



# **Irrigation Infrastructure Renewal Projections - 2013/14 to 2046/47**

## Report on Methodology

April 2012

**© Queensland Bulk Water Authority 2012**

This document is and shall remain the property of Queensland Bulk Water Authority. The document may only be used for the purposes for which it was prepared. Unauthorised use of this document in any form whatsoever is prohibited.

**Document Status**

Version	Date	Author	Reviewed	PCG Approval
1	20/4/12	GH	MD	
2				

# Contents

1.	Introduction	1
2.	Scope	2
	2.1 Infrastructure	2
	2.2 Renewal Work	2
	2.3 Exclusions from Renewals Annuity	3
3.	Background	4
	3.1 Seqwater	4
	3.2 Historical Renewal Expenditure	4
	3.3 Current Asset Management Practices	4
	3.4 Proposed Future Asset Management Improvements	8
4.	Asset Information	9
	4.1 Irrigation Infrastructure	9
	4.2 Relevant Asset Information	9
5.	Approach	12
	5.1 General	12
	5.2 Development of Renewal Projections	12
6.	Useful Asset Lives	15
7.	Asset Refurbishment Frequency	16
8.	Detailed Assessment	17
9.	Cost Estimation	18

## Table Index

Table 1	Identification of Asset Renewal Needs	5
Table 2	Summary of Irrigation Infrastructure	10

## Appendices

- A Overview of Seqwater's Asset Management Framework
- B Asset Criticality and Condition Assessment Criteria and Rating System

## Irrigation Infrastructure Renewal Projections - 2013/14 to 2046/47

---

- C Standard Useful Asset Lives
- D Standard Asset Refurbishment Frequencies
- E Cost Escalation Indices

# 1. Introduction

Seqwater owns and operates the following seven irrigation schemes:

- ▶ Central Lockyer WSS;
- ▶ Lower Lockyer WSS;
- ▶ Logan River WSS;
- ▶ Mary River WSS;
- ▶ Cedar Pocket WSS;
- ▶ Warrill Valley WSS; and
- ▶ Central-Brisbane WSS.

Seqwater also owns and operates a distribution system, the Morton Vale Pipeline.

There are nine tariff groups associated with these schemes.

To assist with the determination of price paths, a forecast of future renewal expenditure is required at the individual tariff group level.

The renewal projections have been developed and documented in separate reports, one for each tariff group.

This report outlines the scope of works, and the methodology used, for the development of the renewal projections. The methodology is consistent for each tariff group.

## 2. Scope

### 2.1 Infrastructure

The renewal projections cover Seqwater's water supply infrastructure that is fully, or partially, used for the supply of irrigation water. (A list of such is provided in Section 4) Therefore the following types of infrastructure related to the irrigation schemes have been excluded from the forecasts:

- ▶ Water supply and waste water treatment plants servicing nearby communities and recreational areas; and
- ▶ Infrastructure which sole purpose is to mitigate the impact of droughts or supply non-irrigation water (refer Section 4.1).

Although irrigation customers are required to contribute towards the renewal of recreation assets associated with the irrigation schemes, such assets have been excluded from these projections as the associated renewal costs are relatively small and more difficult to reliably forecast.

### 2.2 Renewal Work

For the purposes of developing the renewal projections, Seqwater has defined 'renewals' as work required to maintain the service capacity of an asset in perpetuity, and ensure the asset meets relevant compliance requirements.

The renewal projections comprise the following types of works forecasted as being required between 2013/14 and 2046/47 financial years:

- ▶ Replacement of assets;
- ▶ Refurbishment of assets;
- ▶ OPEX work that are both infrequent (eg greater than 10 year frequency) and of high value (>\$10k); and
- ▶ Upgrade or modification to assets, only when required for compliance purposes.

Renewals exclude:

- ▶ Augmentations;
- ▶ Maintenance that is managed through Seqwater's maintenance system (CIS), or which has been budgeted as an operating cost (eg meter repairs, repairs to channel infrastructure etc); and
- ▶ Dam safety inspections.

Although it is assumed that a 20-year rolling annuity will apply (as per the Queensland Competition Authority's (QCA) draft decision for SunWater), data over a 30-year rolling period has been gathered so that the annuity can be assessed over both periods. Accordingly, Seqwater has forecast renewals that are expected to be required between 2013/14 and 2046/47. For clarity, although the following items are included in the above definition of renewals, Seqwater has not sought to include them in its renewal forecasts:

- ▶ Renewals associated with damage associated with the January 2011 floods, as it is expected that Seqwater's insurance cover will fund such renewals;
- ▶ Minor renewals projects of estimated value less than \$10,000, although such small projects, if and when they occur, will be accounted for in the future as renewals expenditure where they meet the above definition;
- ▶ Uncertain or unforeseen work, and contingencies for such, that may be required as a result of:
  - Potential future changes to legislation and imposition of other requirements on Seqwater;
  - Future flood or other events causing damage to assets; and
  - Unforeseen asset failures.

The costs arising from such events, if they occur, will be accounted for as renewals expenditure where they meet the above definition.

### **2.3 Exclusions from Renewals Annuity**

In accordance with the Direction Notice of the QCA, capital expenditure (renewals) for the following types of projects have been excluded from the renewals annuity:

- ▶ Dam safety upgrades to comply with the instructions of the Dam Regulator; and
- ▶ Water meter upgrades to comply with the national metering standards (as part of the National Water Initiative).

Where Seqwater is entitled to receive funds for a portion of the cost of a renewal project, that portion has also been excluded from the renewals annuity. The most common example of such a situation is where a Seqwater fence is on the boundary with another land-owner's property, in which the land-owner is required to contribute towards the cost of renewal of the fence. For such situations, the cost the land-owner is required to contribute towards the renewal of the fence has not been included in the annuity.

Where infrastructure has a primary function other than, but in addition to, irrigation water supply (eg Wivenhoe Dam), the full renewals projection has been reported in the expectation that the regulator will provide guidance on the apportionment of costs.

## **3. Background**

### **3.1 Seqwater**

The Queensland Bulk Water Supply Authority (trading as Seqwater) was established by the Queensland Government in November 2007 to own, manage and operate bulk supply and water treatment assets throughout South East Queensland (SEQ).

In July 2008, Seqwater took over ownership and responsibility for bulk water infrastructure in SEQ from several water service authorities and local government councils. This included irrigation infrastructure from Sunwater.

### **3.2 Historical Renewal Expenditure**

Renewal expenditure since 2008 has generally been limited to a collection of works identified by the previous asset owners as critical to maintain ongoing supply, and reinstatement of assets damaged by the 2011 floods. Seqwater postponed initiation of a broader capital investment program to allow information collection, review of the project justification and prioritisation across the asset base. Therefore a backlog of overdue renewal work is sometimes included in the first years of these renewal projections.

### **3.3 Current Asset Management Practices**

#### **3.3.1 Asset Management Framework**

Seqwater commenced development of an Asset Management Framework concept in 2010/11 to facilitate improved integration, planning and management of natural and built assets. The framework also seeks to better leverage investment in Research, Science and Technology to pursue the most efficient ways to treat bulk water supplies across source, store and supply multi-barriers, as well as ensure continued bulk water supply reliability and long term security.

This framework is a work in progress, with key elements being developed, trialled and documented before formal adoption.

An overview of the framework is provided in Appendix A.

### 3.3.2 Asset Information and Management Systems

Leading up to the taking over of ownership and responsibility for bulk water infrastructure in SEQ, Seqwater implemented an Asset Migration project. The project aimed to migrate, into its then asset management system called HardCat, asset data from the organisations that had previously been responsible for the infrastructure.

The extent, quality and structure of the data varied significantly, requiring Seqwater to embark on the development of a new Asset Register, in which it established an asset hierarchy and audited each site to identify each existing asset and its position within the asset hierarchy. The development of the irrigation infrastructure part of the new Asset Register was still in progress at the time of undertaking the renewal projections, with the majority of irrigation asset details yet to be recorded in the Asset Register.

In 2009, Seqwater commenced implementation of a new Asset Management System, called TechnologyOne. The system is currently used as the new Asset Register, as well as to manage maintenance. Strategic functions, such as Renewal Planning, are undertaken outside of the system.

While the irrigation infrastructure of the new Asset Register is under development, Seqwater maintains asset information in various locations. The information will be reviewed, updated and recorded in the Asset Register in the near future.

### 3.3.3 Renewal Planning

Seqwater’s renewal planning process generally comprises the following:

- ▶ Identification of asset renewal needs;
- ▶ Evaluation of potential renewal works; and
- ▶ Development and approval of proposed renewal programs/projects.

An outline of each step is provided as follows.

#### Identification of asset renewal needs

Seqwater has several existing processes being implemented in which the need to renew an asset is identified. These processes are listed in the following table, and discussed in Subsections 3.3.4 to 3.3.8.

**Table 1 Identification of Asset Renewal Needs**

Asset Group	Relevant Existing Processes				
	Operator advice	Asset Maintenance Program	Dam Safety Management Program	Facility Asset Management Plan development	Site Safety Assessments
Dams	√	√	√	√	√
Weirs	√	√			√
Channels		√			√

Asset Group	Relevant Existing Processes				
	Operator advice	Asset Maintenance Program	Dam Safety Management Program	Facility Asset Management Plan development	Site Safety Assessments
Pump Stations	√	√			√
Water Meters		√			

### Evaluation of potential renewal works

Following identification of asset renewal needs, potential renewal works are evaluated. The valuation comprises the following:

- ▶ Assessment/consideration of risk of failure;
- ▶ Options assessment (considering options such as ‘do nothing’, defer timing of works, non-asset solutions); and
- ▶ Scoping and cost estimation of recommended option.

