


Review of Operating and Capital Expenditure of the Sydney Catchment Authority

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Review Report

Independent Pricing and Regulatory Tribunal

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Halcrow Pacific
Level 40, 385 Bourke Street, Melbourne VIC 3000, Australia
GPO Box 1841, Melbourne VIC 3001
Tel +61 3 8682 3900 Fax +61 3 8682 3999
www.halcrow.com

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Abbreviations

Acronym	Description
CMA	Catchment Management Authority
CMEM	Civil, Mechanical and Electrical Maintenance (Contract)
FSL	Full Supply Level (of storage)
FTE	Full Time Equivalent (staff numbers)
HMSFS	Hydrometric Monitoring and Sampling Field Services (Contracts)
PMF	Probable Maximum Flood
SCA	Sydney Catchment Authority
SCARMS	Sydney Catchment Authority Reservoir Management System

Executive Summary

Introduction

Halcrow has been engaged by the Independent Pricing and Regulatory Tribunal (IPART) to undertake an independent review of capital and operating expenditure incurred by the Sydney Catchment Authority (SCA). This work forms part of the process of reviewing/setting prices for regulated services for a period of up to five (5) years commencing on 1 July 2012.

Scope of Review

Halcrow has been engaged to assess the adequacy, appropriateness and efficiency of the Sydney Catchment Authority's past and proposed levels of operating and capital expenditure. The assessment has comprised:

- undertaking a strategic management overview of the Sydney Catchment Authority's operating environment, planning and asset management processes, and the scope for it to fulfil its responsibilities in a more efficient and cost effective way, taking into account available benchmarks of comparable water or natural resource managers;
- examination of the total level of expenditure;
- a broad and high level assessment of long term capital expenditure; and
- assessment of expenditure on an individual activity/project basis.

Strategic Management Overview

The SCA's operating environment has been subject to a number of changes since its last price determination. These changes have led to reduced water sales and a more volatile demand, as well as the need (in some cases) to change/augment its infrastructure and adjust its approach to operational management.

The SCA has recently initiated and continues to implement changes to its management systems and approach. These changes are aimed at better aligning the organisation and its operations with the key focus areas identified in its *Corporate Sustainability Strategy*.

The SCA is no longer the sole supplier of water to the Sydney, Illawarra and Blue Mountains Region. The commissioning of the Sydney Desalination Plant and the commissioning of recycled water schemes have resulted in a reduction of SCA water sales.

Other changes have included the commencement of the *Greater Metropolitan Water Sharing Plan* including new environmental flow regimes for Warragamba Dam and dams in the Upper Nepean system, and the adoption of a revised *Metropolitan Water Plan*.

The SCA's operations are supported by a number of business systems, planning frameworks and processes. Of specific interest to this review are:

- Asset Management Framework;
- Operations and Maintenance Planning processes;
- Capital Planning Framework; and
- Project Management Framework.

These systems and processes have been reviewed with the primary objective of determining whether they are sufficiently robust and consistent with good industry practice to:

- facilitate informed investment decisions; and
- target and optimise expenditure such that services can be provided at the lowest sustainable cost.

The SCA is in the process of developing and implementing a new Asset Management Framework which involves restructuring its approach to both the strategic and tactical management of its assets. This restructure has involved the further development and implementation of key processes such as Life Cycle Costing and a corporate wide Business Risk Support System, which will include a wider application of risk cost estimation.

The SCA's new Asset Management Framework has not yet been fully implemented across all asset categories and/or management processes. Whilst water supply assets have traditionally been well captured/documented within the asset management system, other asset categories have either only recently been (eg. IT equipment), or are yet to be (eg. land and property assets) captured. It is noted that components of the asset procedures, eg. asset disposal, are not yet fully developed and implemented.

It is also noted that the guideline in support of the capital expenditure program does not specifically identify the use/implementation of capital prioritisation processes. Whilst this tends to infer that, provided capital investment is assessed as being warranted it will be included in and implemented as part of the capital program, the SCA notes that prioritisation of expenditure is undertaken as part of its internal review processes that include reviews by the Project Review Panel, the Executive and the Board Asset Management Committee prior to approval by the SCA Board.

Despite these qualifications, the SCA has made and continues to make significant improvements in its strategic management framework and supporting systems. Whilst some shortfalls in the forward planning in support of the proposed capital program have been observed, it is apparent that SCA's business processes will continue to become more effective as its entire asset portfolio is captured within its asset management system and its updated approaches to planning and project management are fully implemented.

Review of Operating Expenditure

The Sydney Catchment Authority's regulated expenditure in the period 2009/10 to 2011/12 is 3.7 percent (\$8.8 million) less than the amount allowed in the 2009 Price Determination.

Operating expenses were lower than allowed by IPART for the following reasons:

- Reduced staff numbers;
- Project deferment;
- Improved operating conditions; and
- Change in scope of projects and new efficiency initiatives.

None of these adversely affected the SCA in meeting its statutory obligations and service standards. Halcrow concludes that the SCA's operating expenditure incurred over the current price path is efficient.

The annual forecast operating expenditure is, however, 7 percent (\$6 million) greater than the annual average for current price path. No substantive change in the SCA's level of activities is expected over this period with the exception of a recommencement of pumping from the Shoalhaven Scheme and taking of supply from the Fish River Scheme.

At the aggregate level of operating expenditure, the SCA proposes to maintain the labour efficiencies achieved over the current price path. Additional expenses will be incurred which will increase the level of efficient costs.

At the aggregate level, the increase in operating costs can be explained by:

- a 1.8 percent increase in average staff numbers equating to a cost increase of about \$0.6 million and an increase of about 0.9 percent in the average cost of labour (+\$0.3 million);
- lifting of the moratorium on Shoalhaven pumping which will result in costs of \$2 million;
- recommencement of supply from the Fish River Scheme at a cost of about \$1.1 million;
- additional licence fees of \$1.1 million payable to the Water Administration Ministerial Corporation (Office of Water); and
- an increase of \$0.9 million in Customer Service costs from 2011/12 to 2015/16, representing a new levy to be imposed by Sydney Water for calibration services.

Unlike the 2009 Determination, the SCA is not proposing a blanket reduction in operating expenditure reflecting additional efficiency savings.

Halcrow has identified current shortfalls in the SCA's capital planning and management systems. Full development and implementation of its recently updated processes may attract additional expenditure.

It can be expected, however, that the SCA will make continuing efficiency gains. Halcrow has set an annual efficiency target of 0.3 percent per annum (cumulative) against core operating expenditure (\$87 million per year) over the determination period.

The allowed operating expenditure will need to be adjusted to take account of the carbon tax. Further adjustments may also be required for movements in the market price of electricity. Adjustments in respect of these items will increase the allowed expenditure shown below in **Table E.1**.

Halcrow also proposes the expensing of expenditure proposed to be capitalised by the SCA.

The level of expenditure allowed is sufficient for the SCA to meet its service level commitments.

The SCA has identified gaps in current institutional arrangements for the coordination of the metropolitan water supply. These gaps principally relate to the operation of the desalination plant. They create uncertainties which impact the risk profile of the SCA. The SCA seeks to address these through a change in the revenue mix between fixed and usage charges and the provision of an 'insurance premium' for Shoalhaven pumping costs.

Review of Capital Expenditure

Of the fifteen (15) projects reviewed in detail, in general expenditure related to both historic and future projects is prudent. For both historic and future projects, there has been little consistency in documenting business needs, however, in general Halcrow has been able to follow the background to why the SCA has proposed expenditure.

Several projects selected for review are driven by decisions made by the NSW Government in its series of *Metropolitan Water Plans* released in 2004, 2006 and 2010. Where the NSW Government has set budgets, the SCA has in general exceeded them, however, have remained transparent in communicating where actual expenditure has been higher than forecast.

Halcrow has observed a consistent lack of scope, definition and costing of proposed capital expenditure for projects in the coming price path. This observation leads Halcrow to believe projects are not being delivered as efficiently as they could be, and this may also be a contributing reason for historic underspend. Adjustments to the allowed expenditure are recommended in some cases.

Where future projects still lack definition, in order to promote efficiency, it is Halcrow's recommendation that expenditure should only be permitted for detailed investigation/early procurement activities in the upcoming period. This would place the SCA in a better position to accurately cost a known program for the following determination. Alternatively, a shorter determination of 3 years for may be considered appropriate. This would allow sufficient time for the SCA to better prepare detailed business cases and commence early procurement activities such as tendering.

On the basis of the review, Halcrow has recommended adjustments amounting to \$4.272 million (\$real 2011/12) for the current determination period (2009/10 to 2011/12) and \$79.033 million (\$real 2011/12) for the period 2012/13 to 2016/17. These adjustments are based on:

- reduction of expenditure in respect of three (3) projects, including:
 - two (2) projects for which efficiency adjustments are proposed; and
 - one (1) project for which a component of the works is not deemed prudent at this time;
- reduction of expenditure on the basis of efficiency and adjustment of the delivery timeframe (also for efficiency purposes) for one (1) project;
- deferment of expenditure for four (4) projects; and
- expensing (rather than capitalisation) of expenditure in respect of two (2) projects.

Proposed Adjustments to Forecast Expenditure

The SCA's proposed operating expenditure for the period 2012/13 to 2016/17, together with Halcrow's recommended level of operating expenditure, is summarised in **Table E.1**.

Table E.1: Forecast and Recommended Operating Expenditure (\$million 2011/12)

Expenditure Profile (\$value)	2012/13	2013/14	2014/15	2015/16	2016/17	Total Cost 2012/13 to 2016/17
SCA Forecast Operating Expenditure Profile	89.7	89.6	89.7	89.7	89.7	448.4
Efficiency target	(0.3)	(0.5)	(0.8)	(1.0)	(1.3)	(3.9)
Carbon Tax Shoalhaven	1.3	1.3	1.3	1.4	1.4	6.7
Carbon Tax Other	0.5	0.5	0.5	0.6	0.6	2.7
Halcrow Recommended Expenditure Profile (based on SCA Proposal)	91.2	90.9	90.7	90.7	90.4	453.9
SCA Forecast Capital Expenditure to be Expensed	5.8	2.3	2.0	0.0	0.0	10.1
Halcrow Recommended Operating Expenditure Profile	97.0	93.2	92.7	90.7	90.4	464.0

It is noted that operating expenditure recommended by Halcrow includes an allowance for capital expenditure proposed by the SCA which Halcrow considers should be expensed.

The SCA's recorded actual and proposed capital expenditure for the period 2008/09 to 2016/17, together with Halcrow's recommended level of capital expenditure, is summarised in **Table E.2**.

Table E.2: Actual/Forecast and Recommended Capital Expenditure – 2008/09 to 2016/17 (\$million 2011/12)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
SCA Forecast Expenditure Profile (AIR/SIR)	80.333	53.812	27.164	18.669	31.497	32.877	36.627	45.883	61.049	207.934
Recommended Adjustments	-0.742	-2.912	-0.389	-0.971	-6.595	-3.250	-7.373	-25.113	-36.702	-79.033
Halcrow Recommended Forecast Expenditure Profile	79.589	50.900	26.775	17.698	24.902	29.627	29.254	20.771	24.347	128.901

1 Introduction

1.1 Overview

Halcrow has been engaged by the Independent Pricing and Regulatory Tribunal (IPART) to undertake an independent review of capital and operating expenditure incurred by the Sydney Catchment Authority (SCA). This work forms part of the process of reviewing/setting prices for regulated services for a period of up to five (5) years commencing on 1 July 2012.

1.2 Background

The Sydney Catchment Authority was established in 1999 by the *Sydney Water Catchment Management Act 1998*, to manage and protect the water catchment areas and infrastructure under its control, and to supply water of sufficient quality to its customers.¹

The Sydney Catchment Authority's main customer is Sydney Water, which currently uses approximately 99 percent of its water supply. Other customers include Shoalhaven City Council, Wingecarribee Shire Council and approximately sixty five (65) smaller raw water and unfiltered water retail customers.²

IPART has responsibility for setting the maximum prices that the Sydney Catchment Authority can charge its customers. In the context of monopoly businesses, IPART's role is to protect customers from paying for inefficient or unnecessary expenditure, while ensuring these businesses raise adequate revenue to deliver the required services. To this end, IPART seeks to set prices which do not reward inefficient investment and asset management decisions, or inefficient operations and practices.³

IPART is also responsible for making recommendations to the Minister on the Sydney Catchment Authority's Operating Licence. The current licence started on 8 April 2011 and expires on 30 June 2012. IPART is currently undertaking a review of the Sydney Catchment Authority's Operating Licence.

The purpose of this review is to inform IPART's investigations into the prudent and efficient operating and capital expenditure of the monopoly supplier. In addition, it is required to assist IPART in developing a cost benefit analysis on the proposed changes to the Operating Licence by gathering and assessing necessary input data.⁴

¹ IPART, *Review of the Operating Licence and review of prices for the Sydney Catchment Authority from 1 July 2012*, June 2011, pg18.

² IPART, *Review of the Operating Licence and review of prices for the Sydney Catchment Authority from 1 July 2012*, June 2011, pg18.

³ IPART, *Request for Scope of Work and Quote: Review of Operating and Capital Expenditure of the Sydney Catchment Authority*, 3 June 2011.

⁴ Halcrow's input to the review of the Operating Licence is separately presented in the report: Halcrow, *Cost Benefit Analysis of Proposed Changes to Sydney Catchment Authority's Operating Licence; Input Data*, November 2011.

