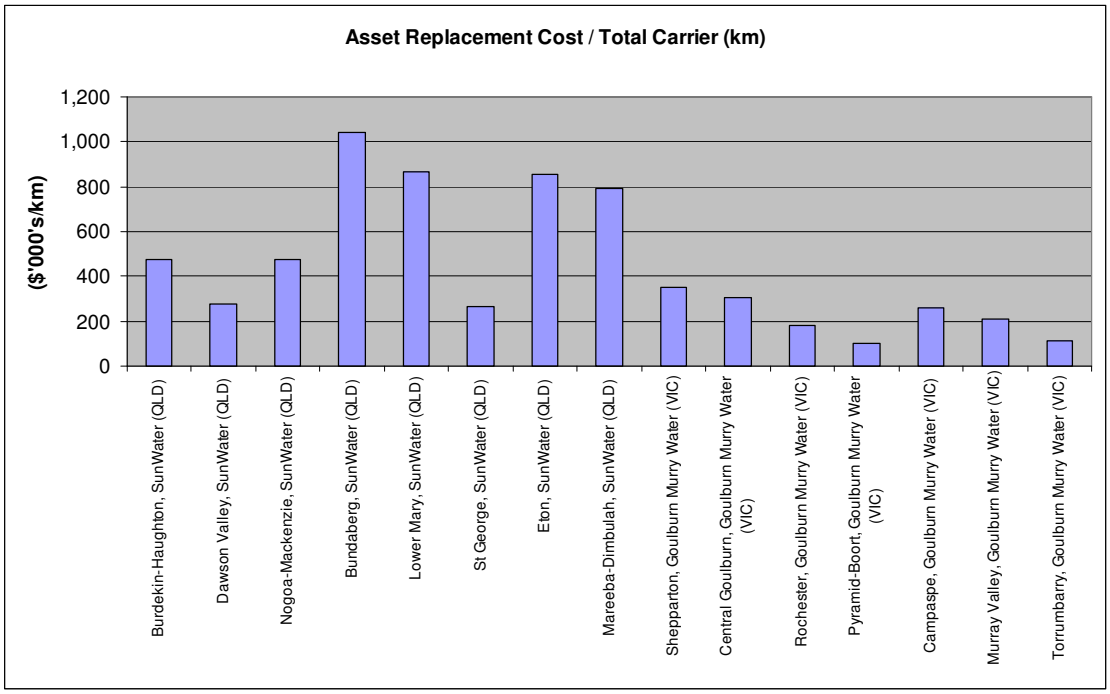


Figure A-8 Gravity Irrigation Asset Replacement Cost Per Total Carrier km

The following observations are made:

- Emerald (Nogoa Mackenzie) and Theodore (Dawson) distribution systems have lower asset replacement costs per total carrier kilometre than other SunWater gravity irrigation schemes apart from St George.
- In general, SunWater gravity irrigation schemes have higher asset replacement cost per total carrier km than Goulbourn Murray Water Schemes.