Where proposed renewal works have a value of greater than \$10k, a Business Case is developed.

### Development and approval of proposed renewal programs/projects

The Seqwater Renewals Programmes are governed by the Seqwater Minor Works and Renewals Project Control Group. This group oversees the development and delivery of the programme.

Projects are identified through a condition and criticality assessment process that defines the risk of asset failure. This failure risk is used to prioritise projects in the programme.

The Asset Portfolio Master plan outlines long term facility level planning for Seqwater. It provides projections regarding upgrades, disposals and new facilities. The renewals programmes are developed cognisant of these longer term facility level plans so that these renewals plans are consistent with longer term objectives. Portfolio Master Planning has not been extended to irrigation assets at this time.

Business cases are developed prior to works commencing. The business case confirms the need identified during the planning process and includes an options assessment to determine the most efficient method of meeting the need. The business case outlines the project scope of work and the project budget.

Work on a project of value greater than \$10k will not proceed without a business case approved through the governance group.

### **3.3.4 Operator Advice**

Facility operators generally have a good understanding of the condition and performance of a large proportion of assets at Seqwater’s facilities. A ‘work request’ system is in place

where the operators can identify issues with assets, many of which are related to the need to renew and asset.

### **3.3.5 Asset Maintenance Program**

Seqwater's asset maintenance program consists of the following:

- ▶ Scheduled Maintenance, being maintenance on an asset, that is operational, to minimise deterioration in its condition and/or performance. The maintenance is periodic, and raised from a schedule;
- ▶ Reactive Maintenance, being maintenance on an asset, that can no longer function as required, to restore its function; and
- ▶ Planned Maintenance, being maintenance on an asset, that is operational, to improve its condition and/or performance to the required level. The maintenance is scheduled to be undertaken at an appropriate time.

Asset renewal needs are commonly identified as part of the maintenance program, either when inspecting an asset and considering future renewal needs, or when addressing an asset failure and considering whether to repair or renew the asset.

### **3.3.6 Dam Safety Management Program**

Seqwater Dam Safety Management Program (DSMP) is a combination of policy, procedures and activities which, when methodically carried out, will ensure that each dam remains safe. It generally consists of the following activities<sup>1</sup>:

- ▶ Establishment and implementation of Standing Operation Procedures and Operation and Maintenance Manuals;
- ▶ Ongoing dam condition monitoring;
- ▶ Regular dam safety inspections; and
- ▶ Regular dam safety review.

Asset renewal needs are commonly identified as part of the DSMP.

### **3.3.7 Facility Asset Management Plan Development**

Commencing in 2010, Seqwater has been developing Facility Asset Management Plans (FAMP) for its dams and water treatment plants.

The FAMPs document a 10 year program of capital investment and operational maintenance investment required to maintain the capacity and quality performance of that facility. Works to enhance reliability and performance of the facility without materially modifying the facility are also incorporated where risks dictate. The FAMP documents the basis for these investment recommendations and references the work that established the requirement and priority.

---

<sup>1</sup> Some DSMP activities apply only to Referrable Dams.

A 10 Year Program is developed for each site using a risk management approach. Assets are assessed on their criticality (considering the consequence of an asset failure) and their condition (indicating the likelihood of failure and remaining asset life). These assessments are combined to identify and prioritise works. The plans draw on other planning work and incorporate minor facility modifications that will enhance the reliability and capability of the facility to perform its design purpose.

For the asset condition and criticality assessments, Seqwater has developed and utilises an assessment guide, which defines the criteria and rating system. The guide assists allocation of ratings based on quantitative and qualitative condition descriptions. This allows for a more consistent assessment of assets across the entity. An outline of the criteria and rating system is provided in Appendix C.

### **3.3.8 Site Safety Assessments**

Seqwater has undertaken site safety assessments of all major facilities. The aim of the assessments is to allow for review of safety aspects at the site by people who do not normally work at the site. A safety checklist is used by the inspection team to prompt comprehensive consideration of priority safety aspects.

Most outcomes of the site safety review are addressed through actions undertaken by operators, changes to operational procedures or corrective maintenance work orders but a small number require works to be scheduled through the minor works and renewals programme. Where a project is included in the Renewals programme a business case is required prior to works commencing so that the need is confirmed, the most efficient option to address the need is selected, and a scope of work and budget is defined.

## **3.4 Proposed Future Asset Management Improvements**

In addition to the further development of its Asset Management Framework and the irrigation infrastructure part of the new Asset Register, Seqwater is planning to implement the following specific improvements that will assist future asset renewal planning:

- ▶ Record (and update on an ongoing basis) key asset assessment data (such as condition, criticality, estimated remaining life and asset failure information) within TechnologyOne;
- ▶ Develop modules either within TechnologyOne, or linked to it, to use asset data within TechnologyOne to both analyse asset performance and develop preliminary renewal projections;
- ▶ Develop FAMP for each Irrigation Scheme; and
- ▶ Ongoing improvements to the criticality and condition assessment processes and other business processes.

## 4. Asset Information

### 4.1 Irrigation Infrastructure

A summary of Seqwater's irrigation infrastructure facilities and assets is provided in Table 2 on the following page.

Related infrastructure excluded from the renewal projections are:

- ▶ Logan WSS Scheme - Wyaralong dam, Bromelton Offstream storage, South Maclean Weir and Cedar Grove Weir, as their sole purpose is to mitigate the impact of droughts and supply non-irrigation water; and
- ▶ Central Brisbane WSS Scheme – Mt Crosby weir, as its sole purpose is the supply of non-irrigation water.

### 4.2 Relevant Asset Information

The following existing information was reviewed and where relevant, utilised to develop the renewal projections:

- ▶ Annual, 5 Year and Comprehensive Dam Safety Reviews and Assessments;
- ▶ Draft Dam FAMPs– Wivenhoe, Somerset, Bill Gunn, Borumba, Cedar Pocket, Clarendon, Maroon, Moogerah and Atkinson dams;
- ▶ Water Meter Upgrade Plans;
- ▶ Sunwater Draft WSS 20 Year Programmes of Work 2008/09 – 2028/29 (Excluding Mid-Brisbane);
- ▶ 2011 Site Safety Assessments;
- ▶ Extracts from Financial and Technical Asset Registers;
- ▶ 2009 Asset Valuation – Cardnos;
- ▶ 2010 Asset Valuation – Dams & Weirs – Cardnos; and
- ▶ 2008 Static Asset Data – Sunwater.

**Table 2 Summary of Irrigation Infrastructure**

<b>WSS Scheme</b>	<b>Tariff Group</b>	<b>Dams/Offstream Storage</b>	<b>Weirs</b>	<b>Other Key Assets</b>
Central Lockyer	Central Lockyer	Clarendon Dam Bill Gunn Dam	Kentville, Jordan 1 and 11, Wilson, Clarendon, Glenore Grove, Laidley Creek Diversion, Showgrounds, Crowley Vale	Clarendon Diversion/Supply Channel, Clarendon Pump Station, Redbank Creek Pump Station, Laidley Creek, flowmeters, observation bores, Lake Dyer Diversion, Morton Vale Outlet Works
	Morton Vale Pipeline	-	-	Morton Vale Pipeline, Water Meters
Lower Lockyer	Lower Lockyer	Atkinson Dam	Buaraba Creek, Brightview, Sippels, Potters, O'Reillys,	Gauging stations, Observationbores, Buaraba Creek and Seven Mile Lagoon Diversion Channels, Brightview Channel, Brightview Channel Rising Main, Buaraba Creek Supply Pipeline, Seven Mile Lagoon Outlet Control Structure, Atkinson Pump Station, flow meters
Logan River	Logan River	Maroon Dam	Bromelton,	Gauging Stations, Channels, Pump Stations, Water Meters
Upper Mary River	Upper Mary River	Borumba Dam	Imbil	Gauging Stations, Channels, Pump Stations, Water Meters
	Cedar Pocket Dam	Cedar Pocket Dam	-	Water Meters
	Pie Creek	-	-	Calico Creek Channel, Calico Creek Pipeline, McIntosh Channel, McIntosh Creek Pipeline, Pie Creek Main Channel, Pie Creek Pipeline, Pie Creek Pump Station, Rising Main, Water Meters
Warrill Valley	Warrill Valley	Moogerah Dam	Churchbank, Junction, Upper Warrill	Gauging Stations, Channels, Pump

**Irrigation Infrastructure Renewal Projections - 2013/14 to 2046/47**

<b>WSS Scheme</b>	<b>Tariff Group</b>	<b>Dams/Offstream Storage</b>	<b>Weirs</b>	<b>Other Key Assets</b>
			Diversion, Kents Lagoon Diversion, Aratula, Warrill Creek Diversion, West Branch Warrill Diversion, Railway	Black Gully Diversion, Normanby Gully Diversion, Upper Warrill Diversion, West Branch Warrill Diversion, Warroolaba Creek Diversion, Gauging Stations, Water Meters
Central-Brisbane	Central-Brisbane	Wivenhoe & Somerset Dams	-	Meters (proposed)

## 5. Approach

### 5.1 General

The renewal projections were developed over the following two stages:

#### Stage 1 – Desktop analysis of relevant existing information.

This stage utilised relevant existing information listed in Section 4.2. From this information, the renewal projections were developed using criteria/methodology discussed in the following sub-section and sections.