1.3 Scope of Review

Halcrow has been engaged to assess the adequacy, appropriateness and efficiency of the Sydney Catchment Authority's past and proposed levels of operating and capital expenditure. The assessment has comprised:

- undertaking a strategic management overview of the Sydney Catchment Authority's operating environment, planning and asset management processes, and the scope for it to fulfil its responsibilities in a more efficient and cost effective way, taking into account available benchmarks of comparable water or natural resource managers;
- examination of the total level of expenditure;
- a broad and high level assessment of long term capital expenditure; and
- assessment of expenditure on an individual activity/project basis.

More specifically, Halcrow has assessed:⁵

- the *efficiency* of operating expenditure for the period 1 July 2009 to 30 June 2011, to the extent necessary to assess the *efficiency* of the proposed operating expenditure;
- the *efficiency* of the proposed operating expenditure for the period from 1 July 2011 to 30 June 2017;
- the *efficiency* and *prudence* of capital expenditure for the period from 1 July 2008 to 30 June 2011;
- the *efficiency* and *prudence* of proposed capital expenditure for the period from 1 July 2011 to 30 June 2017;
- the *efficiency* and *prudence* of proposed long term capital expenditure for the Upper Canal, Warragamba Dam and Shoalhaven Transfer Projects; and
- the Sydney Catchment Authority's past performance against its current output measures and review and recommend output measures for the next determination period.

In undertaking the review, consideration has to be given to:

- relevant legislation, regulatory requirements and Government policies and initiatives;
- current and projected capacity;
- growth in customer numbers;
- current asset condition and renewal requirements;
- asset management frameworks, plans and practices;
- existing operational requirements;
- ring fencing of and cost transfers between regulated and unregulated activities;

⁵ The terms "*efficiency*" and "*prudence*", as they apply for the purposes of this assignment, are explained in the *Request for Scope of Work and Quote* for the *Review of Operating and Capital Expenditure by Sydney Catchment Authority*.

- segregation of and cost transfers between heritage/non commercial activities, and the other regulated activities of the business;
- implications of significant developments in the Sydney Catchment Authority's major customer (Sydney Water);
- specific regional and demographic circumstances of the Sydney Catchment Authority;
- implications for expenditure of demand management initiatives;
- efficient costs of providing the relevant bulk water services;
- potential for contestability in the provision of bulk water services;
- current and likely future environmental, health and safety standards; and
- current and likely future service obligations.

1.4 Structure of Report

This report discusses and presents Halcrow's key findings and recommendations arising from the review of operating and capital expenditure by the Sydney Catchment Authority. Specifically:

- **Section 1** provides background in respect of the Sydney Catchment Authority, IPART and the scope of this review.
- **Section 2** provides a brief overview of the information provided by the Sydney Catchment Authority for the purposes of this review.
- **Section 3** provides an overview of the approach adopted by Halcrow in reviewing the efficiency of operating expenditure and the prudence and efficiency of capital expenditure.
- **Section 4** outlines Halcrow's review of the Sydney Catchment Authority's strategic management process, and more specifically, its approach to planning and asset management processes.
- **Section 5** outlines Halcrow's assessment of the operating expenditure incurred/forecast by the Sydney Catchment Authority.
- **Section 6** outlines Halcrow's assessment of capital expenditure incurred/forecast by the Sydney Catchment Authority.
- **Section 7** summarises the findings of Halcrow's assessment and presents the conclusions drawn from the review. Recommendations in respect of the prudence and efficiency are also presented.

1.5 Report Limitations

This report has been prepared for IPART by Halcrow for the sole purpose of providing an assessment as to the efficiency of the Sydney Catchment Authority's historical and proposed operating expenditures and the prudence and efficiency of its historical and proposed capital expenditure in the period 2009 to 2017. 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 the Sydney Catchment Authority, from meetings and discussions held with Sydney Catchment Authority representatives, and on information provided by the Sydney Catchment Authority 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 the Sydney Catchment Authority.

2 SCA Submission and Supporting Information

The Sydney Catchment Authority's submission in respect of the review of prices comprises the following documentation:

- Sydney Catchment Authority – Submission to IPART Review of the Operating Licence and Prices (Pricing Submission or Submission);⁶ and
- Annual Information Return/Special Information Return (AIR/SIR).⁷

Other supporting information that has been provided for the purposes of conducting this review has included:

- Detailed information in support of proposed operating expenditure;
- Project business cases; and
- Additional information and clarifications in response to specific questions raised by Halcrow.

⁶ Sydney Catchment Authority, *Submission to the Independent Pricing and Regulatory Tribunal; Review of Operating Licence and Prices for the Sydney Catchment Authority 2011*, 16 September 2011.

⁷ Sydney Catchment Authority, *Annual Information Return (Final AIR.xlsx)*.

3 Review Methodology

3.1 Overview

The review of the Sydney Catchment Authority's operating and capital expenditure has comprised a number of elements including:

- A desktop review of information provided by the Sydney Catchment Authority in its Pricing Submission and AIR/SIR.
- Preparation of a Request for Information that identified key supporting information required to effectively undertake the review. This was submitted to the Sydney Catchment Authority on 30 September 2011.
- Meetings with Sydney Catchment Authority representatives at the Authority's Penrith offices to obtain more detailed information in relation to its historical and forecast expenditure; meetings were held on 4th, 5th and 6th October 2011.
- A desktop review of information provided by the Sydney Catchment Authority in support of its Pricing Submission, both during and subsequent to the meetings with its representatives. Additional requests for information were made by Halcrow on the basis of information provided.
- The detailed review of key elements of operating expenditure (both historical and forecast) to assess the efficiency of such expenditure.
- The detailed review of key elements of capital expenditure (both historical and forecast) to assess the prudence and efficiency of such expenditure.
- Synthesis of data obtained from the above evaluation to draw conclusions in respect of the efficiency and prudence of the expenditure.
- Preparation of this report to document the findings of the review.

The review has also been informed by the learning Halcrow gained by undertaking both the 2011 Operational Audit and the 2011 Audit of the SCA's Asset Management Obligation. The results of these audits are separately documented.^{8,9}

The following sections outline the basis upon which the prudence and efficiency of expenditure has been assessed.

3.2 Assessment of Prudence

The assessment of whether the Sydney Catchment Authority's capital expenditure is *prudent* has been split into a number of key tasks.

The first key task has involved the review and assessment of whether the Sydney Catchment Authority has in place an effective and robust planning framework.

⁸ Halcrow, *2011 Operational Audit of Sydney Catchment Authority; Audit Report*, November 2011.

⁹ Halcrow, *2011 Audit of Sydney Catchment Authority's Asset Management Obligation; Audit Report*, November 2011.

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 the Sydney Catchment Authority's planning framework, which has been informed by the audit of the SCA's asset management obligations, has been aimed at assessing whether the above key elements can be identified.

The second key task in the assessment of prudence has involved testing whether the Sydney Catchment Authority has been able to demonstrate the rigour with which the framework is applied throughout the organisation. This has involved a more detailed review of actual and proposed capital expenditure, including periodic maintenance 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.

Consideration of these elements has, once again, been informed by the audit of the SCA's asset management obligations.

3.3 Assessment of Efficiency

In undertaking the review of efficiency, Halcrow has sought to determine whether the costs presented in the Sydney Catchment Authority's Pricing Submission and AIR/SIR 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.

3.4 Cost Escalation

Throughout this report, all expenditure has been reported in \$nominal and \$2011/12 real unless otherwise stated. Historical expenditure has been indexed to \$2011/12 real using escalation factors provided by IPART. Forecast expenditure has been adjusted to \$2011/12 real using IPART's nominated escalation factor, ie. 2.5 percent per annum.

Adopted escalation factors are as shown in **Table 3.1**.

Table 3.1: Escalation Factors used in this Report

Escalation from	Escalation Factor		
	Nominated by IPART	Proposed by SCA	
		Labour	Non-Labour
\$2005/06 to \$2006/07	3.2%		
\$2006/07 to \$2007/08	2.9%	3.4%	3.4%
\$2007/08 to \$2008/09	3.4%	2.8%	2.8%
\$2008/09 to \$2009/10	3.1%	3.9%	3.9%
\$2009/10 to \$2010/11	2.3%	1.9%	1.9%
\$2010/11 to \$2011/12	3.1%	3.0%	3.0%
\$2011/12 to \$2012/13	2.5%	2.5%	3.0%
\$2012/13 to \$2013/14	2.5%	2.5%	2.5%
\$2013/14 to \$2014/15	2.5%	2.5%	2.5%
\$2014/15 to \$2015/16	2.5%	2.5%	2.5%
\$2015/16 to \$2016/17	2.5%	2.5%	2.5%

An assessment of the Sydney Catchment Authority's escalation factors is outside the scope of this review. It is, however, noted that in its AIR/SIR the SCA applies inflation rates (in the "Opex" Worksheet) for non-labour costs based on a calculation of year-on-year March to March inflation (applying the Average of Four Quarters/ Average of Four Quarters). It is understood that IPART's figures are year-on-year June to June. IPART has not distinguished between labour and non-labour indexation rates.

The identical issue of the SCA adopting different indexation rates to IPART was reported in the operating expenditure review for the 2009 Determination.¹⁰

¹⁰ Worley Parsons, *Review of Capital and Operating Expenditure; Sydney Catchment Authority (2009 Determination)*, January 2009, pg21.

4 Strategic Management Overview

4.1 Overview

The Sydney Catchment Authority is constituted under the *Sydney Water Catchment Management Act 1998*. Its role is to protect 16,000 square kilometres of drinking water catchments and to manage dams, pipelines and other infrastructure that are used to supply water to its customers with raw water.

The SCA's operating environment, which is extensively defined, has been subject to a number of changes since its last price determination. These changes have led to reduced water sales and a more volatile demand, as well as the need (in some cases) to change/augment its infrastructure and adjust its approach to operational management.

The SCA has recently initiated and continues to implement changes to its management systems and approach. These changes are aimed at better aligning the organisation and its operations with the key focus areas identified in its *Corporate Sustainability Strategy*.

This section provides an overview of the SCA's operating environment and its management systems and business planning frameworks in order to provide an understanding of the basis upon which its expenditure proposal for the coming price path period has been developed.

4.2 Operating Environment

4.2.1 General

The Sydney Catchment Authority operates in an environment driven by a number a legislative and associated instruments. These include, but are not limited to:

- *Sydney Water Catchment Management Act 1998*;
- *Sydney Water Catchment Management Regulation 2008* – which allows the SCA to protect water quality and manage the catchments by exercising certain regulatory functions over non-scheduled premises and activities under the *Protection of the Environment Operations Act 1997*;
- Sydney Catchment Authority *Operating Licence*;
- *Water Management Licence* – administered by the Water Administration Ministerial Corporation (currently the NSW Office of Water), this Licence defines the SCA's water access rights and obligations, and authorises the operation of its water management works;
- *Memoranda of Understanding* – which guide the management of relationships with NSW Health and the Environmental Protection Authority;
- *Bulk Water Supply Agreements* – between the SCA and its principal customers, ie. Sydney Water, Shoalhaven City Council and Wingecarribee Shire Council;

- Catchment audits;
- Operational audits; and
- Price determinations.

Other instruments that impact the way the SCA operates include:

- *Water Industry Competition Act 2006*;
- *Greater Metropolitan Water Sharing Plan*; and
- *Metropolitan Water Plan*.

Introduction of the *Water Industry Competition Act 2006 (WICA)*, which facilitated the introduction of competition into the water industry, is a key change to the SCA's operating environment since the last (2009) price determination. The most significant manifestation of the WICA has been the commissioning of the Sydney Desalination Plant, which has resulted in a reduction of SCA water sales to approximately 85 percent of previous levels. The SCA is no longer the sole supplier of water to the Sydney, Illawarra and Blue Mountains Region.

Other changes have included the commencement of the *Greater Metropolitan Water Sharing Plan* including new environmental flow regimes for Warragamba Dam and dams in the Upper Nepean system, and the adoption of the revised (2010) *Metropolitan Water Plan*.

4.2.2 Legislative Framework¹¹

The *Sydney Water Catchment Management Act 1998* (the Act) is the legislation that defines the roles, functions and objectives of the Sydney Catchment Authority.

The role of the SCA under the Act is to:

- manage and protect the catchment areas and catchment infrastructure;
- supply bulk water; and
- regulate certain activities in or affecting the inner and outer catchment areas.

The main functions of the SCA under the Act are to:

- protect and enhance the quality and quantity of water in the catchments;
- manage and protect the catchment areas, and catchment infrastructure;
- supply bulk water to Sydney Water, other water supply authorities and direct customers;
- protect and enhance water quality;
- research catchments generally, and the health of its own catchments in particular; and
- help educate the community about water management and catchment protection.

¹¹ SCA website, <http://www.sca.nsw.gov.au/about-sca/legislative-framework>, accessed 18 October 2011.

4.2.3 Operating Licence

The operation of the SCA is governed by an *Operating Licence* which sets out the primary roles and responsibilities under which the SCA will operate its business. More specifically, the purpose of the *Operating Licence* is to set out the terms and conditions under which the SCA is to:¹²

- (a) *meet the objectives and other requirements imposed on it in the Act;*
- (b) *provide, construct, operate, manage and maintain efficient and co-ordinated viable systems and services for supplying Bulk Raw Water;*
- (c) *comply with the quality and performance standards required in the Licence or required to be developed under the Licence;*
- (d) *report against indicators on the impact of its activities (including but not limited to, the impact of energy used and waste generated), or other matters as determined by IPART;*
- (e) *recognise the rights given to Customers and the community by the Licence; and*
- (f) *be subject to the Annual Audit of compliance with the Licence.”*

The SCA's first *Operating Licence* was issued on 2 July 1999; the current *Operating Licence* was issued on 8 April 2011 and will expire on 30 June 2012.