A.3.4 Combined operation and maintenance expenditure per total carrier km

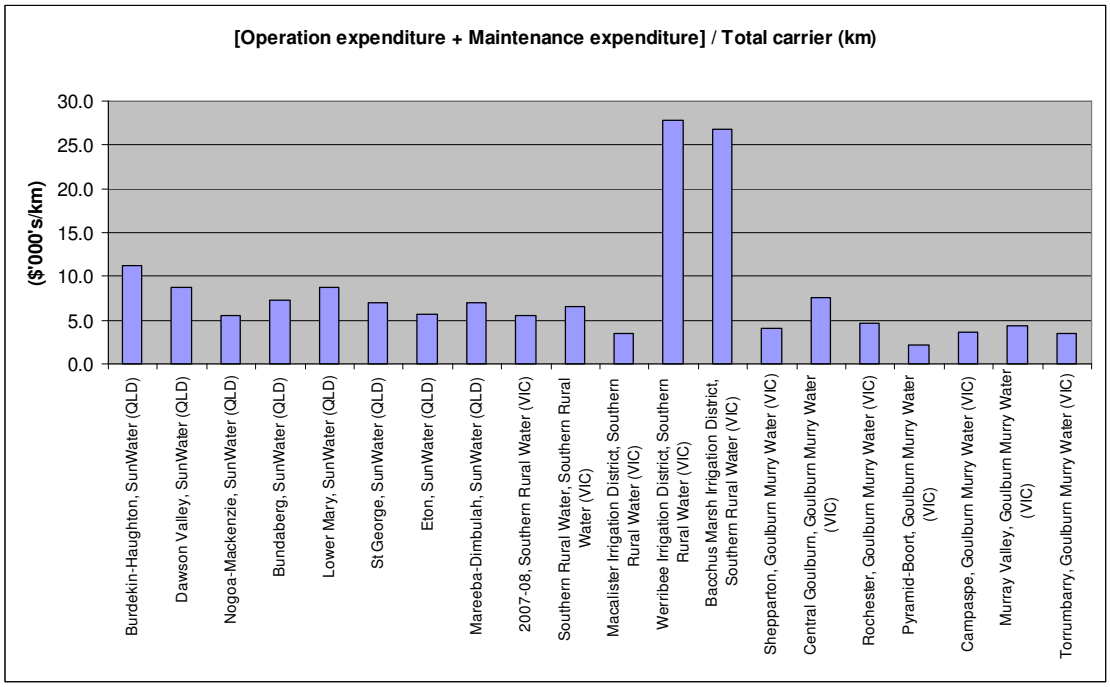


Figure A-9 Gravity Irrigation Operation Expenditure and Maintenance Expenditure per Total Carrier km

The following observations are made:

- In general, SunWater gravity irrigation schemes have higher O&M expenditure per total carrier km than Southern Rural Water (VIC) and Goulbourn Murray Water (VIC) gravity irrigation schemes apart from Werribee (VIC) and Bacchus Marsh (VIC) schemes.
- Dawson Valley has one of the highest O&M expenditure per total carrier km of the 20 schemes reviewed

Appendix B Operating Expenditure and Water Usage

B Operating Expenditure and Water Usage

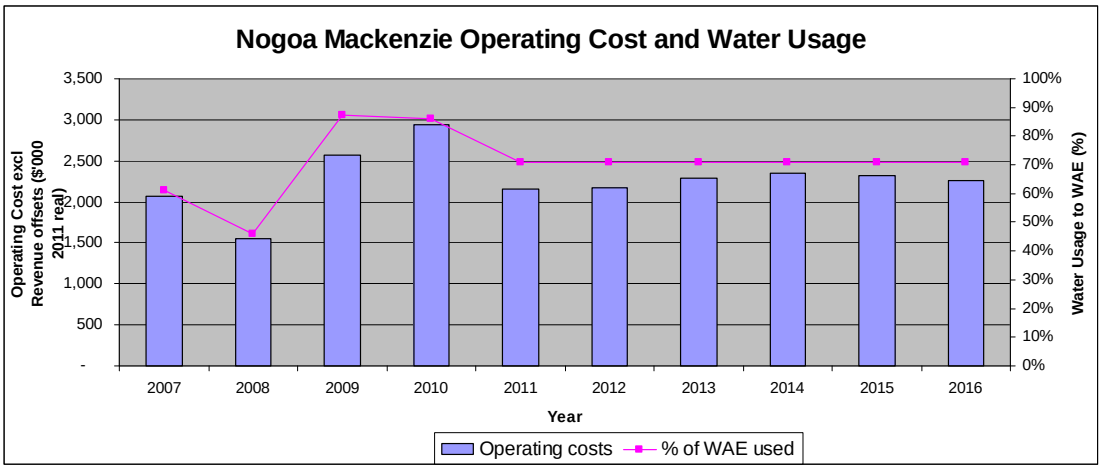
SunWater has stated in each of its NSPs for the Biloela schemes that "*all costs are fixed, regardless of the volume taken.*" While Halcrow accepts that some operating costs will remain fixed irrespective of water usage within a scheme, it is likely that some elements of operating expenditure will vary in accordance with usage.

Halcrow notes that during periods of low usage, scheme management costs will be lower than during periods of high usage (ie. full allocation). During interviews with SunWater, it noted that during periods of lower allocation operations staff focus on delivering maintenance activities. In this way, it noted that its labour costs tend to be fixed, irrespective of water use.

For the purposes of assessing the impact of water use on operating expenditure, Halcrow has graphed operating expenditure against water usage (measured as the percentage of WAE used). Labour expenditure against water usage has also been graphed. The results of the analysis, for each of the Biloela schemes, are included in the following figures.