#### Stage 2 – Detailed assessments

For this stage, site asset assessments were generally undertaken, where not previously undertaken, for those works assessed in Stage 1 as being required to be undertaken between 2013/14 and 2017/18 financial years<sup>2</sup>. Where the assessment confirmed the work was required to be completed during that period, business cases were developed those projects of value greater than \$10k<sup>3</sup>. The renewal projections were updated based on the findings from this stage.

### 5.2 Development of Renewal Projections

#### 5.2.1 Triggers for and timing of renewal

In practice, Seqwater generally undertakes renewal work when one or more of the following situations occur:

##### Replacement of assets

- ▶ when the asset has failed, or has a high risk of failure, or when the replacement of an asset will significantly reduce the life-cycle cost of the asset; or
- ▶ when the asset no longer complies with legislative requirements; or
- ▶ when the asset poses a significant safety risk which cannot be satisfactorily reduced by other means; and
- ▶ where replacement is the optimum option (compared with options such as refurbishment, 'do nothing' etc.).

##### Refurbishment of assets

- ▶ when the asset has failed, or has a high risk of failure, or when the refurbishment of an asset will significantly reduce the life-cycle cost of the asset; or
- ▶ when the asset no longer complies with legislative requirements; or

---

<sup>2</sup> A site assessment was in some occasions not undertaken where an assessment had already been completed as part of the FAMP development process

<sup>3</sup> The Business Cases were still under development at the time of completing this report and the projections.

- ▶ when the asset poses a significant safety risk which cannot be satisfactorily reduced by other means; and
- ▶ where refurbishment is the optimum option (compared with options such as replacement, 'do nothing' etc.).

#### Upgrade of assets

- ▶ when the asset no longer complies with legislative requirements; or
- ▶ when the asset poses a significant safety risk which cannot be satisfactorily reduced by other means.

As discussed in Section 3.3, Seqwater's asset management systems and processes are under development, and Seqwater is currently not yet in a position to readily develop long term renewal projections using the above criteria.

Seqwater has instead adopted and utilised a simple, transparent and efficient process for the long term renewal projections required to develop the price path. The process comprised the following:

#### Replacement of assets

- ▶ The timing of replacement was initially based on the estimated time the remaining asset life would expire, which is based on relatively current condition assessment data where available, otherwise the age of the asset and its standard useful life (refer Section 6). [Comment: As per standard industry practice, Seqwater would commonly replace critical assets prior to the end of their useful life, for purpose of reducing the risk of failure. By instead allowing in the projections for the assets to be replaced only when they reach the end of their useful life, the value of renewal projections is likely to be lower than that actually required]
- ▶ The timing for renewal work was updated based on safety and compliance issues, and detailed assessments undertaken in Stage 2.

#### Refurbishment of assets

- ▶ For some types of assets, it is deemed necessary to refurbish them once or more times through-out their life for one or more of the following reasons: to maintain service reliability, reduce the risk of failure, minimise life-cycle cost, and maximise life of asset<sup>4</sup>. A schedule of refurbishment work for various assets was being developed (as part of this work) based on engineering opinion, referring to schedules used by the previous asset owners, and Seqwater's developing understanding and experience with the assets. The schedule includes a standard frequency timing of refurbishment (refer Section 7).
- ▶ The timing for refurbishment work was updated based on safety and compliance issues, and detailed assessments undertaken in Stage 2.

---

<sup>4</sup> For the purpose of the renewal projections, the refurbishment work is intended to ensure assets reach the end of their useful life, and not extend the life of the assets past this point. Otherwise there may be a duplication of expenditure in the projections.

### Upgrade of assets

- ▶ Upgrade work for compliance and safety requirements was identified on an asset by asset basis, as part of previously completed site and other assessments.
- ▶ The timing for upgrade work was updated based on further assessment where undertaken in Stage 2.

### **5.2.2 Estimated Expenditure**

The estimated costs of renewals were developed as follows:

- ▶ For the majority of work, costs were sourced from estimates prepared as part of previous valuations and works programs; and
- ▶ For forecasted renewal work valued at greater than \$10k and between 2013/14 and 2016/17 financial years, detailed cost estimates were generally developed, or cost estimates developed in the FAMPs were utilised.

Costs were based on Year 2012/13 rates, with no escalation for future inflation etc. Such escalation is allowed for in the pricing model separately undertaken.

Further details on the cost estimation methodology are discussed in Section 9.

## 6. Useful Asset Lives

As discussed in Section 5.2.1, Standard Useful Asset Lives (UAL), in conjunction with asset age, have commonly been utilised in estimating the remaining asset lives and the timing of asset replacement activities.

The Standard UALs currently adopted and used<sup>5</sup>:

- ▶ Are based on those used in the most recent Asset Valuations, supplemented by additional ones derived from Seqwater's engineering opinion; and
- ▶ Are listed in Appendix C.

In some instances, UALs were modified to suit site assessment findings and reviews at workshops, in which the UAL was adjusted in consideration of the current assessed remaining life of an asset.

---

<sup>5</sup> The list of Standard UALs has yet to be finalised and approved, as it was still under development at the time of developing the projections.

## 7. Asset Refurbishment Frequency

As discussed in Section 5.2.1, a schedule of refurbishment work for various assets was being developed (as part of this work).

The schedule utilises standard refurbishment frequencies<sup>6</sup> which:

- ▶ Have been derived from Seqwater's engineering opinion (based on its knowledge of the assets);
- ▶ Are listed in Appendix D.

---

<sup>6</sup> The list of standard refurbishment frequencies has yet to be finalised and approved, as it was still under development at the time of developing the projections.

## 8. Detailed Assessment

For those works assessed in Stage 1 as being required to be undertaken between 2013/14 and 2017/18 financial years, a detailed assessment was generally undertaken where not previously undertaken.

The assessment consisted of a visual condition assessment of the relevant assets, using Seqwater's condition assessment guide (referred to previously in Section 3.3.7). Options for, and the timing of, required renewal work were assessed. Where renewal work was confirmed to be required between 2013/14 and 2016/17 financial years:

- ▶ Detailed cost estimates were developed in accordance with Section 9 for work greater than \$60k;
- ▶ For projects of value between \$10k and \$60k, either detailed cost estimates were developed or cost estimates developed in the FAMPs were utilised; and
- ▶ Business cases were under development<sup>7</sup> (where not already in existence) for each scheme, addressing projects of greater than \$10k between 2013/14 and 2016/17 financial years, and for projects that were estimated to have an impact of greater than 10% of the annuity.

For business case development, a standard Seqwater template developed in consultation with the Queensland Treasury was utilised. Business cases included a review of options, and detailed cost estimates.

The renewal projections developed during Stage 1 were updated and finalised to suit the findings from the detailed assessment.

---

<sup>7</sup> Business cases were under development at the time of completing this report

## 9. Cost Estimation

Where relevant, the following existing cost estimation data developed in the past has been utilised, indexed to 2012/13 values:

- ▶ Replacement costs from asset valuation work;
- ▶ Refurbishment costs from previous owners 20 Year Works programs; and
- ▶ Replacement and refurbishment costs in FAMPs for dams.

The indices used to convert old cost estimates to 2012/13 values were developed by Cardno consultants and are provided in Appendix E.

For renewal projections between 2013/14 and 2017/18, more detailed cost estimation was undertaken for projects of value greater than \$10k utilising the following:

- ▶ Rawlinson's Construction Cost Estimate Guide;
- ▶ Indicative prices provided by manufactures;
- ▶ Available historical cost information; and
- ▶ Seqwater's engineering opinion.

Appendix A

# Overview of Seqwater's Asset Management Framework

# Seqwater's Asset Management Framework

Seqwater manages a complex asset portfolio, comprising a range of natural and built assets of varying asset types, ages, sizes, geographic dispersion and condition accompanied by varying degrees of asset information and knowledge. Seqwater recognises that its effectiveness as a business is underpinned by its understanding and management of its assets.