Under the provisions of the *Operating Licence*, the SCA is subject to an annual audit of its compliance with its obligations of the *Licence* and the memoranda of understanding (required under the provisions of the *Licence*) with NSW Health and the Environment Protection Authority (now the Office of Environment and Heritage).

4.2.4 Greater Metropolitan Water Sharing Plan

The *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011* commenced on 1 July 2011. It includes rules for protecting the environment, extractions, managing licence holders' water accounts, and water trading in the plan area.

Water sources included in the plan area “cover an area of approximately 32,500 square kilometres, from Shoalhaven Heads in the south, Broken Bay in the north, Lithgow to the west and Goulburn to the south-west. The region is bounded by and includes the Hawkesbury River catchment to the north and west and Shoalhaven River catchment to the south and south-west. The region also includes the rivers of the Illawarra and metropolitan Sydney.”¹³

Apart from setting extraction limits, one of the principal elements of the *Greater Metropolitan Water Sharing Plan*, is the requirement in respect of the release of environmental flows. This requirement not only has a potential impact on catchment yield, but has also necessitated works to facilitate compliant flow releases.

¹² NSW Government, *Sydney Catchment Authority Operating Licence (2011-2012)*, Part 1, Section 1.1.

¹³ NSW Office of Water, *Water Sharing Plan; Greater Metropolitan Region Unregulated River Water Sources; Guide*, July 2007, pg1.

4.2.5 Metropolitan Water Plan

The NSW Government's *Metropolitan Water Plan* was developed to ensure there is enough water, both during the recent drought and into the future, for Sydney, the Blue Mountains and the Illawarra. It also addresses restoration of the health of the Hawkesbury-Nepean River and other waterways in the Greater Sydney area.

The *Plan* provides ways to better supply, save or recycle water and identifies initiatives that will help deliver cost-effective solutions for the region's future water needs.

The NSW Office of Water leads a whole-of-government approach to implementing and updating the *Metropolitan Water Plan*, with a major review of the plan undertaken every four years. The most recent update, the *2010 Metropolitan Water Plan*, was released in August 2010; previous versions were issued in 2004 and 2006.

Whilst the Plan identifies a range of initiatives that impact on the operations of and/or require action by the SCA, one significant element of the *2010 Metropolitan Water Plan* is that it specifies the operating rules for the Sydney Desalination Plant, which was commissioned in June 2010.

4.3 Management Systems

4.3.1 General

As previously mentioned, the SCA has recently initiated and continues to implement changes to its management systems and approach. These changes are aimed at better aligning the organisation and its operations with the strategies identified in its *Corporate Sustainability Strategy*.

The SCA's operations are supported by a number of business systems, planning frameworks and processes. Of specific interest to this review are:

- Asset Management Framework;
- Operations and Maintenance Planning processes;
- Capital Planning Framework; and
- Project Management Framework.

These systems and processes have been reviewed with the primary objective of determining whether they are sufficiently robust and consistent with good industry practice to:

- facilitate informed investment decisions; and
- target and optimise expenditure such that services can be provided at the lowest sustainable cost.

4.3.2 Corporate Sustainability Strategy¹⁴

The Sydney Catchment Authority's strategic direction is set in its *Corporate Sustainability Strategy 2010-2015*. The *Strategy* embeds sustainability in the SCA's governance and structures and in its business and operational plans.

In recognition that it must continue to change the way it does business to balance its social, environment, and economic responsibilities, the SCA has refocused its values and behaviour to be more sustainable in achieving the organisation's vision and role.

The *Strategy* identifies six key areas of focus for the period 2011 to 2015, and details how the SCA works to achieve them. These focus areas are:

- Engaged People (Employees);
- Stakeholder Relationships;
- Business Viability;
- Industry Excellence;
- Reliable Water; and
- Resource Optimisation.

The *Corporate Sustainability Strategy* is encapsulated on a single page. As well as a clear statement of the SCA's objective in respect of each focus area, it identifies strategies for achievement of and performance indicators that will be used to measure that achievement.

4.3.3 Management of Assets (Asset Management Framework)

4.3.3.1 Overview

The SCA is in the process of developing and implementing a new Asset Management Framework (refer **Figure 4.1**), which involves restructuring its approach to both the strategic and tactical management of its assets. This restructure has involved the further development and implementation of key processes such as Life Cycle Costing and a corporate wide Business Risk Support System, which will include a wider application of risk cost estimation.

In conjunction with this review of the SCA's operating and capital expenditure, Halcrow has undertaken an audit/assessment of the SCA's compliance with the asset management obligations of its *Operating Licence*.¹⁵ It is clear from the activities currently in hand to implement a revised Asset Management Framework that the SCA is committed to the continuing development and improvement of its asset management practices. This commitment is supported by the recent organisational restructure¹⁶ and the SCA's intent to implement an upgrade of its MAXIMO asset management system.

¹⁴ SCA website, http://www.sca.nsw.gov.au/_data/assets/pdf_file/0014/23423/SCA_CSS_print23-05.pdf accessed 26 October 2011.

¹⁵ Halcrow, *2011 Audit of Sydney Catchment Authority's Asset Management Obligation; Audit Report*, November 2011.

¹⁶ Following an internal realignment effective from January 2011, the SCA's Asset Management System will be managed by the recently formed Assets and Major Projects Group.

It is also of note that the SCA has undertaken a self assessment of its asset management capability relative to the requirements of PAS 55 *Asset Management* and the NSW Government's Total Asset Management policy/framework. It has stated its intention to review procedures in relation to developments in the evolution of Asset Management standards (notably PAS 55 and ISO55000 *Asset management -- Overview, principles and terminology*).

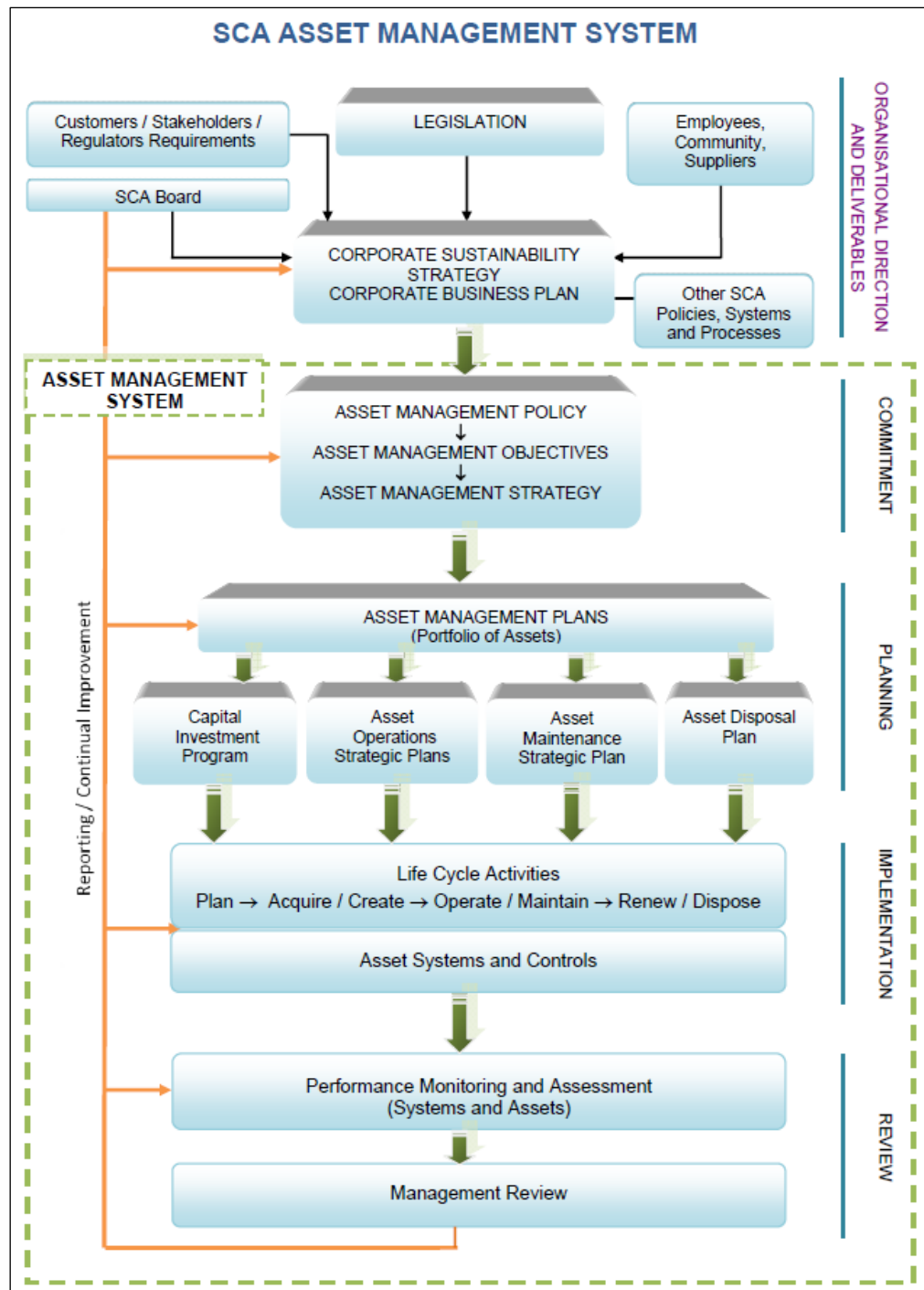


Figure 4.1: Sydney Catchment Authority Asset Management System

It is noted, however, that the SCA's new Asset Management Framework has not yet been fully implemented across all asset categories and/or management processes. Whilst water supply assets have traditionally been well captured/documented within the asset management system, other asset categories have either only recently been (eg. IT equipment), or are yet to be (eg. land and property assets) captured.

It is also noted that components of the asset procedures, eg. asset disposal, are not yet fully developed and implemented.

4.3.3.2 Asset Portfolio

The SCA's asset portfolio differs from that of many water industry entities in that it comprises a number of large, individual assets (as opposed to a large number of like assets). Its water supply assets, ie. the dams, bulk water transfer and associated infrastructure, which are directly employed in the delivery of its services are all individual assets which require the development of their own asset management plans.

The asset portfolio also includes assets that facilitate or support delivery of the SCA's primary service, ie. the supply of bulk raw water. These include land and property assets as well as data capture and management infrastructure.

4.3.3.3 Asset Management Implementation

The SCA employs a number of tools, systems and processes in managing its assets. Principal amongst the tools is the MAXIMO Enterprise Asset Management System, which the SCA is planning to upgrade and fully implement in the first quarter of 2012. The proposed upgrade of MAXIMO will enable the full implementation of a range of analyses and planning tools that will support the full suite of asset management practices required for alignment with the NSW Government's Total Asset Management policy/framework.

The SCA has recently captured (and continues to capture) additional asset categories within MAXIMO;¹⁷ this will enable the broader implementation of this tool in support of the management of its assets.

As shown in **Figure 4.1**, the SCA's Asset Management Framework is supported by a range of policies and processes. These are summarised in a number of process charts which address elements of asset management practice including, for example:

- Asset Identification and Registration (D2011/29401);
- Asset Movements (D2011/29423);
- Asset Retirement (D2011/29433);
- Work Request (D2011/29430);
- Plan and Schedule (D2011/29431);
- Works Management (D2011/29409); and
- Maintenance Effectiveness (D2011/29424).

¹⁷ Until recently, MAXIMO was principally used to support management of the SCA's key water supply assets, ie. those assets directly associated with the delivery of its core functions.

4.3.3.4 Dam Safety Management

Given the significance of dams and associated infrastructure within the SCA's asset portfolio, compliance with the requirements of the NSW Dam Safety Committee is a key driver of the management of these assets. These requirements, which are based principally around guidelines published by the Australian Committee on Large Dams (ANCOLD), inform the operation and maintenance of the SCA's dams as well as the need for future works resulting from changes to standards.

4.3.4 Operations and Maintenance Planning

On the basis of the information provided for this review, including the SCA's Pricing Submission, Halcrow has inferred that the SCA has implemented a 'top down' approach to the development of its operating expenditure forecast for the coming price determination period (refer **Section 5.2** for further discussion). Nonetheless, Halcrow recognises that the SCA uses a number of plans and processes to support the detailed planning and implementation of its operations and maintenance activities.

MAXIMO is used to record asset details, including condition, criticality and associated risk. It is the primary tool used in identifying, planning and implementing asset maintenance activities. It is also used to monitor asset condition and drive the renewal of assets where appropriate.

In order to improve the capture of asset information into MAXIMO, contracts for the supply/construction of new assets include requirements for the contractor to provide details of asset maintenance and renewal requirements in a form that facilitates uploading into MAXIMO.

Other elements of the SCA's management systems that are used to inform/develop the SCA's operating expenditure forecasts include:

- *Water Monitoring Program 2010-2015* – which outlines the nature and extent of its monitoring program; and
- *Healthy Catchments Program* – the annual program of catchment protection and management activities implemented in support of the SCA's *Healthy Catchments Strategy 2009-12*.

4.3.5 Capital Planning

The SCA's capital planning process is documented in its *Manual for the Development and Management of the Capital Expenditure Program*.¹⁸ This guideline outlines the processes to be followed in the initial development of the capital program and when the program is to be changed.