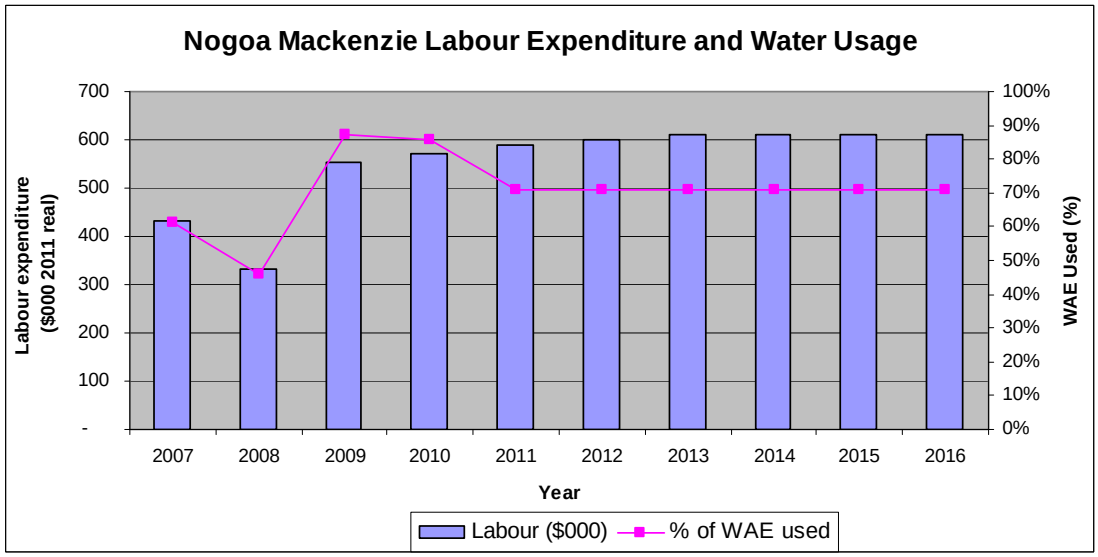
Although the rates of change are not consistent from year to year, the analysis clearly indicates that there is a link between operating costs and scheme water usage, and labour expenditure and water usage.

B.2 Nogoa Mackenzie Bulk WSS



Source: Historical usage data from SunWater spreadsheet: *Usage Analysis – Nogoa Mackenzie V2.xls*.. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

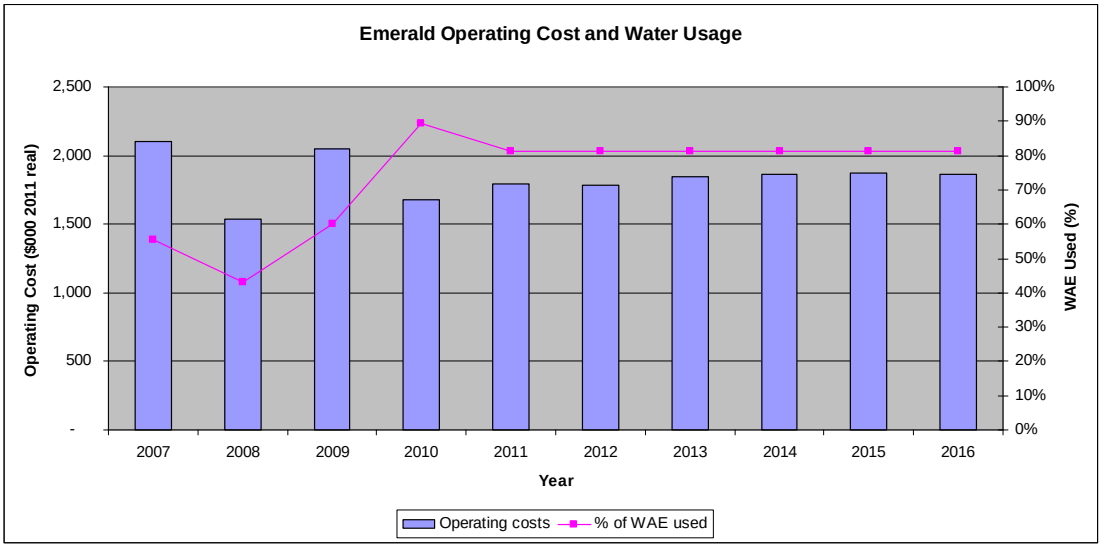
Figure B-1 Operating Cost and Water Usage for Nogoa Mackenzie Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Nogoa Mackenzie V2.xls.. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

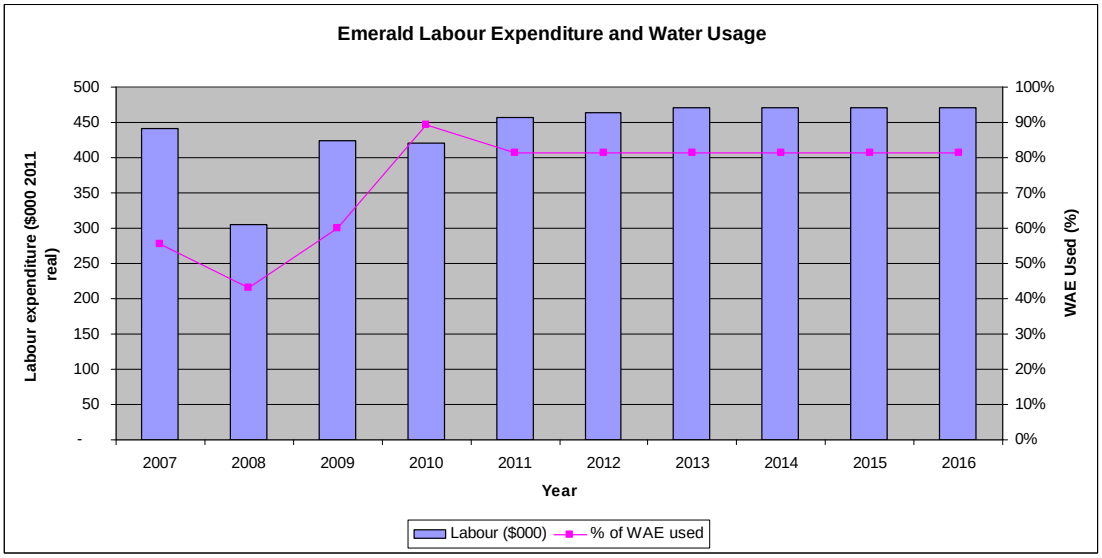
Figure B-2 Labour Expenditure and Water Usage for Nogoa Mackenzie Bulk WSS