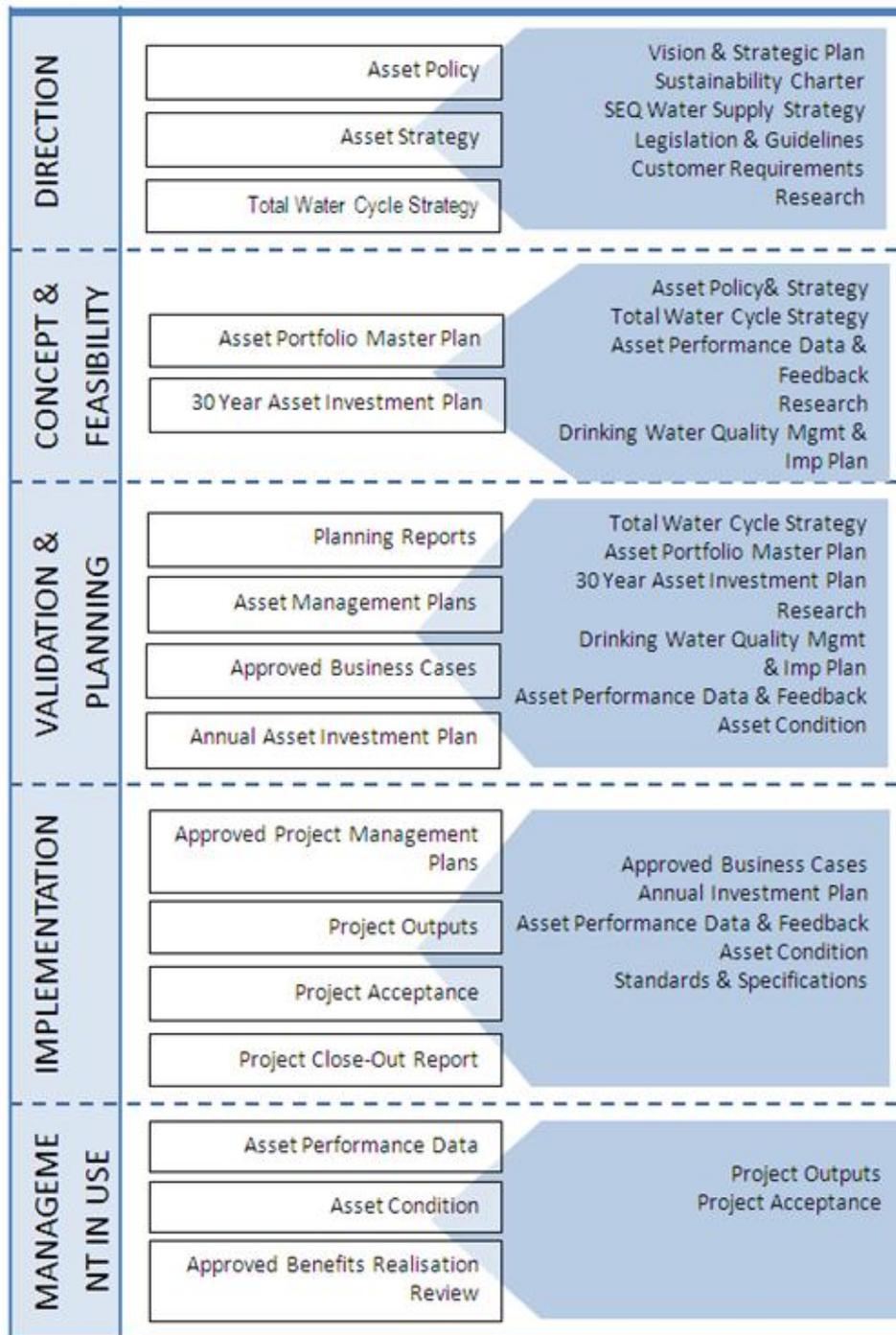
Seqwater notes the following definition of asset management (PAS 55-1:2008, British Standards Institute):

*“Asset management is the systematic and coordinated activities and practices through which an organisation optimally and sustainably manages its assets and asset systems, and their associated performance, risks and expenditures over their life cycles for the purposes of achieving its organisations strategic plan.”*

In 2010-11, Seqwater commenced development of an overarching Asset Management Framework to manage its assets, as illustrated in Figure 1 below. Seqwater's Asset Management Framework aims to facilitate improved integration, planning and management of natural and built assets. It seeks to better leverage investment in Seqwater's Research, Science & Technology team to pursue the most efficient ways to address compliance risks in the treatment of bulk water across source, store and supply multi-barriers, as well as to ensure reliability and security of supply. It also aims to align with the delivery of Seqwater's Strategic Plan and attain successful performance in asset management by achieving:

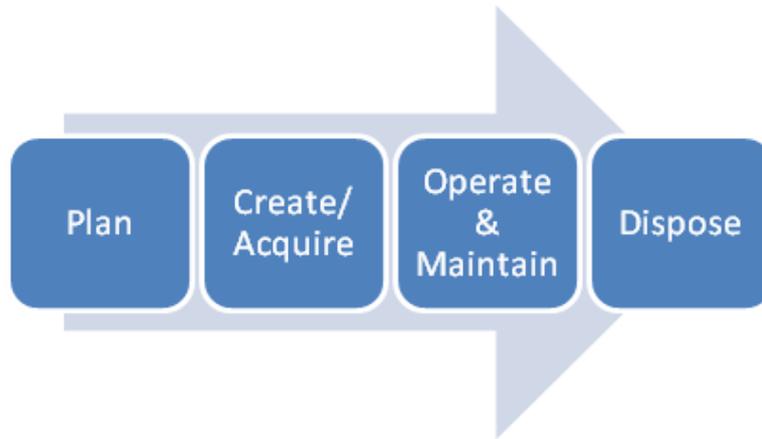
- uniform organisational processes in asset management;
- prudent asset investment decision-making;
- a balanced approach to investment across our catchments;
- standardising processes for successful asset management (including project delivery); and
- delivering efficient outcomes and value for money.

**Figure 1 – Asset Management Framework (overview)**



A number of supporting elements of the Asset Management Framework are under development, with key elements being developed, trialed and documented before formal adoption. As can be seen in Figure 2 below, Seqwater’s asset management function is broad and encompasses the entire lifecycle of physical assets, from direction setting, to management in use, to disposal, as well as considering the broader direction and long term planning of its asset portfolio.

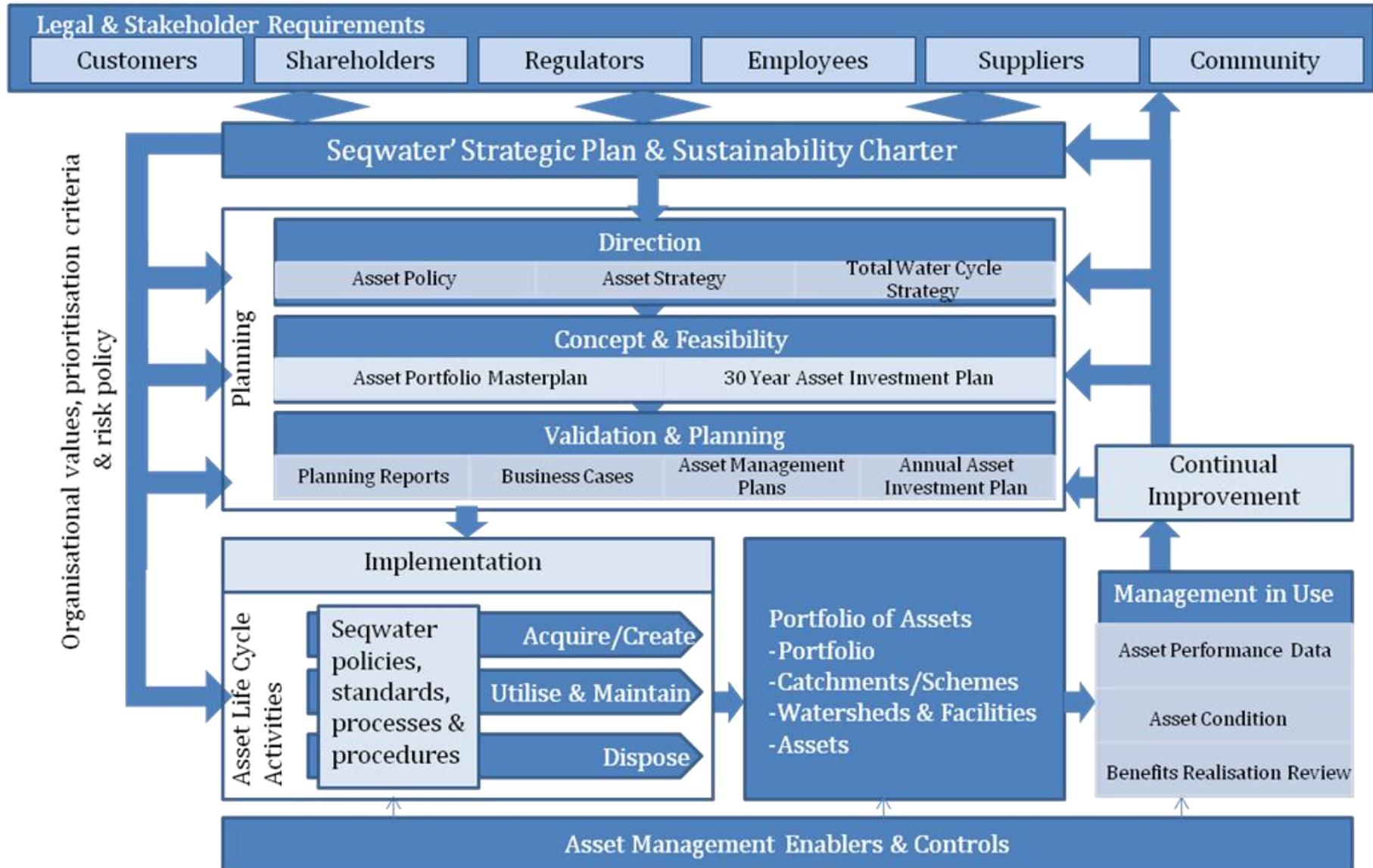
**Figure 2 – Seqwater view of the complete asset life cycle**