Development of the capital program is interlinked with and dependent upon the SCA's Project Management Framework, which is outlined in **Section 4.3.6**.

Key stages in the development of the Capital Expenditure Program are identified and explained; as shown in **Figure 4.2**, they include:

¹⁸ SCA, *Manual for the Development and Management of the Capital Expenditure Program*, August 2010.

- *Project Development* – involves the identification of both new and existing projects as documented in the form of a Project Brief or Business Case (new projects) or Change Requests (existing projects);
- *Program Development* – involves the Project Review Panel (refer **Section 4.3.6**) undertaking a review and assessment of project briefs, business cases, project and program changes, project portfolio status and implications for the Annual and Forward Programs. Projects with approved project briefs or business plans are included on the Annual Program or Forward Program as appropriate.
- *Program Approval* – the Capital Expenditure Program is reviewed and approved through a process involving the SCA Executive, the Board’s Standing Committee on Asset Management and the Board.

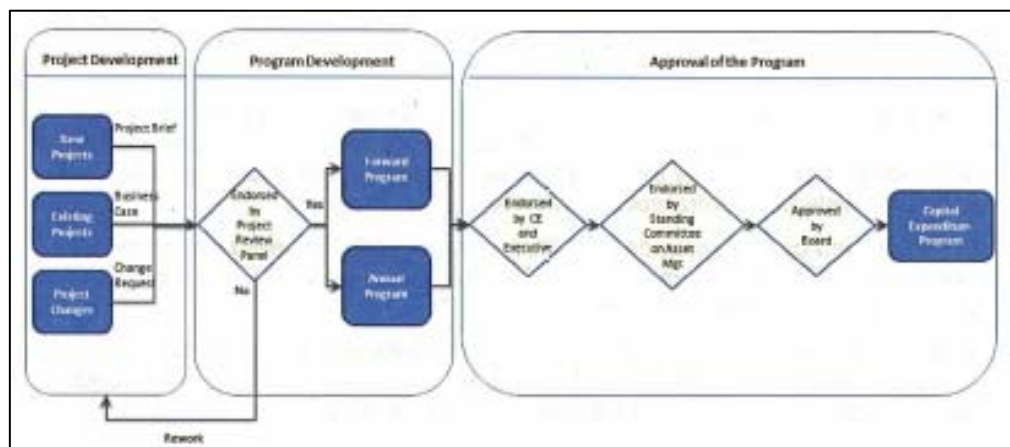


Figure 4.2: Key Stages in the Development of the SCA's Capital Expenditure Program¹⁹

The SCA's Forward Capital Expenditure Program is a rolling four year program that extends beyond the upcoming year and aligns with the four year business plan.

It is noted that the guideline²⁰ does not specifically identify the use/implementation of capital prioritisation processes. Whilst this tends to infer that, provided capital investment is assessed as being warranted it will be included in and implemented as part of the capital program, the SCA notes that prioritisation of expenditure is undertaken as part of its internal review processes that include reviews by the Project Review Panel, the Executive and the Board Asset Management Committee prior to approval by the SCA Board.

It is also noted that, given the nature of the SCA's asset portfolio and its principal service obligation of supplying bulk water, a key element of its forward capital planning comprises long term planning in respect of catchment yield and the need for future supply augmentations.

¹⁹ Ibid, pg4.

²⁰ Ibid.

4.3.6 Project Management Framework

As part of the review and realignment of its business systems, the SCA has developed and is implementing a new *Project Management Framework*.²¹ The Framework is to guide the management of all SCA projects; it is supported by a more detailed series of guidelines/fact sheets that are available via the SCA's Project Management Intranet site.

The SCA defines a 'project' as follows:²²

"A project is 'non routine' work and is the organisation of activities in a one off endeavour to create a unique product within a defined timeframe to achieve specific objectives."

As shown in **Figure 4.3**, the Framework outlines five (5) phases in the management of projects, as follows:

- *Concept Phase (high level scoping)* – involves the clear definition of what the project is intended to achieve and the benefit it will bring to the SCA;
- *Initiation Phase (detailed scoping)* – involves the identification of the project objectives and deliverables, how the project will be delivered, who/what resources are required/will be involved, project costs and timeframes. The output of this phase is a Business Case and Project Management Plan;
- *Implementation Phase (Project Delivery)* – involves undertaking the procurement process and execution of the work, together with monitoring control and reporting of the project;
- *Transition Phase (Handover)* – involves updating of project status reports and plans and the completion of any necessary change requests once the project client and sponsor are satisfied that the agreed outcomes have been delivered to the required standard; and
- *Closure Phase (End of Project)* – involves the finalisation of all administrative processes associated with the project.

As also shown in **Figure 4.3**, Review Gates, at which endorsement by the Project Review Panel is required, have been established at the end of each phase. The Review Panel, which includes representatives of key functions across the SCA's business, is required to undertake an independent review and assessment of the relevant documentation (specific to the phase completed) and make a recommendation to Suspend, Rework, Continue or Withdraw the project proposal.

²¹ SCA, *Project Management Framework*, September 2010.

²² Ibid, pg3.

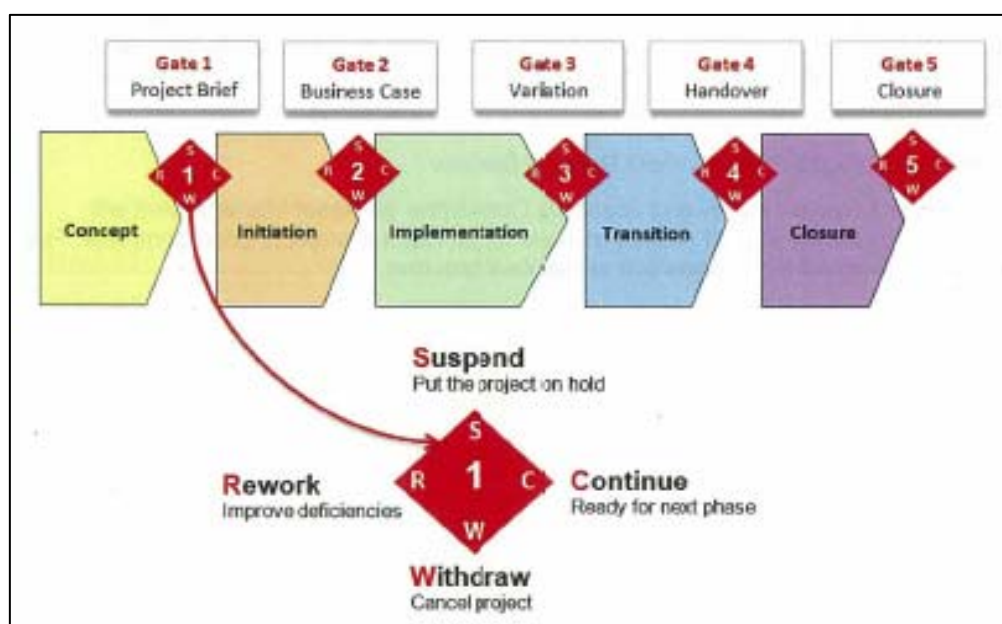


Figure 4.3: The SCA Project Management Framework Phases and Review Gates²³

4.4 Summary

The Sydney Catchment Authority operates in an environment defined by a range of legislative and related instruments. The SCA's expenditure proposal is driven by the obligations that these instruments impose.

The SCA has recently initiated and continues to implement changes to its management systems and approach. These changes are aimed at better aligning the organisation and its operations with the strategies identified in its *Corporate Sustainability Strategy*.

Halcrow's detailed review of a sample of capital projects indicates that updated capital planning and project management are not yet fully implemented. A lack of scope, definition and costing of proposed capital expenditure for projects in the coming price path was observed; this may, in at least some cases, be a product of the extensive lead times involved in typical project development compared to the timeline over which the new processes have been developed and implemented.

As part of the review and realignment of its business systems, the SCA is in the process of developing and implementing a new Asset Management Framework and the supporting processes and guidelines. Whilst not yet fully implemented in respect of its entire asset portfolio, it appears that the management systems, tools and processes that are now in place provide an effective basis for the development of the SCA's expenditure proposals across the forthcoming price path.

The SCA's business processes will continue to become more effective as its entire asset portfolio is captured within its asset management system and the implementation of its updated approaches to planning and project management are fully implemented.

²³ Ibid, pg9.

5 Operating Expenditure

5.1 Overview

Sydney Catchment Authority has reported actual regulated operating expenditure for the period 2009/10 to 2011/12 amounting to \$231.2 million (\$2008/09).²⁴ This figure excludes:

- \$17.3 million paid to Councils for the accelerated sewerage program; and
- \$6.2 million for recoverable expenditure.

This is \$8.8 million, or 3.7 percent, less than allowed for in the 2009 Price Determination.²⁵

The equivalent regulated operating expenditure figure in \$real 2011/12 terms is \$251.4 million.

Forecast regulated operating expenditure for the period 2012/13 to 2016/17 amounts to \$448.4 million (\$real 2011/12). The real increase in average annual operating expenses for the forthcoming period compared to the average of the three years to 2011/12 is 7 percent.

The cost classifications adopted in the SCA's submission and in the AIR/SIR do not facilitate a review of the SCA's historical operating costs by the objectives and functions designated under the Act. The expenditure line items (labour and expense) are inputs that are not linked in the material presented to the organisation's outputs/outcomes.

The SCA has grouped its forecast expenditure within classifications consistent with its new *Corporate Sustainability Strategy*. These classifications better match its legislative responsibilities.

The key focus areas under the *Corporate Sustainability Strategy* are supported by performance indicators and strategies described in the Submission.

No benefit/cost analyses²⁶ are presented in justification of supporting projects although the projects, where listed, are consistent with the focus areas and the Act.

²⁴ Calculated from AIR/SIR (Table 3.1) and SCA Submission to IPART, September 2011, p39 applying IPART indexation rates.

²⁵ IPART, *Review of prices for the Sydney Catchment Authority, From 1 July 2009 to 30 June 2012*, June 2009, pg48. The variation in the figures to those quoted in the SCA submission arises from the different indexation rates proposed by IPART to those adopted by SCA.

²⁶ An exception is the SCADA project; refer SCA email dated 26 October 2011.

5.2 General Forecast Approach

In respect of its approach to forecasting operating expenditure, the SCA states:²⁷

“The SCA’s operating expenditure forecast is developed by building up the budget based on resources and activities from each business unit providing expenditure information. This process of expenditure forecast (for both capital and operating expenditure) is embedded in the SCA’s annual business planning process which requires business units to develop detailed forward business plans and linking expenditure forecast to business activities in the business plans.”

There is no evidence in the SCA’s submission of this process being implemented in respect of operating expenditure, nor was such evidence presented at interviews with SCA officers. Rather, it is inferred from the information presented that the SCA has adopted a top down approach to estimating its operating expenditure for the forthcoming price path.

In its submission, the SCA states:²⁸

“For the upcoming determination period, the SCA will keep its core operating expenses at real 2008-09 levels (\$87.2 million in 2011-12 dollars), ... In addition to existing core operating expenditure, the SCA also seeks to include an amount for a proposed self insurance scheme premium to cover the expected cost of Shoalhaven water transfer.”

The efficient cost level of \$87 million (\$real 2011/12) was established by IPART at the 2009 Determination.

The SCA’s proposed prices make no allowance for a carbon tax although figures are provided in the Submission on the likely impact.²⁹ Similarly, it has assumed its electricity prices remain at current levels. The amount that the SCA pays for electricity is linked to prevailing market prices.³⁰

The SCA has provided descriptions of initiatives designed to improve operations and service levels that were introduced in the price path from 2009/10 to 2011/12 and proposed to be introduced in the next price path. Generally, it has not quantified the benefits/costs of these initiatives.

Halcrow requested that the SCA³¹ provide a reconciliation of actual (and proposed) expenditure with the amount allowed for by IPART at the 2009 Determination with details by project/activity including:

- additional activities performed;
- efficiency initiatives; and
- savings in operating expenditure arising from capital expenditure.

²⁷ SCA, *Response to Draft Expenditure Review Report prepared by Halcrow*, 21 November 2011, pg4.

²⁸ SCA submission to IPART, 2011, section 6.5.1, pg51.

²⁹ SCA submission to IPART, pg54.

³⁰ SCA advice 6 October 2011. The supplier, Eraring Energy has a say in when the power is drawn to avoid peak periods.

³¹ Halcrow, *Request for Information*, 30 September 2011.

The SCA has not met this request, but has provided information that in part explains the variations.

5.3 Service Levels

The output measure proposed by the consultant in the operating expenditure review for the 2009 Price Determination was:³²

“SCA shall remain within the total approved operating expenditure for the determination period, excluding any pumping costs from the Shoalhaven System and any new costs required to comply with Government directions. This shall be achieved without any reduction in the service levels provided and without increase in the risk profile of SCA operations.”

From the evidence available, Halcrow concludes that the SCA met the proposed performance measure.

The SCA has:

- Provided a reliable water supply as evidenced by:
 - providing supply to raw water customers without interruption;
 - achieving 100 percent compliance with Australian Drinking Water Guidelines for raw water supply and 99.6 percent compliance with bulk water supply arrangements;
 - obtaining a 100 percent compliance rating with its Water Management Licence (including environmental flow requirements).
- Achieved key outcomes in cooperation with stakeholders demonstrated by:
 - finalising water supply agreement with Wingecarribee Shire Council;
 - completing the catchment to tap water quality risk assessment with Sydney Water;
 - providing catchment councils with the tools required to undertake assessment of planning proposals; and
 - partnering with Catchment Management Authorities (CMAs) to deliver the Catchment Program Scheme and grazer incentive program.
- Ensured its business viability by:
 - reducing its insurance premiums while improving coverage and reducing levels of excess;
 - achieving 88 to 100 percent compliance with the requirements of its *Operating Licence*;
 - improving its asset management system (see separate report); and
 - enhancing project and program management processes.