B.3 Emerald Distribution Scheme



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Nogoa Mackenzie V2.xls.. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

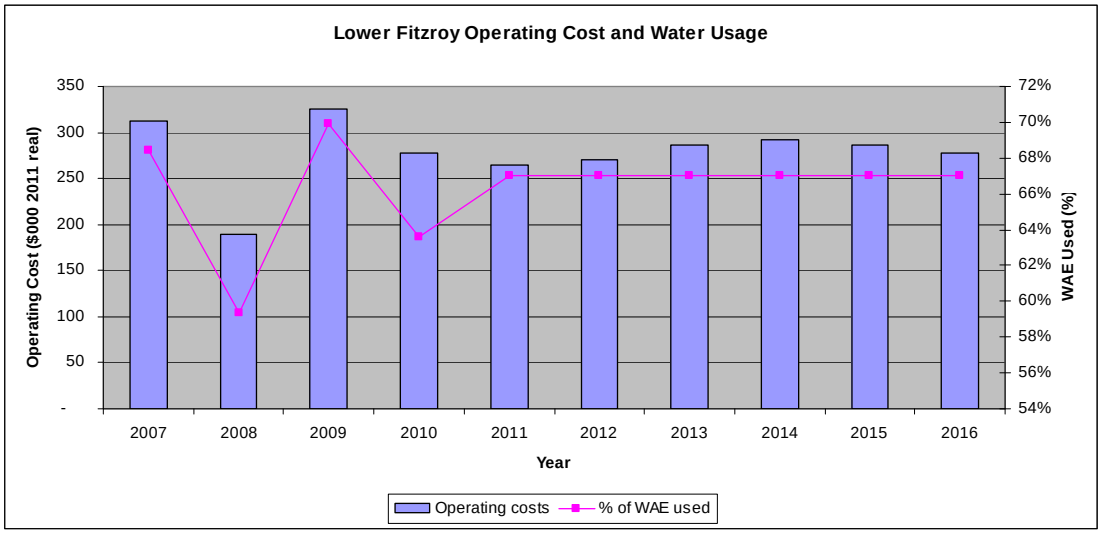
Figure B-3 Operating Cost and Water Usage for Emerald Distribution Scheme



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Nogoa Mackenzie V2.xls.. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

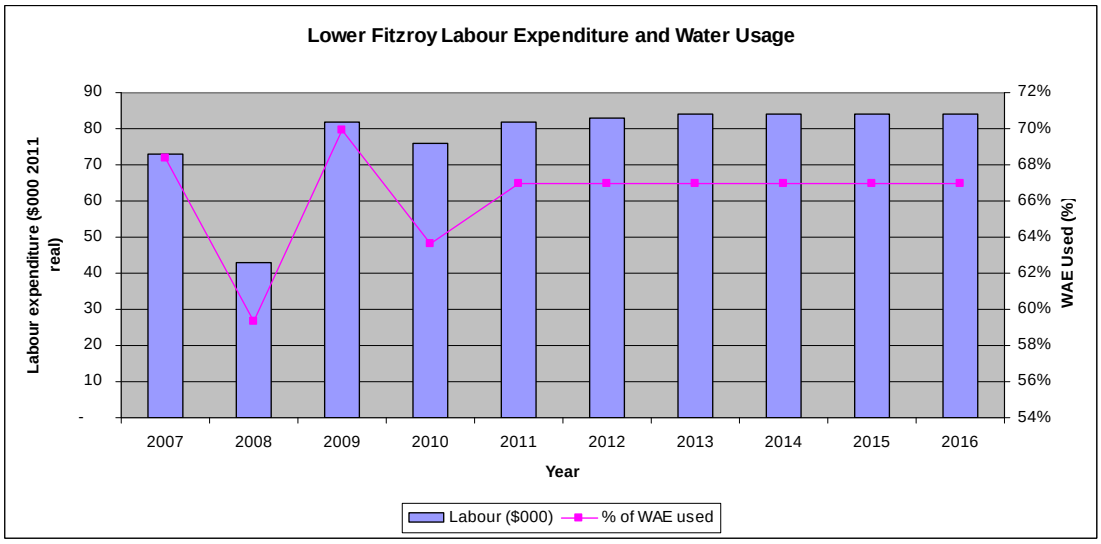
Figure B-4 Labour Expenditure and Water Usage for Emerald Distribution Scheme