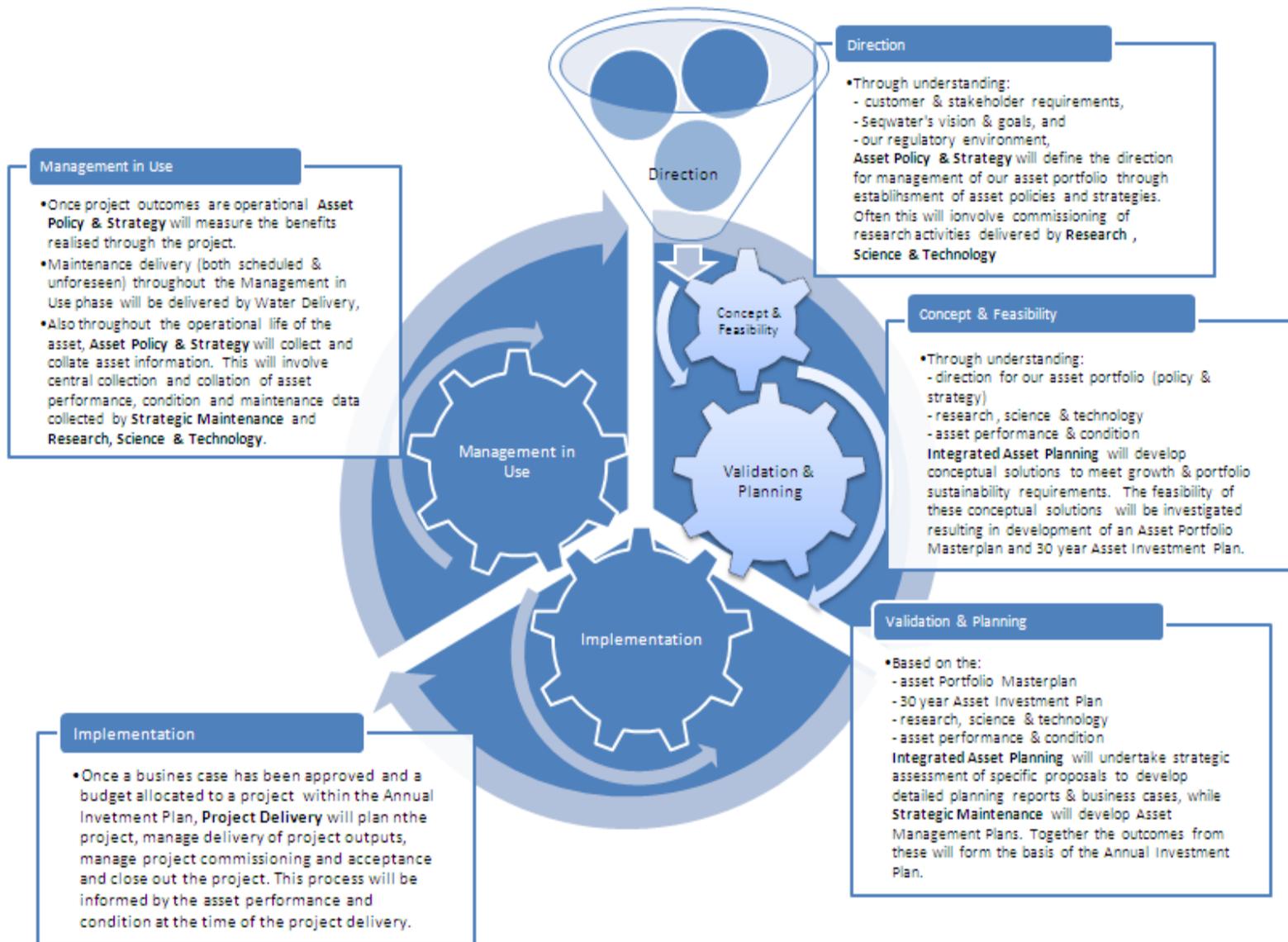
Specifically, the Asset Management Framework incorporates five phases comprising: **Direction, Concept and Feasibility, Validation and Planning, Implementation, and Management in Use.**

Figure 3 below illustrates how the different phases in the Asset Management Framework fit together in practice, and Figure 4 shows how each phase is managed within Seqwater.

Figure 3 – Asset Management Framework (Delivery)



**Figure 4 – Asset Management Framework (Cog Overview)**



Asset management within Seqwater is performed predominantly within the Asset Delivery Group, with the following teams dedicated to these specific aspects of asset management:

- **Asset Policy & Strategy** – responsible for developing and managing the strategies and policies relating to asset management, responsible for owning and managing asset information, playing a liaison role with key external stakeholders who influence the direction for management of Seqwater’s asset portfolio, and overseeing benefits realisation review of asset investment (Direction phase, Management in Use phase);
- **Integrated Asset Planning** – responsible for the portfolio level master planning for Seqwater’s catchment based assets. This includes regional, sub-regional and individual asset planning up to a 30 year horizon. The master planning process verifies needs of the business and identifies options for major changes to the attributes of our assets which may be required over time. It is also then the responsibility of this team to validate the actions required under the master plan as and when they fall due. This process involves the completion or validation of Options Studies and preparation of subsequent Business Cases for approval of capital projects. (Concept & Feasibility phase);
- **Project Delivery** – responsible for managing each stage of the delivery of capital projects, including project planning, project implementation, project support and project conclusion, for the entire asset portfolio including major capital and operational projects, built asset refurbishment and renewals, and natural asset projects (Implementation phase);
- **Strategic Maintenance** – this team does not deliver the maintenance, but optimises the efficiency of the maintenance activities undertaken, by developing the processes used to identify maintenance requirements, and then implementing those processes through systems (for example the Corporate Information System). The group is also responsible for maintenance planning, across the Seqwater’s asset portfolio, including for land and recreation assets as well as infrastructure assets, as well as the development of Facilities Asset Management Plans (FAMPs), Natural Asset Management Plans (NAMPs) and Recreation Asset Management Plans (RAMPs), as well as compliance auditing (Validation & Planning phase, Management in Use phase); and
- **Program Management Office** – responsible for supporting the operations of the Asset Delivery Group, by reporting on the program of operational and capital projects, providing project and financial support in the delivery of project outputs to maximize program deliverables, preparing defined budgets for future years’ asset management programs and development of financial processes (Purchase Order processes) for project expenditure and ongoing expenditure review.

Some other asset management activities are conducted within other parts of the Seqwater business, pertaining to specific assets or asset classes, such as:

- Technical Warranty & Development group – responsible for the management of the Gold Coast Desalination Plant (GCDP) and the Western Corridor Recycled Water scheme (WCRWS), with certain asset management functions performed by contractor Veolia Water under long term legacy contracts;
- Group Support and Catchment Management Services team within the Water Delivery group: responsible for the management and maintenance of the recreation assets located in Seqwater’s recreation sites; and for the management and maintenance of certain natural assets located within Seqwater’s water catchment areas;
- Water Quality & Environment team within the Water Delivery group: responsible for management of non-infrastructure assets relating to water quality testing, such as instrumentation, water quality and event gauging stations and laboratory equipment;
- Property & Facilities team within the Business Services group: responsible for land and building management as well as fleet; and
- Information Communications & Technology (ICT) and Records & Information Management (RIM) teams within the Business Services group: responsible for the provision of information and communications technology and records and information management, respectively, and management the non-infrastructure assets relating to these services such as hardware, software and databases.

#### *Asset policies and strategies, direction and management-in-use*

The Asset Policy and Strategy team within Asset Delivery group develops and maintains Seqwater’s policies, strategies and procedures relating to asset planning, delivery and maintenance, including the broader catchment portfolio, as well as managing asset information and benefits management. The core functions of the team are as follows:

- development, management and maintenance of asset policies and strategies;
- asset management information services for all assets;
- activities associated with the alignment of assets, asset management practices, procedures and data management across the asset portfolio;
- setting the direction for future asset management and ensuring a sufficient, but prudent level of asset investment, including catchment investment; and
- stakeholder group development and participation (both internal and external stakeholders, with particular focus on key external stakeholders who influence the direction of asset management).

The Asset Policy and Strategy team has responsibility for the following significant documents and processes:

- the Seqwater asset policies, strategies and procedures, including individual policies, strategies and procedures (see the draft Seqwater Asset Policy and Strategy Map in Figure 5 below);
- sponsorship of components of the research program to ensure Seqwater’s direction is best informed by research, science and technology; and
- asset information.

**Figure 5 – Seqwater Asset Policy and Strategy Map**



In performing its activities, the Asset Policy and Strategy team produces the following significant outputs on an ongoing basis:

- asset information management and asset information services to the organisation;
- development and maintenance of the currency of Seqwater’s asset policies, strategies and procedures;
- benefits management, including benefits realisation reviews and workshops following completion of projects;
- benchmarking and industry practice reviews; and
- consultation and liaison with key internal and external stakeholders who influence the direction of asset management.

During 2011-12, Seqwater undertook an internal benchmarking exercise of reviewing its functions and the scope and content of the asset management policies, strategies and procedures it is developing under the Asset Management Framework against accepted asset management industry best practice.