³² Worley Parsons, *Review of Capital and Operating Expenditure- Sydney Catchment Authority (2009 Determination)*, January 2009, pg44.

5.4 Benchmarking

The SCA participated in WSAA's benchmarking of asset management practiced by Australian and overseas water utilities. The outcomes are discussed in the *Audit Report*³³ outlining assessment of the SCA's compliance with the asset management obligations of its *Operating Licence*.

This is the only benchmarking exercise that SCA nominated to Halcrow in which it was a participant.³⁴

The NSW Treasury Strategic Performance Review of SCA (KPMG Report)³⁵ of May 2011 noted the following opportunities for improvement flowing from previous benchmarking reviews:

- Developing new staff recruitment strategies for the ageing workforce;
- Introducing a triple bottom line decision making framework; and
- Adopting a business risk support system.

The SCA has not referred these benchmarking studies to Halcrow.

The consultant undertaking the operating and capital expenditure review for the 2009 Determination noted that:³⁶

"Benchmarking against peer organisations is difficult in the case of the SCA, as there are major differences between SCA and peer companies, in size, geographical location, function, operating environment and structure of operations."

This situation is unchanged from 2009.

While the opportunities for benchmarking at an organisational level are limited, Halcrow has compared SCA's policies and procedures with best practice where practicable, eg. asset management.

In the absence of relevant benchmarking comparators, Halcrow has placed greater emphasis on movements in aggregate operating expenditure and an assessment of the SCA's service outputs.

³³ Halcrow, *2011 Audit of Sydney Catchment Authority's Asset Management Obligation; Audit Report*, November 2011.

³⁴ SCA advice 6 October 2011.

³⁵ KPMG, *Strategic Performance Review of SCA*, May 2011, pg14.

³⁶ Worley Parsons, *Review of Capital and Operating Expenditure- Sydney Catchment Authority (2009 Determination)*, January 2009, pg17.

5.5 Accelerated Sewerage Program

The Government directed the SCA to disburse \$17.7 million (excluding GST)³⁷ to Local Councils to upgrade their sewerage facilities to improve water quality in the catchment. It was expected that the full amount would be disbursed in 2009/10. There remains \$9.4 million (\$2007/08), ie. \$10.2 million (\$real 2011/12) to be disbursed in 2011/12.³⁸

The delay in disbursement of the funds reflects delays by Councils in completing the scheduled works.³⁹ The SCA expects the planned works to be completed by 30 June 2012 with the associated improvements in water quality to follow.⁴⁰

The SCA quotes the key outcomes of the project to be annual reductions in nitrogen (33.3 tonnes) and phosphorus (14.7 tonnes) loads. A measurement system is in place to record outcomes.

5.6 Unregulated Activities

IPART does not determine prices for all of the SCA's activities. Unregulated activities include:⁴¹

- Recovery from mining companies of the cost of 'rehabilitation and preventative works of its (SCA) assets caused by mine subsidence';
- 'Leasing of agricultural and residential properties, where SCA holds properties for future or current water services'; and
- Conference facility rental.

The SCA has provided the following explanation of its accounting for unregulated activities:⁴²

"In the SCA financial systems, income from unregulated activities are accounted for in separate general ledger accounts. Therefore, we are able to clearly separate income from unregulated activities. However, separating expenditure on unregulated activities are conducted outside of our financial systems as some of the facilities that generate external income also serve the SCA's internal needs. The table below shows the breakdown of unregulated income and expenditure for the current price determination period. Commentary for the expenses category are (sic) provided below the tables. Please note that the information are (sic) in dollars of the year."

³⁷ IPART, *Review of prices for the Sydney Catchment Authority, From 1 July 2009 to 30 June 2012*, June 2009, pg138.

³⁸ SCA submission to IPART 2011, pg52.

³⁹ SCA submission to IPART 2011, pg42.

⁴⁰ Verbal advice from SCA on 6 October 2011.

⁴¹ SCA, Submission to IPART 2011, p35

⁴² SCA email dated 28 October 2011.

Unregulated Income			
Description	2009-10	2010-11	2011-12
Income – dam safety consulting	\$ 244,957	\$ 202,635	\$ 370,000
Income – mining consulting	\$ 1,561,306	\$ 342,687	\$ 730,000
Income – Conference Centre, Manor, Avon Dam	\$ 58,612	\$ 56,137	\$ 60,000
Income – cottages (includes Braidwood in-kind contributions)	\$ 768,394	\$ 752,441	\$ 627,859
Rental Income (subleases)	\$ 158,760	\$ 423,766	\$ 555,000
Income – freedom information	\$ 150	\$ -	\$ 500
Income – royalties	\$ 50,830	\$ 61,784	\$ 55,000
Income – grants	\$ 52,825	\$ -	\$ -
Income – other (Includes access licenses , fines & penalties)	\$ 259,937	\$ 251,461	\$ 150,000
Total	\$ 3,155,771	\$ 2,090,911	\$ 2,548,359
Unregulated Expenditure			
Description	2009-10	2010-11	2011-12
Expenditure – dam safety consulting (income less profit)	-\$ 213,006	-\$ 176,204	-\$ 321,739
Expenditure – mining consulting (income less profit)	-\$ 1,357,657	-\$ 297,989	-\$ 634,783
Expenditure – Conference Centre, Manor, Avon Dam Accom	-\$ 58,612	-\$ 56,137	-\$ 60,000
Expenditure – cottages	-\$ 768,394	-\$ 752,441	-\$ 627,859
Rental Expenditure (subleases)	-\$ 158,760	-\$ 423,766	-\$ 555,000
Expenditure – freedom information	-\$ 150	\$ -	-\$ 500
Expenditure – royalties	\$ -	\$ -	\$ -
Expenditure – other	\$ -	\$ -	\$ -
	-\$ 2,556,579	-\$ 1,706,537	-\$ 2,199,881

Dam safety and mining consulting expenditure. We apply a percentage margin on mining and dam safety consulting. The margin was reviewed in 2008/09 and at the time, comparable to profit margin that was generally used by Engineering Consulting firms at the time.

Conference Centres and Cottages. When conference facilities are hired out to external users, goods and services used are charged to hirers at cost.

Subleases. Subleases are charged on a cost recovery basis on the percentage of lease space occupied.”

The expenditure allowed for in the 2009 Determination excluded all unregulated expenditure. The consultant engaged to review expenditure for the 2009 Determination stated:⁴³

“SCA has confirmed that unregulated activity costs are not included in the data presented for consideration of past and forecast costs for this assessment.”

⁴³ Worley Parsons, Review of Capital and Operating Expenditure- Sydney Catchment Authority (2009 Determination), January 2009, pg21.

The AIR/SIR submitted for this determination includes expenditure on unregulated activities. In its 2011 Submission, the SCA shows the gross operating expenditure including the unregulated expenditure and then makes adjustments at the aggregate level to enable comparisons between the actual expenditure incurred and the regulated expenditure allowed by IPART in the 2009 Determination.⁴⁴

For consistency with the 2009 Determination's presentation of operating costs, Halcrow has excluded unregulated expenditure from the recommended regulated operating expenditure.

Halcrow has not reviewed the recoverable expenditure procedures underlying the basis for cost recovery, however, is informed by the SCA that the costs recovered are fully distributed costs (and not incremental costs).⁴⁵

While IPART does not regulate the margin earned on unregulated activities, it is important to understand its calculation to ensure that the regulated activities are not subsidising the unregulated activities.

5.7 Heritage Assets and Non-Commercial Activities

The SCA does not separately account for the costs associated with heritage assets and non-commercial activities. It states:⁴⁶

"... the majority of the SCA's heritage items are also current working assets and are managed as part of the overall capital and operating program.

The management of heritage assets is currently being moved into the Maximo asset management system. Once the migration is complete, the SCA will be able to track expenses that are related to the maintenance of heritage assets."

5.8 Environmental, Health and Safety Standards

The SCA does not separately account for costs associated with environmental, health and safety standards. It is not aware of any changes to current standards that will impact future cost levels.

It was not able to identify any costs higher than commercial levels associated with government ownership, awards and conditions, operating environment, staffing levels, assets, technology or other factors.⁴⁷

⁴⁴ SCA Submission to IPART, 2011, p39

⁴⁵ SCA verbal advice dated 6 October 2011.

⁴⁶ SCA submission to IPART, 2011, pg70.

⁴⁷ SCA advice 6 October 2011.

5.9 Coordination of the Metropolitan Water Supply

The SCA highlights institutional gaps in the current arrangements for coordinating the water supply for Sydney:

*“..... there are no formal arrangements in place between the wholesale suppliers to ensure adequate reserves are available for all supply nodes on a day to day basis.”*⁴⁸

*“The operating rules set broad parameters for supply security and in practice there are a range of other matters at an operational level that need to be managed to allow the rules to be implemented. For example, how the (desalination) plant is ramped up and shut down, how supply interruptions are managed and the opportunity to access greater volumes of water should these be needed.”*⁴⁹

The SCA has not made any provision for additional costs it may incur as a result of these institutional gaps.⁵⁰

5.10 Historical Expenditure

5.10.1 Overview

The Sydney Catchment Authority's regulated expenditure in the period 2009/10 to 2011/12 is 3.7 percent less than the amount allowed in the 2009 Price Determination.⁵¹

Operating expenses were lower than allowed by IPART for the following reasons:

- Delays in staff recruitment;
- Project deferment;
- Improved operating conditions; and
- Change in scope of projects and new efficiency initiatives.

None of these adversely affected the SCA in meeting its statutory obligations and service standards.

Table 5.1 shows a comparison between the allowed expenditure and actual expenditure.

IPART indexation rates are applied to convert the figures from nominal dollars to \$real 2011/12.

⁴⁸ SCA submission to IPART, 2011, p15.

⁴⁹ SCA submission to IPART, pg16.

⁵⁰ SCA advice 6 October 2011.

⁵¹ IPART, *Review of prices for the Sydney Catchment Authority, From 1 July 2009 to 30 June 2012*, June 2009, pg48.

Table 5.1: Cost Comparison: 2009 Determination with Actual (\$million)

	2009/10	2010/11	2011/12	Total
Expenditure allowed in 2009 determination (\$2008/09)⁵²				
Gross Opex	97.3	80.0	80.0	257.3
Accelerated sewerage program	17.3			17.3
<i>Regulated operating expenditure</i>	<i>80.0</i>	<i>80.0</i>	<i>80.0</i>	<i>240.0</i>
Actual Expenditure (\$2008/09)⁵³				
Gross Opex	82.1	81.1	91.6	254.7
Accelerated sewerage program	4.4	3.5	9.4	17.3
Recoverable expenditure	2.6	1.7	1.9	6.2
<i>Regulated operating expenditure</i>	<i>75.1</i>	<i>75.9</i>	<i>80.3</i>	<i>231.2</i>
Variance in regulated operating expenditure (\$2008/09)				
\$million	-4.9	-4.1	0.3	-8.8
%	-6.1	-5.2	0.3	-3.7
Actual regulated operating expenditure (\$2011/12)	81.7	82.5	87.3	251.4

Note: Totals may not add due to rounding.

The AIR/SIR shows gross operating expenditure. Individual expense line items have not been adjusted to exclude the accelerated sewerage program and recoverable (non-regulated) expenditure.

Despite the description, Shoalhaven pumping costs are included under 'Energy Costs (excluding Shoalhaven pumping)' in 2008/09 and earlier years in the AIR/SIR.

There are large variations from year to year in individual expense line items in the AIR/SIR. These in part relate to changes in the Chart of Accounts.

The SCA's Submission and subsequent responses to queries raised by Halcrow help to explain the variation of actual expenditure from the level of expenditure allowed for by IPART at the 2009 Determination; these are discussed further below.

⁵² IPART, *Review of prices for the Sydney Catchment Authority, From 1 July 2009 to 30 June 2012*, June 2009, pg47/48.

⁵³ SCA, AIR/SIR Table 3.1, adjusted applying IPART indexation rates and SCA submission to IPART, 2011, pg39.

There is a large increase (5.8 percent) in regulated operating expenses between 2010/11 and the forecast figure for 2011/12. The increase reduces to 3.3 percent if the increases in licence fees to the NSW Office of Water and bulk water purchases (Fish River) are excluded.⁵⁴

The 2011/12 forecast, which the SCA has set at the level of efficient costs established by IPART at the 2009 Determination, is the basis of the SCA's estimates of expenditure in future years. Any increase from the 2010/11 expenditure is carried forward to future years.

IPART noted in its 2009 Determination report⁵⁵ several efficiency measures to be adopted by the SCA over the period 2009/10 to 2011/12. The reporting of these efficiency measures was qualified by the following comment:

*"SCA has not determined its forecast operating expenditure by reviewing line items or specific cost categories and then summing to calculate a total expenditure figure. It is presently establishing plans to enable it to achieve the forecast efficiency target."*⁵⁶

The measures highlighted by IPART were:

- Moving dam safety survey work in-house;
- Renegotiating the Special Area Strategic Plan of Management Service with the Department of Environment and Climate Change;
- Reviewing and redeveloping the Dam Safety Management Program, leading to better risk identification and cost savings;
- Improving the efficiency of its catchment program through better targeting of activity as a result of the Catchment Decision Support System; and
- Developing an evaluation and monitoring process for all catchment activities.