B.4 Lower Fitzroy Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Lower Fitzroy V2.xls.. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

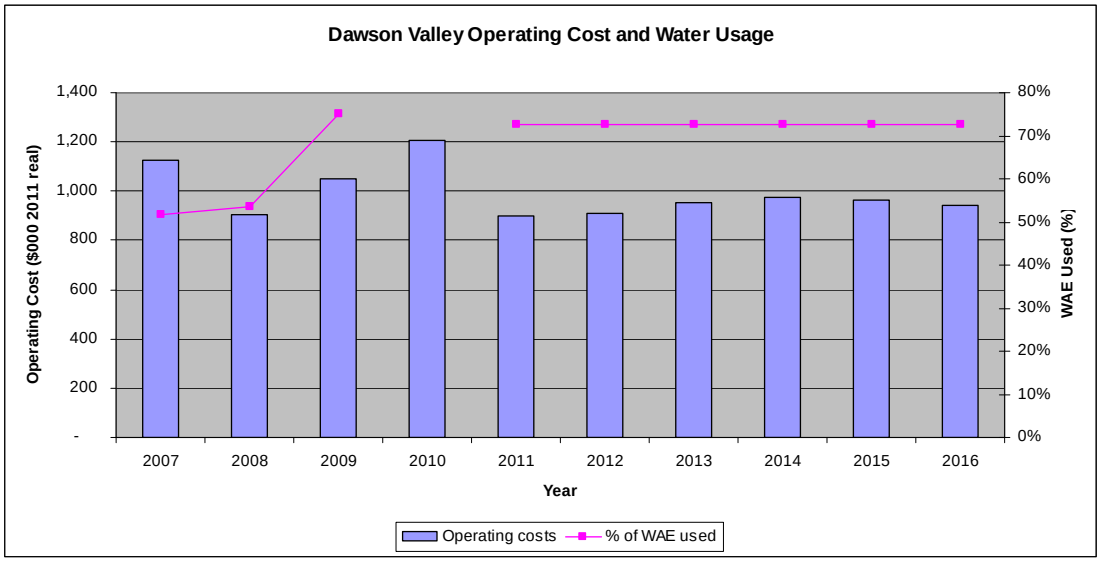
Figure B-5 Operating Cost and Water Usage for Lower Fitzroy Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Lower Fitzroy V2.xls.. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

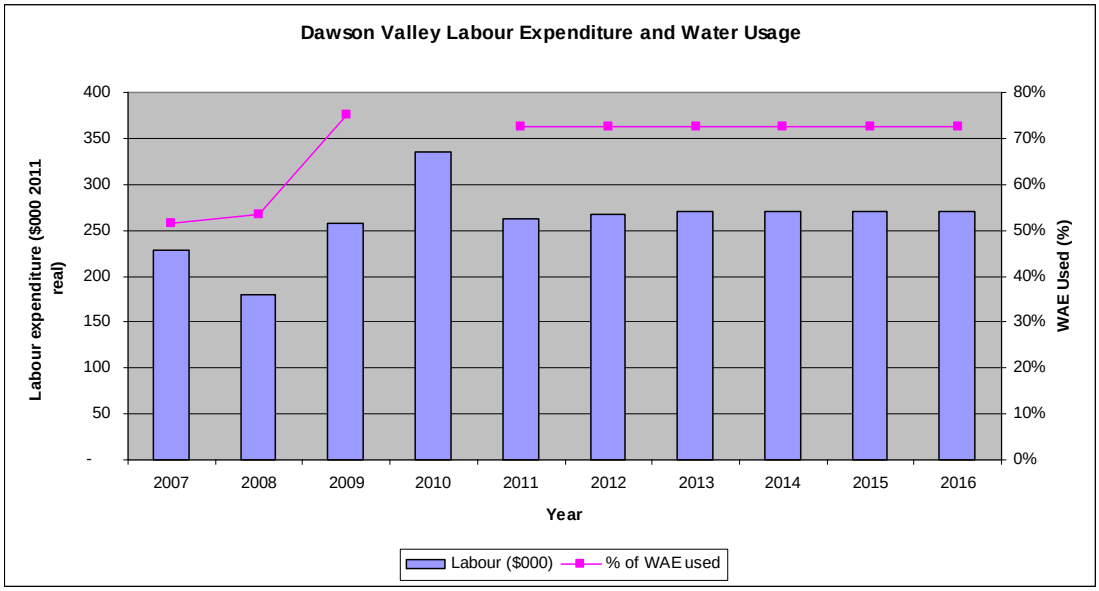
Figure B-6 Labour Expenditure and Water Usage for Lower Fitzroy Bulk WSS