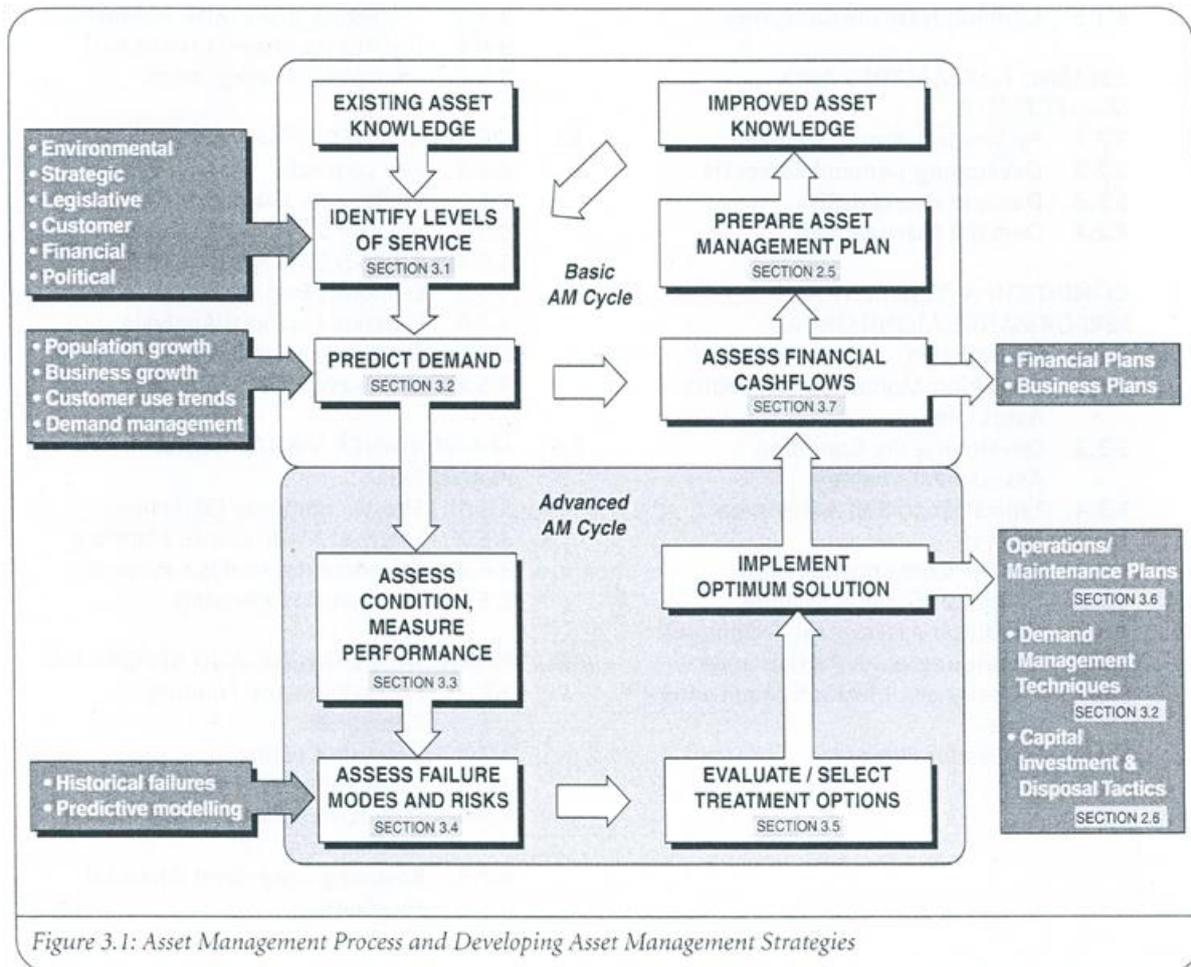
The International Infrastructure Management Manual (IIMM) (IPWEA, 2006) and the UK Publically Available Specification - the Optimized Management of Physical Assets – No. 55 (PAS-55) (IAM, 2008) are widely accepted best practice industry guides for asset intensive organisations, such as Seqwater, in developing and implementing asset management frameworks and best practice asset planning and management practices.

The IIMM's approach and scope for development and implementation of an Asset Management Plan was used to ensure the scope and content of the policies, strategies and procedures being developed by Seqwater would deliver a mature and comprehensive asset management framework.

PAS-55 was reviewed to ensure the scope and content of relevant policies, policy directives, strategies and procedures being developed by Asset Policy and Strategy group addressed the relevant aspects of this standard's asset management principles.

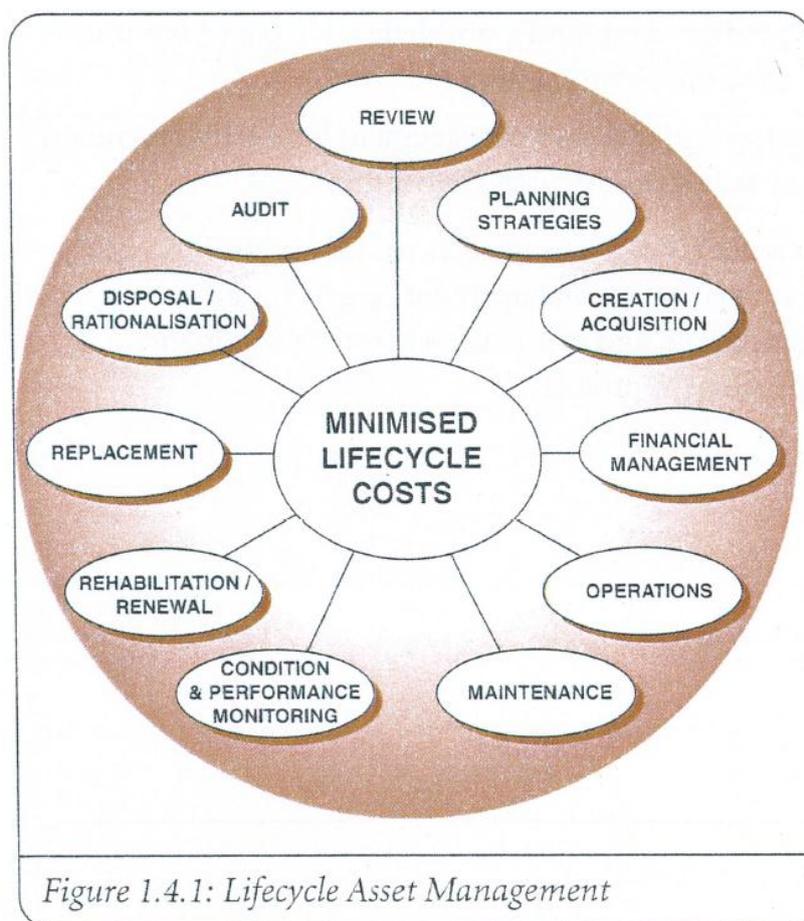
The Asset Policy and Strategy team reviewed the IIMM to confirm that the Asset Management Framework and respective asset management policies, strategies and procedures do in fact address the key points on the manual's roadmap for development of a comprehensive asset management planning approach, illustrated in Figure 6 below.

**Figure 6 – Asset Management Process and Developing Asset Management Strategies (from IIMM, IPWEA 2006)**



In addition, assets within the portfolio of assets Seqwater is now responsible for are at different points on the asset lifecycle. Therefore, the asset management framework has been assessed for its ability to address assets at all points of the asset lifecycle, as illustrated in Figure 7 below.

**Figure 7 – Asset Management Lifecycle (from IIMM, IPWEA 2006)**



In this respect, Seqwater's development and implementation of the Asset Management Framework will:

- address development of a complete and accurate Asset Register of all assets and capture of all critical asset information;
- in consideration of Seqwater's Grid Contract and the Grid Operating Protocols, confirm what levels of service (performance standards) existing assets are required to sustain over their predicted residual lives to meet SEQ growth demands as determined by the Queensland Water Commission;
- conduct an asset condition assessment (to a basic level) of all assets and a detailed condition, risk and criticality assessment of identified critical assets;
- determine the condition and performance based residual lives of all assets in order to determine the lifecycle and renewal costs of the asset portfolio;
- undertake asset risk and criticality assessments to determine which assets pose the greatest business risks with asset failure for a prioritised, more detailed assessment;
- optimise the operation and maintenance regimes for both critical and non-critical assets (where opportune) to minimise overall business risk to asset failure;

- plan asset investment, renewal and disposal solutions, focussing on priority assets and others when appropriate, to meet Grid Contract obligations and level of service requirements (performance standards); and
- determine and maintain a prudent 30-year forecast of asset investment and operational funding requirements - reviewed each year as Seqwater improves its knowledge of its assets.

Appendix B

# Asset Criticality and Condition Assessment Criteria and Rating System

## Asset Criticality and Condition Assessment Criteria and Rating System

### Criticality Assessment

Asset Criticality is a score assigned to each asset at a facility that is a measure of the assets consequence of failure. Assets that have a significant impact if they fail are of higher criticality. Criticality is measured on a scale of 1 – 5 and is assessed in accordance with the Seqwater Risk Assessment Framework. The criticality does not consider the asset's likelihood of failure.

The assessment involves specialist input from operations, maintenance, treatment process and water quality officers to ensure that the implications of asset failure are well understood.

### Asset Condition Assessment.

Asset Condition is a measure of the physical state of an asset. Asset condition is measured on a 1 – 5 scale with assets in poor conditions having a higher score. A general description of the condition scores are as follows:

Rating	Description <sup>8</sup>
1	Very good condition
2	Minor defects only
3	Maintenance required to return to acceptable level of service
4	Requires renewal
5	Asset unserviceable

Asset condition is assessed by appropriately qualified technical or engineering personnel. Asset history and condition monitoring data is an important, but not essential input, to assigning a condition score.