The SCA advises that all of these measures have been successfully adopted with the exception of the renegotiation of the fee for the Special Areas Strategic Plan of Management Service. While the SCA has been able to transfer some functions to the Department in the southern end of its area of operations, the planned reduction of \$1 million in the fee levied by the Department did not eventuate.⁵⁷ This was absorbed by the SCA.

Halcrow has separately assessed asset management, dam safety, water quality and catchment management as part of the *Operating Licence* compliance audit and audit of the SCA's compliance with its asset management obligations.

⁵⁴ The increase in licence fees flows from IPART's 2010 determination of charges levied by the NSW Office of Water (Water Administration Ministerial Corporation).

⁵⁵ IPART, *Review of prices for the Sydney Catchment Authority, From 1 July 2009 to 30 June 2012*, June 2009, pg50.

⁵⁶ Ibid, pg52.

⁵⁷ SCA advice 6 October 2011.

5.10.2 Labour

Labour and related expenses make up approximately 35 percent of the SCA's total operating expense, although that percentage has varied from 31 percent to 41 percent over the four years to 2011/12.⁵⁸

The 2011/12 figure of 250 FTE is substantially below the level of 289 in 2007/08. The operating expenditure allowed by IPART for the current price path was based on the 2007/08 number of 289 being maintained for the full period.⁵⁹

The 2011/12 FTE number is 3.7 percent greater than the figure for 2009/10. The 2009/10 figure was below planned numbers even after taking account of redundancies. There were delays in staff recruitment caused by the Government freeze on appointments.⁶⁰ The figure of 250 FTE is held constant over the forecast period.

The NSW Treasury Strategic Performance Review of SCA (KPMG Report)⁶¹ noted with reference to an SCA document, Workforce Turnover Document, December 2010:

"Specifically a restructure in FY 2010 resulted in 32 voluntary redundancies and achieved additional efficiencies.

The redundancies covered a range of both staff and management positions at different grade levels. Redundancies were a direct result of the realignment of financial work areas, removal of duplicate processes, and streamlining of systems and new technologies to support future work responsibilities."

The 2010 redundancies were in addition to nine (9) redundancies recorded in financial year 2009. The lower staff numbers in 2009/10 and 2010/11 were offset, in part, by real increases of 2.8 percent a year in wage rates.⁶²

Table 5.2 shows employee numbers and staff costs (converted here to \$real 2011/12) over the period 2008/09 to 2011/12.⁶³

⁵⁸ SCA AIR/SIR, Table 3.1.

⁵⁹ Worley Parsons, *Review of Capital and Operating Expenditure- Sydney Catchment Authority (2009 Determination)*, January 2009, pg29.

⁶⁰ SCA advice 6 October 2011.

⁶¹ KPMG, *Strategic Performance Review of SCA*, May 2011, pg87.

⁶² SCA submission to IPART, pg39.

⁶³ Email received 21 October 2011.

Table 5.2: Employee numbers & Labour related expenses (\$'000 2011/12)

2011/12 \$000	2008/09	2009/10	2010/11	2011/12
Labour (excl. employee provisions)	28,391	25,090	24,938	25,330
Employee provisions	9,841	5,521	6,373	7,150
Payroll Tax & FBT	2,149	1,975	1,835	1,719
<i>Total Labour & Related expenses</i>	<i>40,381</i>	<i>32,586</i>	<i>33,146</i>	<i>34,199</i>
Staff numbers	272	241	246	250
Average cost /employee \$				
Labour (excl. employee provisions)	104,377	104,107	101,373	101,322
Employee provisions	36,181	22,909	25,905	28,600
Payroll Tax & FBT	7,901	8,195	7,460	6,876
<i>Total Labour & Related expenses</i>	<i>148,459</i>	<i>135,211</i>	<i>134,738</i>	<i>136,798</i>

The reduction in employee entitlements in 2009/10 is partially explained by changes in the long service leave provision caused by “*changed discount rates, impact of staff redundancies and changes in SCA demographic profile*”.⁶⁴

5.10.3 Administration, Property and Asset Maintenance

The SCA has provided revised figures for the expense items administration, property and asset maintenance (refer **Table 5.3**). These have been adjusted to remove the effects of changes to the chart of accounts.

Asset maintenance expense has decreased markedly from the levels recorded in 2008/09 and 2009/10. The reduction reflects the establishment of a new civil, mechanical and electrical contract which has delivered substantial savings.

Table 5.3: Adjusted Figures

2011/12 \$000	2008/09	2009/10	2010/11	2011/12
Administration	5,369	8,078	5,656	6,220
Property	4,503	4,295	5,104	4,572
Maintenance of assets	12,833	12,495	8,586	7,620

Asset management is considered in detail in the *Audit Report*⁶⁵ outlining assessment of the SCA’s compliance with the asset management obligations of its *Operating Licence*.

⁶⁴ SCA submission to IPART, 2011, pg40.

⁶⁵ Halcrow, 2011 *Audit of Sydney Catchment Authority's Asset Management Obligation; Audit Report*, November 2011.

5.10.4 Bulk Water Purchases

Supply from the Fish River scheme ceased in the drought years and water was supplied on a temporary basis from other sources. These arrangements are not sustainable in the long term.

The fixed charges (minimum annual quantity) incurred in respect of supply from the Fish River scheme were still payable during the drought years. The combination of higher charges (determined by IPART) and the recommencement of supply in 2011/12 (which attracts usage charges) has resulted in a doubling of expenditure in respect of these bulk water purchases.

Bulk water purchases increase by \$1 million 2011/12. The higher figure is maintained throughout the coming determination period with adjustment for on-going real price increases.

5.10.5 Cost Reductions

The SCA has provided the following explanations for lower than allowed expenses:

- The improved weather condition over the period enabled a reduction in costs incurred on contractors for non-routine water quality monitoring and reporting.
- Lower than expected costs were incurred in respect of the Warragamba 50th anniversary project (change in scope) and insurance premiums.
- There were delays in a number of projects including catchment modelling, Bathymetry works and dam break studies.

In addition there were delays or savings in a number of projects including cyanobacteria research, Braidwood lands and the Metropolitan Dams Electrical Assessment project.

The SCA has provided a detailed explanation of the delays and under expenditure on the cyanobacteria project.⁶⁶ Much of the work was originally scheduled to be undertaken by external consultants because of staff shortages, however, as events unfolded, not all of the originally scheduled work was required and more than expected of the work was able to be completed in house. Some work was delayed for completion until later years and there will be some leakage of expenditure into 2012/13. The project's objectives should still be realised.

The SCA has also provided the following explanations for variations on expenditure on other projects including Bathymetry works and dam break studies:⁶⁷

⁶⁶ SCA email dated 27 October 2011.

⁶⁷ SCA email dated 28 October 2011.

<i>Extract from 10/11 budget</i>				
	<i>Budget</i>	<i>Actual</i>	<i>Explanation</i>	<i>Additional Comments</i>
<i>Improvement to Wathnet</i>	200,000	200,000	<i>Review completed</i>	
<i>Improvement to SCARMS</i>	200,000	0	<i>Delays in establishing contract with CWR for support for model improvements</i>	<i>This activity will provide ongoing support and development for the SCARMS system. Contracts have now been established and improvements will progress as required on an ongoing basis. Budget for 11 / 12 is \$150k</i>
<i>Lake Bathymetric Surveys</i>	100,000	0	<i>Delays in developing contract as no staff allocated</i>	<i>Bathymetric surveys are periodically undertaken to ensure data about storage volumes is current. These surveys will be completed in 11-12</i>
<i>Cathment modelling</i>	150,000	35,000	<i>Delays in business case approval</i>	<i>This modelling will trial the application of advanced rainfall/ runoff and stream modelling in one catchment as a pilot. The trial will be completed in 11-12 at \$100k</i>
<i>Revise Rainfall and inflow datasets for modelling</i>	200,000	100,000	<i>Catchment model for Warragamba developed.</i>	<i>Datasets for the Warragamba Catchment had a high priority and were needed to current modelling of potential environmental flow releases. They were completed. Requirements for the Shoalhaven and Upper Nepean are a lower priority and have not revised at this time. They will be progressed , subject to prioritisation against other commitments.</i>
<i>Develop water quality management strategy for storages</i>	50,000	0	<i>Project not commenced</i>	<i>This project would develop a long term water quality strategy for reservoirs. Will now progress in 2012/ 13</i>
<i>Warragamba Dam break study update</i>	200,000	0	<i>No internal staff available for externally project management</i>	<i>This work will now be largely undertaken during 11 / 12 using internal staff, with some to be \$30k spent for GIS data. The work will be completed on time for input into the Warragamba Dam risk and reliability project.</i>
	1,100,000	335,000		

The explanations highlight that, while there have been project delays, these delays should not hamper the SCA in meeting its legal and contractual commitments.

5.11 Drivers of Operating Expenditure over the Forecast Period

The SCA has outlined in its Submission⁶⁸ the principal drivers of its expenditure over the forecast period. There is, however, limited data demonstrating the impact of these drivers on forecast costs relative to past costs and quantification of the contribution that the associated actions will have in achieving the performance measures under each focus area.

⁶⁸ SCA Submission to IPART, 2011, pg53.

The key drivers are:

- Supply of Water:
 - Water monitoring program costing \$7 million per annum for the collection and laboratory analysis of samples;
 - Water modelling capability critical to the analysis of supply sufficiency; and
 - Scientific research to better understand the dynamics of the SCA's catchment and reserves.
- Catchment activity:
 - Development of a new healthy catchment strategy that will outline risks and priorities for catchment protection. The level of expenditure will reduce with completion of the accelerated sewerage program; and
 - Refinement of joint actions with CMAs.
- Asset maintenance and management:
 - Reaping the on-going benefits of the letting of a new civil, mechanical and electrical contract in the current price path; and
 - Implementation of the SCADA project to enhance asset management.
- Regulation (concurrence role):
 - Focussing on the potential impacts on surface and groundwater of mining and coal seam gas extraction.
- People:
 - Development of staff to meet the needs of the organisation; and
 - Addressing the ageing of the workforce.

5.12 Forecast Expenditure

5.12.1 Overview

Table 5.4 compares the projected expenditure from 2012/13 to 2016/17 to actual expenditure in 2010/11 and projected expenditure in 2011/12.

Table 5.4: Projected Operating Expenses

Actual/Forecast Expenditure (\$million 2011/12)	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Gross operating expenditure	88.1	99.6	91.5	91.1	91.2	91.2	91.2
- Accelerated sewerage program	3.8	10.2					
- Recoverable expenditure	1.8	2.1	1.8	1.5	1.5	1.5	1.5
<i>Regulated operating expenditure</i>	<i>82.5</i>	<i>87.3</i>	<i>89.7</i>	<i>89.6</i>	<i>89.7</i>	<i>89.7</i>	<i>89.7</i>
Less:							
▪ Increase in licence fees		1.1	1.1	1.1	1.1	1.1	1.1
▪ Increase in bulk water purchases		1.1	1.1	1.1	1.1	1.1	1.1
▪ Shoalhaven pumping			2.0	2.0	2.0	2.0	2.0
<i>Total adjustment</i>		<i>2.1</i>	<i>4.1</i>	<i>4.1</i>	<i>4.1</i>	<i>4.1</i>	<i>4.1</i>
Comparable Operating Expenditure	82.5	85.2	85.5	85.5	85.5	85.6	85.6

Note: Totals may not add due to rounding.

Operating expenditure is forecast to increase by \$2.7 million or 3.3 percent between 2010/11 and 2011/12 after adjustment for licence fees and bulk water purchases. The increase in Labour and employee entitlements account for \$1.2 million of this increase. There is also a leakage of expenditure from 2010/11 to 2011/12 caused by project delays (refer **Section 5.10.5**).

At the aggregate level, the main contributor to the variation between the level of gross regulated expenditure in 2011/12 and subsequent years is \$2 million per annum for Shoalhaven pumping.

5.12.2 New Activities or Revisions to Existing Activities

The analysis of expenditure has been made more difficult by changes to the Chart of Accounts; this is exemplified below.

The SCA provided the listing presented in **Table 5.5** of non labour expense line items.⁶⁹ All items exhibit significant variations over the period from 2011/12 to 2015/16. If correct, this highlights considerable change over the forecast period in expenditure on specific activities which is masked at the aggregate level.

⁶⁹ SCA email dated 21 October 2011.

Table 5.5: Major non-Labour expenditure variations (\$'000)

	2011/12	2012/13	2013/14	2014/15	2015/16
Special Areas, Controlled and Freehold Lands	3,922	5,693	5,771	5,925	5,813
Environmental flow Management	0	1,295	1,313	1,348	1,322
E-Flow monitoring	1,400				
Asset Operate & Maintain	2,811	4,645	4,710	4,742	4,640
Dam Safety	1,025	823	492	408	401
Customer Service	4,786	4,992	5,305	5,562	5,702

The SCA subsequently indicated that the variations in respect of the first three items are explained by changes to the classification of expenditure.⁷⁰ The lack of consistency in the presentation of historical and forecast figures should be addressed for future determinations.