B.5 Dawson Valley Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis - Dawson V2.xls. 2010 usage not provided. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

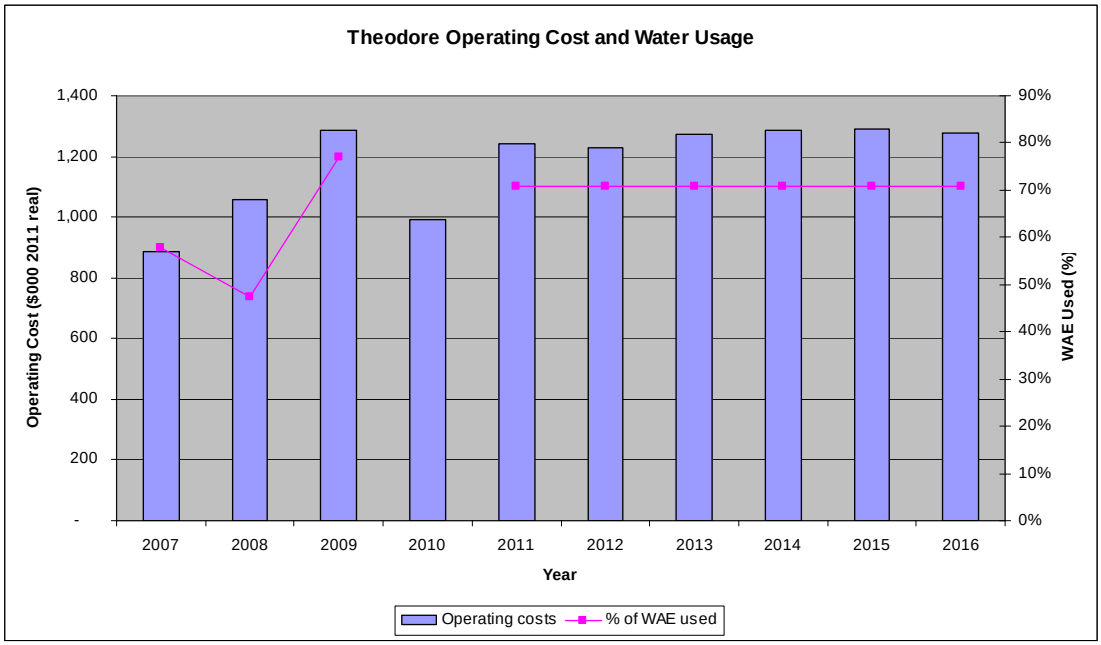
Figure B-7 Operating Cost and Water Usage for Dawson Valley Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis - Dawson V2.xls. 2010 usage not provided. Forecast usage data and labour expenditure data from SunWater's NSP for the scheme.

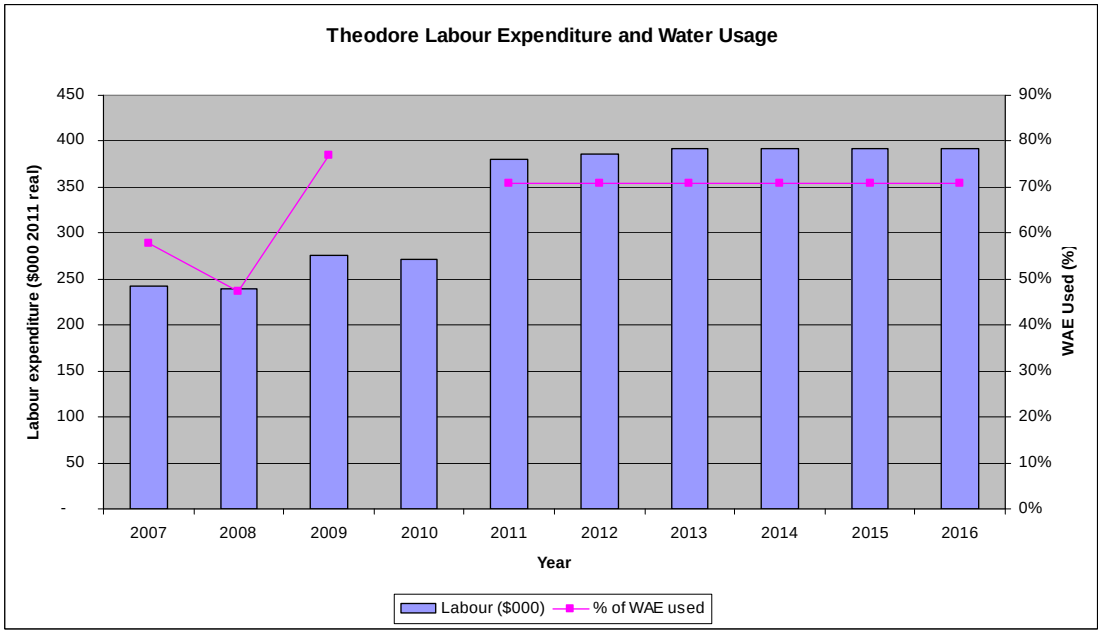
Figure B-8 Labour Expenditure and Water Usage for Dawson Valley Bulk WSS