---

<sup>8</sup> Current description, which was updated at end of 2011, is shown.

## Appendix C

# Standard Useful Asset Lives

**Current List of Standard Useful Asset Lives (Note: List is still under development)**

Facility Type	Asset Type	Std Useful Lives	Source	
Bores	Bore	50		
	Flowmeter	10		
	Instrumentation	10		
	Pipe work	50		
	Pump & Motor	20		
	Switchboard	20		
	Valves	30		
	Access Road	30		
	Buildings	60		
	Dams	Dam Civil Works	200	
Dam Embankment		200		
Electrical		20		
Destratification System		30		
Fences (Security) and Gates		30		
Instrumentation		10		
Inlet/outlet works		100		
Trash Racks		70		
Access Bridge		80		
Mechanical		25		
Standby generator		40		
Pipe work		80		
Recreation facilities		30		
Spillway Civil Works		100		
Gates		100		
Gantry crane/hoist		70		
Telemetry		10		
Water Level recorders		30		
Cone valve		70		
Butterfly valve		70		
Regulator valve		70		
Gate valve		40		
Channels		Channel	100	
		Lagoons		
Lagoons		Pump & Motor	20	
	Structure	60		
Repeater Towers	Civil -structure	80		
	Control & Monitor	10		
River Intakes	Mechanical & Electrical	20		
	Electrical	20		
Water mains & fittings	Lifting Gear	20		
	Mechanical (pumps)	20		
	Metalwork	25		
	Pipe work	50		
	Structure (concrete)	80		
	Pipeline	80		
	Valves - isolating	30		
	Valves - control	15		
	Water Meters	15		
	Tunnels & conduits	100		
Water Pump Stations	Building	60		
	Disinfection Equipment	20		
	Electrical	20		
	Lifting Gear	20		
	Mechanical - generator	20		
	Mechanical - pumps	20		
	Metalwork	25		
	Meters	15		
	Pipework	50		
	Roads & Drainage	30		
	Structure - Concrete	80		
	Surge Protection Vessel	40		
	Switchboard	20		
	Telemetry	10		
	Valves	30		
Weirs	Weir	100		
	Inlet/outlet works	100		
	Outlet valves	80	Seqwater Workshop	
General	Communications	30		
	Piezometers	25		
	Telemetry	10		
	Water Level recorders	30		
	Fire Services	30		
	Roads & Drainage	30		
	Civil structure	80		
	Signage	15		
	Culvert	80		
	Air valves	50	Seqwater Workshop	
Access way, ladders & handrails	30	Seqwater Workshop		

Seqwater Asset Useful Life Table - Prepared by Cardnos

Appendix D  
**Standard Asset Refurbishment  
Frequencies**

**Current List of Standard Asset Refurbishment Frequencies** (Note: List is still under development)

Facility Type	Asset Type	Refurbishment of	Std Frequency	Source
Bores	Bore			
	Flowmeter			
	Instrumentation			
	Pipe work			
	Pump & Motor			
	Switchboard			
	Valves			
	Access Road	Road	5-12	Sunwater
	Buildings			
	Dams	Dam Civil Works		
Dam Embankment				
Bulkhead Gates		Gate & seals	10-50	
Protection Works		Protection Works	40	
Control Equipment		Control Equipment	25	
Electrical				
Destratification System				
Fences (Security) and Gates				
Instrumentation				
Intake Tower				
Mechanical				
Pipe work		Pipe work	15-25	
Recreation facilities				
Spillway Civil Works				
Spillway Gates		Actuators	20	
Pump & Motor		Submersible Pump	10	
Telemetry				
Trash Screens		Trash Screens	10	?
Valves		Valves	20-75	
Channels		Channel		
Lagoons	Pump & Motor			
	Structure			
Repeater Towers	Civil -structure			
	Control & Monitor			
	Mechanical & Electrical			
River Intakes	Electrical			
	Lifting Gear			
	Mechanical (pumps)			
	Metalwork			
	Pipe work			
	Structure (concrete)			
Water mains & fittings	Pipeline			
	Valves - isolating	Valves	15-20	
	Valves - control			
	Water Meters			
	Tunnels & conduits			
Water Pump Stations	Building			
	Disinfection Equipment			
	Electrical			
	Lifting Gear	Lifting Gear	15	
	Mechanical - generator			
	Mechanical - pumps			
	Metalwork	Metalwork	20	
	Meters			
	Pipework			
	Roads & Drainage			
	Trash Screens	Trash Screens (Galv)	5	
	Signage, fencing & landscaping			
	Structure - Concrete			
	Surge Protection Vessel			
	Switchboard	Switchboard	18	
		Control Equipment	18	
		Telemetry		
		Valves		
Weirs	Weir	Recork const joints	20	
Dam/PStn	Access way, ladders & handrails			

## Appendix E

# Cost Escalation Indices



# Asset Valuation Indexation

Project Number 3602-78/004

**Cardno (Qld) Pty Ltd**  
 ABN 57 051 074 992  
 Level 11 Green Square North Tower  
 515 St Paul's Terrace  
 Fortitude Valley Qld 4006  
 Locked Bag 4006 Fortitude Valley  
 Queensland 4006 Australia  
 Telephone: 07 3369 9822  
 Facsimile: 07 3369 9722  
 International: +61 7 3369 9822  
 cardno@cardno.com.au  
 www.cardno.com.au

**Document Control: Asset Value Indexation**

Version	Date	Author		Reviewer	
		Name	Initials	Name	Initials
Version 1	March 2012	Stephen Walker		Rula Atweh	

"© 2012 Cardno (Qld) Pty Ltd All Rights Reserved. Copyright in the whole and every part of this document belongs to Cardno (Qld) Pty Ltd and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person without the prior written consent of Cardno (Qld) Pty Ltd."

## TABLE OF CONTENTS

1	BACKGROUND .....	1
2	PURPOSE .....	1
3	METHODOLOGY .....	1
4	ANALYSIS OF SEOWATER’S IRRIGATION ASSETS.....	2
5	ANALYSIS OF COST INDICES.....	3
5.1	Selection of Indices.....	3
5.2	Analysis of Indices .....	3
6	INDEX AND APPLICATION .....	4
6.1	Index .....	4
6.2	Application .....	5

## 1 BACKGROUND

Seqwater is preparing its submission to the Queensland Competition Authority (QCA) as part of the Authority's review of pricing for its irrigation schemes.

As parts of its submission, Seqwater will include forecasts of future renewals expenditure. An important input into the calculation of these future forecasts is the value of Seqwater's relevant assets.

Seqwater is reliant upon valuation data provided to it by a number of sources, particularly SunWater, and indexed at various dates, including:

Description	Source	Base year (30 June)
Strategic Asset Data	SunWater	2008
20 year water plan	SunWater	2008
Dams and Weirs Asset Valuation	Cardno	2010

Seqwater requires advice on an appropriate index to escalate the valuation of its irrigation assets to 30 June 2012.

## 2 PURPOSE

The purpose of this short report is to provide an appropriate index for Seqwater's existing valuation data that is:

- Appropriate for application to the assets under consideration;
- Able to be applied to all assets – that is, a single index for all asset classes;
- Transparent in how it has been derived; and
- Sufficiently robust for regulatory review.

For reasons of expediency and simplicity a 'top down' analysis of cost indices is preferred by Seqwater to a 'bottom-up' analysis of the movement in the cost elements of each asset class.

This report and analysis applies to Seqwater's irrigation assets only.

## 3 METHODOLOGY

The following methodology has been adopted to determine an appropriate escalation index:

- Analysis of the assets to which the index will be applied to determine their nature (e.g. construction materials, construction type, significant relevant changes in technology);
- Research into movement in historic cost indices over the period in question including:
  - Measures of inflation;
  - Price of materials (steel, concrete, etc.);
  - Price of plant and labour.

- Analysis of the cost indices to arrive at a single escalation index (expressed annually for 2008 to 2012). Because this report is prepared at March 2012, the index has been extrapolated to 30 June 2012.

## 4 ANALYSIS OF SEQWATER'S IRRIGATION ASSETS

Seqwater is responsible for irrigation assets in the following water supply schemes:

- Central Lockyer Valley;
- Lower Lockyer Valley;
- Logan River;
- Warrill Valley;
- Mary Valley;
- Cedar Pocket; and
- Central Brisbane River

The assets in these schemes include dams and weirs, pumps, pipelines and civil works such as buildings and roads. Figure 4-1 present a breakdown of the value of assets in Seqwater's irrigation schemes by asset type. The asset types are broad groupings of asset categories used in Seqwater's asset register.