Explanations for variations in respect of the other items are as follows:

- Asset Operate and Maintain – Shoalhaven pumping has added \$2 million to the annual cost;
- Dam Safety – the SCA intends to realise savings through changes to the regulation of dam safety, although this is dependent on Regulator approval; and
- Customer Service – reflects an allowance for calibration services provided by Sydney Water but not previously charged.⁷¹

5.12.3 Operating Savings

In response to Halcrow's request for benefit/cost analysis of major projects/operating expenditure initiatives, the SCA has provided the following explanation and details:⁷²

"In an examination of the Business Cases for current projects seven projects had information regarding future operating cost benefits:

Project	Saving (\$k/annum)
<i>SCADA – upgrade</i>	<i>285</i>
<i>Hydrometric Renewals Program</i>	<i>123</i>
<i>Minor Assets Renewals Program</i>	<i>18</i>
<i>Catchment Security & Fencing Program</i>	<i>147</i>
<i>Maximo Upgrade to Version 7</i>	<i>324</i>
<i>Shoalhaven transfers</i>	<i>147</i>
<i>IT Assets Renewals Program</i>	<i>51</i>

⁷⁰ SCA email dated 7 November 2011.

⁷¹ SCA email dated 21 November 2011.

⁷² SCA email dated 20 October 2011.

However, in all cases these savings were identified as part of the financial/economic evaluation and refer to the savings to the SCA compared to a Base Case where the project did not proceed. As all cases are renewals the Base Cases referred to significantly increased potential costs if the upgrades were not approved.

For the savings to appear explicitly in the budget the SCA would have to develop a budget on the basis that the capital program did not exist, and then factor in the operating costs/savings from the capital program. This is not done, rather the budget process implicitly includes the impacts of the capital program.

For the future, the SCA is implementing a Project Management System and it is anticipated that this system will include ongoing operating benefits/costs for each project so that the budget process can explicitly consider these costs/savings. The ongoing operating will be the same as used in the NPV calculations for project justification. Its delivery will be covered in the Post Project Review.”

5.12.4 Improved Cost Tracking (by Focus Area)

The SCA has established six key focus areas “to assess and monitor the success of strategies and projects”.⁷³ It has presented its forecast operating expenditure both by focus area and line item.⁷⁴

The service areas showing the greatest change in the period from 2011/12 to 2016/17 (in \$real 2011/12) are:

- Healthy catchment strategy +\$1.8m (10.1 percent);
- Asset maintenance and management +\$0.9m (6.2 percent); and
- Operate water supply -\$2.2m (17.3 percent).

Each focus area is supported by performance indicators, some of which are quantified.⁷⁵ The performance measures are not generally of a form that is suitable for adoption by IPART as output measures without further detail, eg. ‘reduction in ecological footprint’.

5.12.5 Shoalhaven Pumping

The Government introduced a three year moratorium on Shoalhaven pumping; the moratorium ended on 7 November 2011 and the SCA has subsequently recommenced pumping.⁷⁶ The recommencement of Shoalhaven pumping will increase the costs incurred by the SCA in 2011/12 to that shown in the Submission.

Given the variations that can occur in the pumping of water from the Shoalhaven, the SCA proposes an annual ‘insurance premium’. This is designed to include in the regulated operating expenditure an identical allowance each year whereby, over time, under and over recoveries would balance out.

⁷³ SCA submission to IPART, 2011, pg51.

⁷⁴ SCA submission to IPART, 2011, pg52.

⁷⁵ SCA submission to IPART, 2011, Appendix 1.

⁷⁶ IPART email dated 21 November 2011.

Under the *Metropolitan Water Plan*, pumping from the Shoalhaven commences when dam levels fall to 75 percent and continues until they rise above 80 percent. There are also other constraints; for example, the water level in Tallowa Dam has to be within 1 metre of the top water level of the dam.

The SCA has provided calculations in support of its proposed insurance premium. This shows that the proposed allowance (\$2 million per annum) is less in aggregate over the forecast period than the SCA's modelling suggests will be the likely outcome. Whilst it is lower in the early years, it is higher than the most likely outcome in the later years (2015/16 and 2016/17).

The SCA undertook its modelling on the assumption that dam levels will be at 75 percent at the commencement of the forecast period, ie. 1 July 2012. It has also assumed, in calculating its sales to Sydney Water, that the desalination plant will operate at full capacity over the entire duration of the coming price period. This is consistent with Sydney Water's forecasts, however, it is uncertain whether the forecast volumes of water transfer from the Shoalhaven (which shows a declining trend over the period) is consistent with an equal annual output (at full production) from the desalination plant.

Based on the information provided, \$2 million per annum is considered to be an acceptable estimate of the Shoalhaven pumping costs over the forecast period. The actual outcomes may, however, vary from this depending on dam levels (refer also to **Section 5.12.9** in respect of electricity cost assumptions).

5.12.6 Cost of Supply at North Richmond

The SCA will not incur additional direct costs resulting from the supply of water to Sydney Water's North Richmond Water Treatment Plant. There may, however, be revenue foregone because any additional water released at North Richmond will not be available to supply at other release points.

The SCA advised that:⁷⁷

"The decision taken under the water sharing plan to require 'regulated' releases to North Richmond effectively incorporates North Richmond in the SCA network of 'regulated' supply for the first time. Previously, the SCA made releases for general river purposes, which were tied to Sydney Water's North Richmond demand. As such, the cost of supplying North Richmond will become identical with that of supplying Sydney Water at other offtakes in the supply zone."

Under the SCA's proposal for North Richmond, costs of supply attributed to Sydney Water would not increase in aggregate, but the amount to be recovered through the variable charge would be spread over a greater volume than otherwise.

5.12.7 Cost of Supply to Councils

The SCA has reworked its estimates of the cost of supplying the Councils, Wingecarribee, Goulburn Mulwaree and Shoalhaven. The analysis has taken account of a revision to the yield of the Shoalhaven system from 30 gegalitres per year to more than 75 gegalitres per year.

⁷⁷ SCA submission to IPART, 2011, pg62.

Table 5.6, which is based on information provided by the SCA,⁷⁸ shows the derivation of the cost of supplying water to the Councils.

Table 5.6: Shoalhaven Scheme Supply to Councils – Costing

Cost Component	Amount
<i>Asset Base:</i>	
Written down value	250,501,309
Depreciation	2,852,945
<i>Operating Costs:</i>	
Labour	500,000
Other operating costs	2,443,613
Insurance	545,386
Depreciation	1,426,473
Return on assets (@ 6.5%)	16,282,585
Total Operating Costs	21,198,056
<i>Cost Allocation:</i>	
Safe Yield (ML/year)	77,200
Average cost (per ML)	\$275
Forecast annual demand (ML)	4,700
Annual cost of supply to Councils	\$1,290,555

Notes:

- Written down asset value and depreciation based on detailed listing of relevant system assets; depreciation based on asset specific rates;
- Labour cost based on 5 persons @ \$100,000 per annum;
- Safe Yield includes 2,000ML/annum sourced from Wingecarribee

The amount included for depreciation only takes account of those assets owned by the SCA. Councils may incur additional costs in their own right from the point of supply by SCA to their own networks (eg. Goulburn Council).

It is also noted that the assets are used to supply Sydney Water and Eraring Energy, as well as the Councils. The SCA proposes to allocate the costs based on expected demand (ML); it is proposed to charge the three Councils at the same rate (\$/ML).

The allocation of costs remains subject to:

- finalising arrangements between Eraring Energy and the SCA; and
- confirming the Goulburn Council demand (expected in December 2011).

Subject to finalisation of arrangements between the SCA and Eraring Energy and between SCA and the Goulburn Council, Halcrow concurs in principal with the SCA's approach to the derivation and allocation of the cost of supplying water to the Councils.

⁷⁸ SCA email dated 7 November 2011.

There remain some points of the approach that are not clear (namely the asset value and depreciation amounts appear to correlate to 2009/10 and it appears that only 50 percent of depreciation costs have been taken into account), however, the impact of these on the cost of supply is not readily apparent.

5.12.8 Cost of Raw and Unfiltered Water

At the 2009 Determination, the SCA queried the discrepancy in prices for unfiltered water customers supplied by Sydney Water and those supplied by the SCA.

The SCA has since undertaken a detailed cost analysis and concluded that its current prices do recover the cost incurred for pipeline customers and recover double the costs incurred for Upper Canal customers. Similarly for raw water customers, further investigation by the SCA has shown that the average cost of supply for these customers is less than half the current charge.

The SCA provided an overview of its approach to pricing for unfiltered and raw water customers in its Submission; it has subsequently provided more detail on its calculations.⁷⁹

The SCA has calculated the costs of supply to raw water customers at about \$0.25/kL,⁸⁰ as shown in **Table 5.7**; this is about half the current charge. The SCA proposes to maintain the current charge to reduce the differential if these customers were to ultimately take treated water supply from nearby retail providers.⁸¹

Table 5.7: Calculation of Cost of Raw Water Supply per Customer

Cost Component	Amount
<i>Operating Costs:</i>	
Labour	
Operating costs (billing)	265
Insurance	
Depreciation	
Return on assets (@ 6.5%)	
Total Operating Costs	265
<i>Cost Allocation:</i>	
Average demand (kL/year/customer)	3,375
Average operating cost (per kL)	\$0.08
Average cost of supply from dam (per kL)	\$0.16
Total cost per raw water customer (per kL)	\$0.24

⁷⁹ SCA email dated 7 November 2011.

⁸⁰ SCA Submission to IPART, 2011, pg63. Detailed calculations in SCA email dated 7 November 2011.

⁸¹ SCA Submission to IPART, 2011, pg64. Detailed calculations in SCA email dated 7 November 2011.

As outlined in its Submission, the SCA has prorated the water supply cost (\$0.47/kL) on the basis of the value of its dam assets compared to the value of its total assets.

The calculations for unfiltered water customers are summarised in **Table 5.8**.

Table 5.8: Calculation of Prices for Unfiltered Water

Cost Component	Estimated cost (\$'000) based on Supply from:		
	Warragamba Pipeline		Upper Canal
	Lower Bound	Upper Bound	
<i>Asset Base:</i>			
Offtake and distribution assets	6,000	10,000	0
<i>Operating Costs:</i>			
Labour	200	200	40
Other operating costs (billing, maintenance)	295	295	265
Insurance			
Depreciation (offtake and distribution only)	300	500	0
Return on assets (@ 6.5%) (offtake and distribution only)	390	650	0
Total Operating Costs	1,185	1,645	305
<i>Cost Allocation:</i>			
Average demand (kL per year)	2,000	2,000	2,000
Average cost (per kL)	\$0.59	\$0.82	\$0.15
Water supply cost (per kL)	\$0.47	\$0.47	\$0.47
Total Cost to Customers (per kL)	\$1.06	\$1.29	\$0.62

On the basis of the information provided, Halcrow considers the approach adopted in determining the cost of supplying water to raw and unfiltered raw water customers to be appropriate.

5.12.9 Electricity Prices and Carbon Tax

SCA's proposed operating expenditure assumes current electricity prices will prevail over the price path.

The SCA has adopted the assumptions shown in **Table 5.9** in its calculation of the electricity costs for Shoalhaven pumping.⁸² The assumptions cover the impact of the carbon tax although the cost of a carbon tax is excluded from the operating expenditure figures shown in the AIR/SIR and Submission.

⁸² SCA email dated 20 October 2011.

Table 5.9: Electricity Price Assumptions – Shoalhaven pumping (\$2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Energy Cost per ML - \$/ML	\$67.20	\$67.20	\$67.20	\$67.20	\$69.10
Carbon Cost per ML	\$40.40	\$41.40	\$42.40	\$43.50	\$44.60
Total Cost per ML	\$107.60	\$108.60	\$109.60	\$110.70	\$113.70
% Change	60%	62%	63%	65%	65%
Real Carbon Price Increase %		2.5%	2.5%	2.5%	2.5%

The base electricity price paid by the Sydney Catchment Authority in respect of its Shoalhaven pumping, which includes (for example) retailer and transmission costs, compares with the average price on the National Energy Market of \$30.71/MWh⁸³ for the year to date.

Halcrow notes that legislation for a carbon tax has now been passed by the Commonwealth Parliament. Commonwealth Treasury has released forecasts of higher electricity generation costs even in the absence of a carbon tax.

The SCA's allowance for electricity costs will need to increase to allow for these factors. On the basis of the SCA's calculations, the carbon tax will add 60-65 percent to the \$2 million included each year for Shoalhaven pumping.⁸⁴

Similarly, about 29 percent (or \$0.5 million) will be added to SCA's non-Shoalhaven electricity expenses of \$1.8 million per year.⁸⁵ The SCA pays substantially more (per MWh) for non-Shoalhaven electricity costs, reflecting the diverse geographic locations of the various supply points.

5.12.10 Fixed/Variable Cost Apportionment

The SCA proposes to reduce the proportion of revenue earned from the usage component of its tariffs to Sydney Water to 20 percent. This is to better reflect its short run marginal costs (SRMCs).

The SCA proposes a volumetric charge of \$102.81/ML in 2012/13 to Sydney Water (\$2011/12).⁸⁶

This is reflected in the Frontier Economics calculations⁸⁷ allowing \$70/ML for Shoalhaven pumping costs⁸⁸ and \$30/ML for a "*hypothetical SRMC of \$30/ML to represent SCA's SRMC without Shoalhaven transfers*". Halcrow is unable to verify the latter figure.

⁸³ AEMO website, 23 November 2011, 1.53pm.

⁸⁴ SCA email dated 20 October 2011.

⁸⁵ SCA email dated 20 October 2011.

⁸⁶ SCA Submission to IPART, 2011, pg64.

⁸⁷ SCA Submission to IPART, 2011, Appendix 10, pg10.