B.6 Theodore Distribution Scheme



Source: Historical usage data from SunWater spreadsheet: Usage Analysis - Dawson V2.xls. 2010 usage not provided. Forecast usage data and labour expenditure data from SunWater's NSP for the scheme.

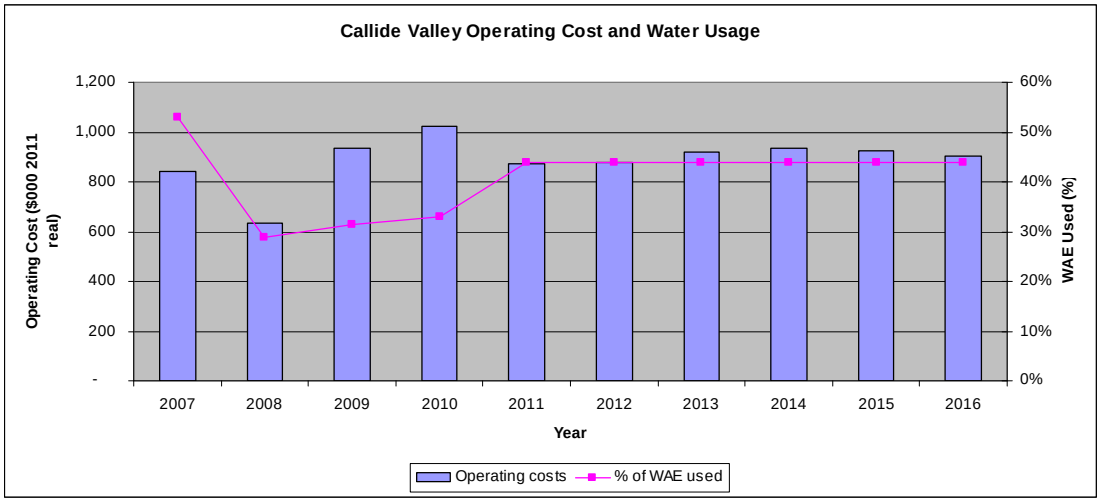
Figure B-9 Operating Cost and Water Usage for Theodore Distribution Scheme



Source: Historical usage data from SunWater spreadsheet: Usage Analysis - Dawson V2.xls. 2010 usage not provided. Forecast usage data and labour expenditure data from SunWater's NSP for the scheme.

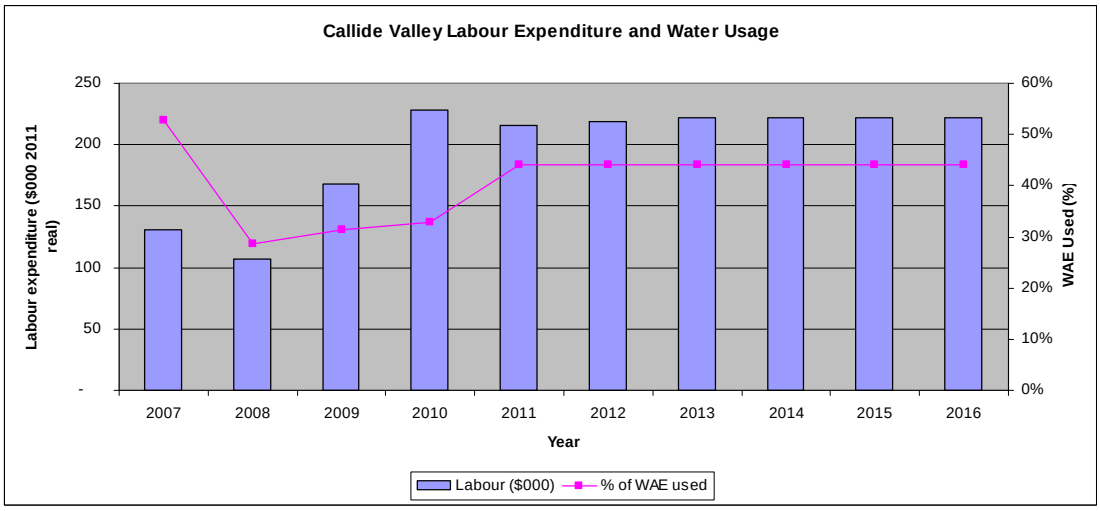
Figure B-10 Labour Expenditure and Water Usage for Theodore Distribution Scheme