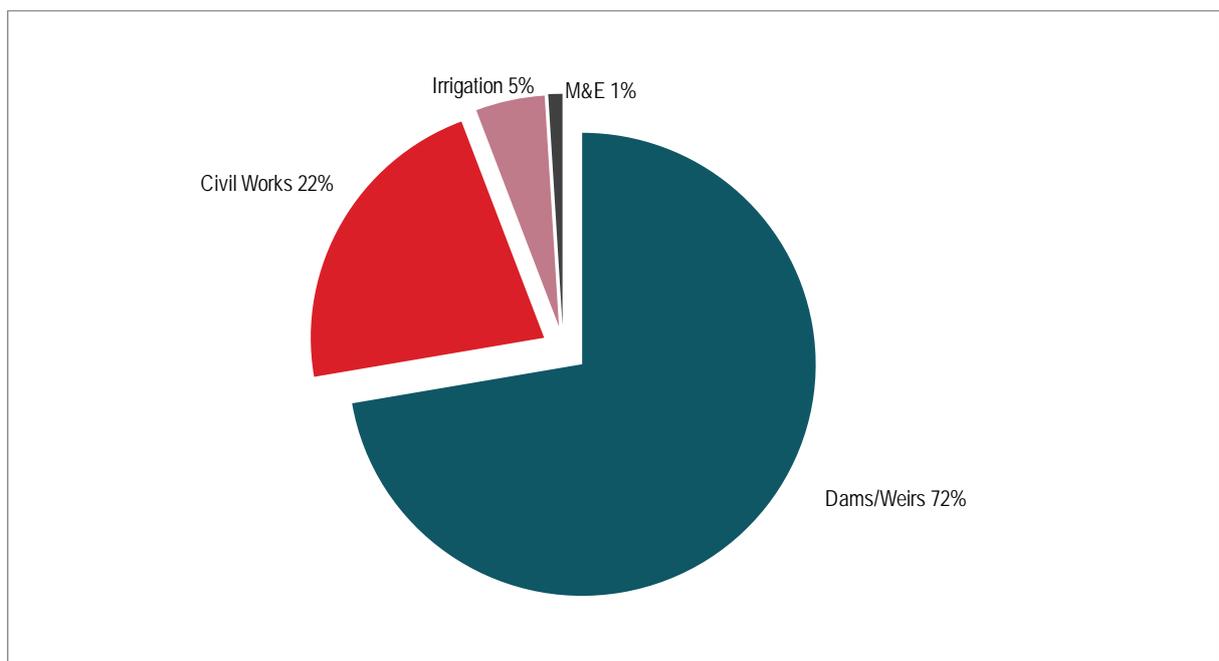


Figure 4-1 - Breakdown of asset value by asset type

This analysis demonstrates that the greatest proportion by value of Seqwater's assets in its irrigation schemes is dams and weirs, accounting for 72% of the total. Civil works (which includes earthworks, buildings, roads and fences), accounts for around 22% of all assets by value. Irrigation and mechanical and electrical assets account for a small proportion of the total asset value.

Accordingly, the movement of the value of dams and weirs will be the biggest driver for overall movement in Seqwater's irrigation assets. And therefore, the construction inputs for dams and weirs, particularly concrete and

earthworks, will be important factors in the movement of the value of dams and weirs, and the overall portfolio of Seqwater's irrigation assets.

## 5 ANALYSIS OF COST INDICES

### 5.1 SELECTION OF INDICES

The cost indices evaluated in this report are measures of the movement in both construction and product inputs and outputs. The measures have different coverage, different basis of calculation and different weightings of items included. No index alone, or combined with other indices, is a perfect measure of the movement in the value of the assets considered over the analysis period. Rather, the indices included in this analysis have been selected based on their broad alignment with the nature of the assets in question and therefore can be reasonably expected to provide a measure of the movement in their value for the analysis period.

The indices selected for analysis are largely sourced from the Australian Bureau of Statistics. Where available, indices specifically for Brisbane or Queensland have been used. The following indices have been evaluated:

- Road and bridges construction;
- Consumer price index;
- Building price index (Rawlinsons);
- Concrete, cement and sand;
- Steel; and
- Labour (construction industry).

### 5.2 ANALYSIS OF INDICES

#### Weighting

The indices selected have been weighted to arrive at a single index to apply to Seqwater's irrigation assets. The following logic has been employed in determining weights:

- The Roads and bridges construction index, the Building price index, and the Consumer Price Index have been given moderate – high weightings as these most closely track movements in construction costs in Queensland over the period in question. The Consumer Price Index also has an important role informing inflation expectations; and
- The input factors (Steel; Concrete, cement and sand; and Labour (construction industry) have been assigned low weights. This is because inputs are only an indirect measure of cost movement, i.e. cost movement also relies on changes in technology, design standards, etc.

#### Weighted index

After applying weights as described above, an overall index has been derived. This overall index is shown in Figure 5-1 along with the individual indices that compose it.

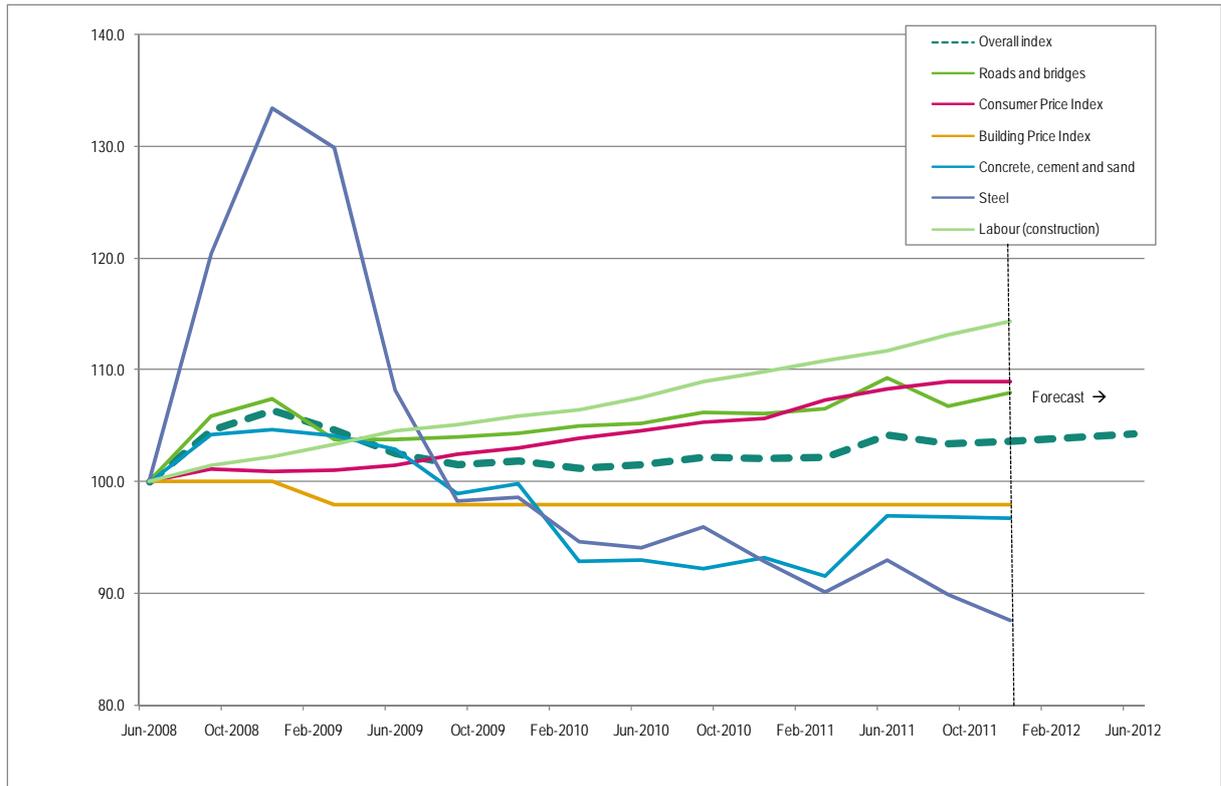


Figure 5-1 - Movement of indices 2008 to 2012

This figure shows that while the cost of Steel and Concrete, cement and sand have fallen significantly over the analysis period, the cost of labour (construction industry) has increased at a rate above the Consumer Price Index. The Consumer Price Index and Roads and bridges construction have closely tracked each other over the analysis period.

The most current data for the indices analysed was December 2011. To derive values of the overall index to June 2012, a linear extrapolation of the average movement in the overall index over the last quarter analysed was undertaken. The uncertainty due to this forecast is not likely to be material.

## 6 INDEX AND APPLICATION

### 6.1 INDEX

The quarterly values of the escalation index recommended to be applied to Seqwater’s irrigation assets are shown in Table 6-1.

Table 6-1 - Quarterly values of escalation index

Dates	Jun-2008	Sep-2008	Dec-2008	Mar-2009	Jun-2009	Sep-2009	Dec-2009	Mar-2010	Jun-2010
Value	100.0	104.6	106.4	104.6	102.6	101.5	101.9	101.2	101.5
Dates		Sep-2010	Dec-2010	Mar-2011	Jun-2011	Sep-2011	Dec-2011	Mar-2012	Jun-2012
Value		102.2	102.1	102.3	104.2	103.4	103.7	104.0	104.3

## 6.2 APPLICATION

The following formula is used to determine the percentage change in the index between two points in time of interest:

$$\text{Percentage change between time 1 and 2} = (\text{Value at time 2} - \text{Value at time 1}) / \text{Value at time 1}$$

For example,

$$\begin{aligned} \text{Change}_{\text{June 2008} - \text{June 2009}} &= (\text{Value}_{\text{June 2009}} - \text{Value}_{\text{June 2008}}) / \text{Value}_{\text{June 2008}} \\ &= (102.6 - 100) / 100 \\ &= 2.6\% \end{aligned}$$

The year on year movements in the escalation index are shown in Table 6-2.

**Table 6-2 – Year on year movements in escalation index**

Period	June 2008 to June 2009	June 2009 to June 2010	June 2010 to June 2011	June 2011 to June 2012
% change	2.6%	-1.0%	2.6%	0.1%