B.7 Callide Valley Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Callide Valley V2.xls. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

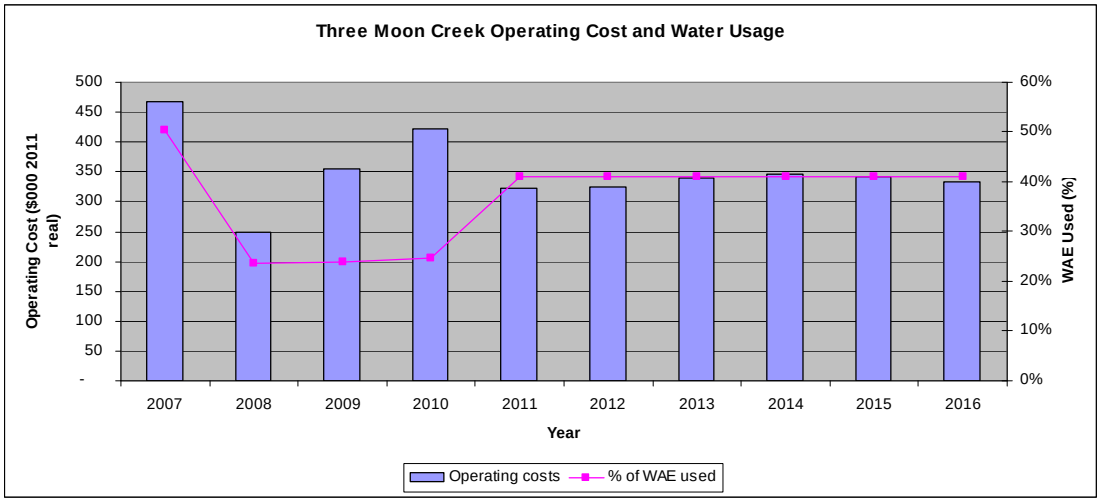
Figure B-11 Operating Cost and Water Usage for Callide Valley Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Callide Valley V2.xls.. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

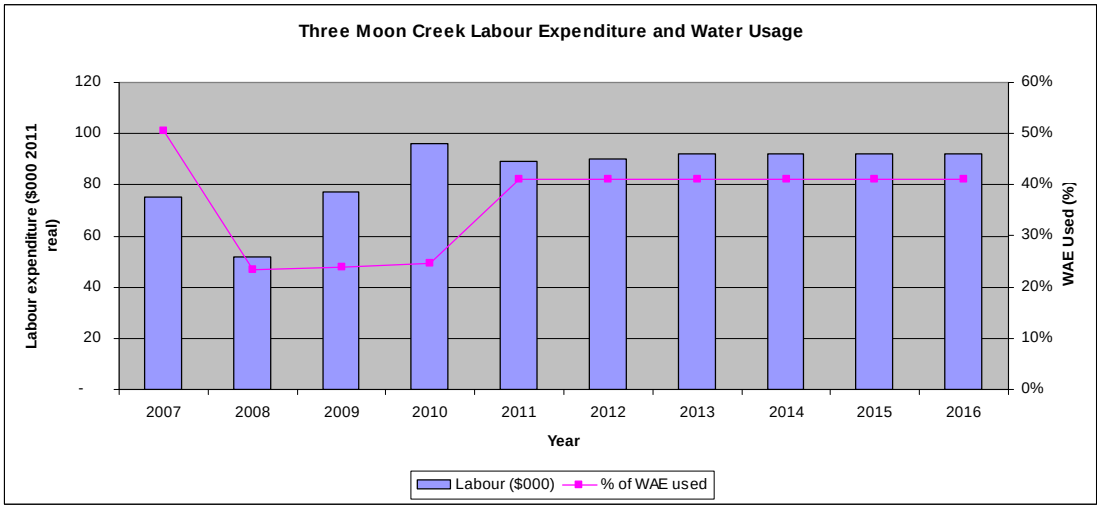
Figure B-12 Labour Expenditure and Water Usage for Callide Valley Bulk WSS

B.8 Three Moon Creek Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Three Moon Creek V2.xls. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

Figure B-13 Operating Cost and Water Usage for Three Moon Creek Bulk WSS



Source: Historical usage data from SunWater spreadsheet: Usage Analysis – Three Moon Creek V2.xls. Forecast usage data and operating cost data from SunWater's NSP for the scheme.

Figure B-14 Labour Expenditure and Water Usage for Three Moon Creek Bulk WSS