⁸⁸ This excludes any allowance for the Carbon Tax.

The 20 percent volumetric revenue represents a compromise between the current 60 percent earned from volumetric charges and the costs of Shoalhaven pumping.⁸⁹

Based on its current electricity costs and the carbon price tabled in Parliament, the SCA has calculated the Shoalhaven pumping costs in 2012/13 to be:⁹⁰

- Energy cost (\$/ML) = \$67.20;
- Carbon cost (\$/ML) = \$40.40; and
- Total (\$/ML) = \$107.60.

5.12.11 Strategic Review Report Efficiency Initiatives

The KPMG *Strategic Performance Review* of the SCA⁹¹ outlines several efficiency opportunities to be explored by the SCA. Excluding items related to non-regulated activities, the opportunities are:

- Dam safety:
 - Improve transparency and efficiency of regulation, and compliance costs for dam safety; and
 - Explore alternative approaches to delivering dam safety.
- Governance arrangements:
 - Consolidate documents relating to governance and decision making processes and conduct internal training for staff.
- Braidwood lands:
 - Quantify the real option value to the NSW Government of retaining Braidwood land for Welcome Reef Dam.

Of these proposals, the dam safety savings are most easily identified in the SCA's expenditure proposal.

5.13 Service Outputs/Outcomes

Over the coming price path, the SCA should, in accordance with its role under its Act:

- manage and protect the catchment areas and catchment infrastructure including:
 - developing a new Healthy Catchment Strategy to outline the risks and priorities for actions that underpin investment in protecting the catchment;
 - improving the coordination of catchment actions with the Catchment Management Authorities;
 - achieving 100 percent compliance with the requirements of the Dam Safety Committee; and
 - complying with the asset management requirements of the *Operating Licence*.

⁸⁹ Discussions with SCA officers 6 October 2011.

⁹⁰ SCA email dated 20 October 2011.

⁹¹ KPMG, *Sydney Catchment Authority Strategic Performance Review; Final Report*, 30 May 2011.

- supply bulk water including:
 - providing supply to raw water customers without interruption;
 - achieving 100 percent compliance with Australian Drinking Water Guidelines for raw water supply and at least 99.6 percent compliance with bulk water supply arrangements;
 - obtaining 100 percent compliance rating with its Water Management Licence (including environmental flow requirements);
 - maintaining a robust water monitoring program for quantity and quality in compliance with the *Operating Licence*; and
 - maintaining a robust water modelling capability in compliance with the *Operating Licence*.
- regulate certain activities in or affecting the inner and outer catchment areas including:
 - ensuring developments it regulates in the catchment have a neutral or beneficial effect on water quality; and
 - improving its understanding of the potential impacts on surface and groundwater of mining and coal seam gas activities.

5.14 Assessment of Operating Costs

The efficient level of operating costs established at the 2009 Determination was \$87 million (\$real \$2011/12). This was based on staff numbers of 289 FTE.

A new sustainable staff number figure of 250 FTE has now been established. This reduction of 39 equates to a saving of approximately \$5.3 million per annum based on average labour costs including employees' entitlements and associated taxes. This is partly offset by greater than expected real wage increases (2.8 percent) in 2009/10 and 2010/11.

This implies significant increases in non-labour cost items. The items identified are:

- The proposed reduction of \$1 million in charges levied by the Department of Environment and Climate Change did not eventuate;
- The \$1 million additional cost for licence fees payable to the Water Administration Ministerial Corporation (Office of Water);
- An additional \$1 million in bulk water charges with recommencement of supply from the Fish River Scheme; and
- The efficiency gain of \$1 million in property costs proposed at the 2009 Determination⁹² is not reflected in the AIR figures to 2011/12.

The SCA has maintained its core expenditure over the forecast period at 2011/12 levels.

⁹² Worley Parsons, *Review of Capital and Operating Expenditure- Sydney Catchment Authority (2009 Determination)*, January 2009, pg47.

5.15 Findings

The operating expenditure incurred by the SCA over the current price path is less than allowed for by IPART at the 2009 Determination. At the same time, the SCA has met its service level obligations. There was no increase in the risk profile of the organisation attributable to the lower level of expenditure.

The SCA has identified gaps in current institutional arrangements for the coordination of the metropolitan water supply. These gaps principally relate to the operation of the desalination plant. They create uncertainties which do impact the risk profile of the SCA. The SCA seeks to address these through a change in the revenue mix between fixed and usage charges and an allowance for an 'insurance premium' for Shoalhaven pumping costs.

Halcrow concludes that the SCA's operating expenditure incurred over the current price path is efficient.

The SCA has not presented its forecast operating expenditure in a form that:

- clearly demonstrates the relationship between the nominated cost drivers and the level of expenditure; or
- allows sensitivity analysis to be conducted that would show the impact on service levels of variations to the allowed expenditure.

The following comments are made in this context:

- There was a significant reduction in staff numbers to that forecast for the current determination period. The 2011/12 number of staff (250 FTE) is to be maintained over the period of the next price path.
- The annual forecast operating expenditure is, however, 7 percent (\$6 million) greater than the annual average for current price path.
- No substantive change in the SCA's level of activities is expected over this period with the exception of a recommencement of pumping from the Shoalhaven Scheme and taking of supply from the Fish River Scheme.

At the aggregate level, the increase in operating costs can be explained by:

- a 1.8 percent increase in average staff numbers equating to a cost increase of about \$0.6 million and an increase of about 0.9 percent in the average cost of labour (+\$0.3 million);
- lifting of the moratorium on Shoalhaven pumping which will result in costs of \$2 million;
- recommencement of supply from the Fish River at a cost of about \$1.1 million; and
- additional licence fees of \$1.1 million payable to the Water Administration Ministerial Corporation (Office of Water); and
- an increase of \$0.9 million in Customer Service costs from 2011/12 to 2015/16, representing a new levy to be imposed by Sydney Water for calibration services.

At the aggregate level of operating expenditure, the SCA proposes to maintain the substantial labour efficiencies achieved over the current price path. Additional non-labour expenses will be incurred which will increase the level of efficient costs.

Unlike the 2009 Determination the SCA is not proposing a blanket reduction in operating expenditure reflecting additional efficiency savings.⁹³

Halcrow has identified current shortfalls in the SCA's capital planning and management systems (refer **Section 6.6**). Full development and implementation of its recently updated processes may attract additional expenditure.

It can be expected, however, that the SCA will make continuing efficiency gains. Halcrow has set an annual efficiency target of 0.3 percent per annum (cumulative) against core operating expenditure (\$87 million per year) over the determination period. In making this judgment, Halcrow has considered:

- about \$0.5 million in projects were delayed to 2011/12 (refer **Section 5.10.5**), thereby boosting the level of expenditure in the base year;
- the SCA has identified \$1 million per year in efficiency savings from projects (refer **Section 5.12.3**), claiming that these efficiency savings are already reflected in the projected figures. This implies that the core expenditure would have increased from \$87 million to \$88 million in the absence of these projects; and
- the late notice and absence of detail provided on the proposed new levy by Sydney Water for calibration services which will see Customer Service costs increase by \$0.9 million over the period to 2015/16.

The allowed operating expenditure will need to be adjusted to take account of the carbon tax. Further adjustments may also be required for movements in the market price of electricity.

Halcrow also proposes the expensing of expenditure proposed to be capitalised by the SCA (refer **Section 6.7**).

The level of expenditure allowed is sufficient for the SCA to meet its service level commitments.

5.16 Recommended Operating Expenditure

The SCA's proposed operating expenditure for the period 2012/13 to 2016/17, together with Halcrow's recommended level of operating expenditure, is summarised in **Table 5.10**.

⁹³ IPART, *Review of prices for the Sydney Catchment Authority, From 1 July 2009 to 30 June 2012*, June 2009, pg53.

Table 5.10: Forecast and Recommended Operating Expenditure (\$million 2011/12)

Expenditure Profile (\$value)	2012/13	2013/14	2014/15	2015/16	2016/17	Total Cost 2012/13 to 2016/17
SCA Forecast Operating Expenditure Profile	89.7	89.6	89.7	89.7	89.7	448.4
Efficiency target ⁹⁴	(0.3)	(0.5)	(0.8)	(1.0)	(1.3)	(3.9)
Carbon Tax Shoalhaven ⁹⁵	1.3	1.3	1.3	1.4	1.4	6.7
Carbon Tax Other ⁹⁶	0.5	0.5	0.5	0.6	0.6	2.7
Halcrow Recommended Expenditure Profile (based on SCA Proposal)	91.2	90.9	90.7	90.7	90.4	453.9
SCA Forecast Capital Expenditure to be Expensed	5.8	2.3	2.0	0.0	0.0	10.1
Halcrow Recommended Operating Expenditure Profile	97.0	93.2	92.7	90.7	90.4	464.0

It is noted that operating expenditure recommended by Halcrow includes an allowance for capital expenditure proposed by the SCA which Halcrow considers should be expensed. This expenditure relates to the following capital projects:

- CPX001 - Warragamba E -flow investigation (refer **Section 6.3.13** and **Appendix A.12**); and
- CPX008 - Upper Nepean Transfer Scheme; Upper Canal Refurbishment (refer **Section 6.3.14** and **Appendix A.13**).

⁹⁴ Calculated as a cumulative 0.3 percent a year based on core expenditure of \$87 million.

⁹⁵ SCA email dated 20 October 2011.

⁹⁶ SCA email dated 20 October 2011.

6 Capital Expenditure

6.1 Overview

Sydney Catchment Authority reported actual capital expenditure of \$99.645 million (\$real 2011/12) over the three (3) year historical price path from 2009/10 to 2011/12. Historical expenditure is 28 percent, ie. some \$39.056 million (\$real 2011/12) less than IPART's 2009 efficient price determination of \$138.701 million (\$real 2011/12).

The historical underspend is due to the deferral of expenditure on projects such as the Upper Canal (\$30 million nominal), works on the Bendeela campground (\$2.9 million nominal), the Warragamba Pipelines and Metropolitan Dams electrical upgrade (\$12 million nominal) and the Warragamba Pipelines and control valves (\$4.8 million nominal).⁹⁷ The deferral of \$49.8 million (\$nominal) is, however, offset by overspend on projects such as the Upper Nepean weirs,⁹⁸ which is in the order of approximately \$8 million (\$nominal).

The forecast expenditure for the period 2012/13 to 2016/17 is \$207.934 million (\$real 2011/12) as shown in **Table 6.1**.

Table 6.1: SCA Historical and Forecast Capital Expenditure (\$million 2011/12)

Expenditure	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
	Actual	Actual	Actual	Budget	Forecast	Forecast	Forecast	Forecast	Forecast
IPART Determination 2009*	-	67.607	36.394	34.700					
SCA Expenditure^	80.000	53.812	27.164	18.669	31.497	32.877	36.627	45.883	61.049
Difference		-13.795	-9.230	-16.031					

Notes:

* based on information presented in the SCA's Submission to the IPART, pg44.

^ There is a small difference in the SCA forecast expenditure included in the submission versus the Annual information return. Halcrow have adopted figures included in the AIR for presentation of information.

Forecast expenditure is primarily aimed at the construction and renewal of assets that are used to collect, store and deliver raw water to customers. In order to meet its service obligations, the SCA must achieve certain standards that ensure the safe and reliable supply of water. The drivers for capital expenditure are described as mandatory and discretionary and are shown in **Table 6.2** along with other drivers such as business efficiency and Government programs.

⁹⁷ Information on expenditure associated with deferrals is based on information presented on page 44 of the SCA's submission to IPART.

⁹⁸ The SCA has in their submission has not provided information on overspend on projects.

Table 6.2: SCA Drivers for Capital Expenditure

	2012-13	2013-14	2014-15	2015-16	2016-17
Mandatory standards	55%	42%	45%	48%	39%
Discretionary Standards	28%	46%	42%	12%	8%
Business Efficiency	14%	9%	8%	6%	3%
Government Program	3%	4%	6%	34%	49%

Note: based on information presented in the SCA's submission to the IPART, pg49.

Over the three year period 2012/13 to 2014/15 the drivers for the SCA's capital expenditure are meeting of mandatory standards and discretionary standards, with 8-14 percent of expenditure related to business efficiency. This is forecast to change in the period 2015/16 to 2016/17, when expenditure related to Government programs increases to 34-49 percent of the proposed capital investment, almost solely due to the Warragamba E-Flows project.

At this stage, the SCA does not have a complete understanding of the expenditure required to deliver the Warragamba E-flows project (as investigations are still underway), however, has included \$47.187 million in its expenditure forecasts (as identified in the AIR/SIR).

6.2 Review of Capital Projects

As part of the review of the SCA's current and proposed capital expenditure programs, Halcrow undertook a detailed examination of a representative sample comprising of fifteen (15) projects, either currently being delivered or proposed for delivery during the upcoming determination period. A high level review of a further four (4) projects was also undertaken.

Using a selection criterion based primarily on the selection of at least 10 percent of all projects exceeding the \$1 million materiality threshold, Halcrow selected the projects listed in **Table 6.3** for detailed review.

When compared to the current SCA capital program, the selected projects represent 67 percent of the program in terms of capital value, which is significantly above the 10 percent threshold requested. When considering the forecast SCA capital program, the selected projects represent 84 percent of the total program forecast for delivery up to 2016/17 and 28 percent of the total program forecast for delivery up to 2021/22.

Table 6.3: Capital Projects Selected for Detailed Review

Project Number	Project Name	Driver	Actual Spend (\$million)	Forecast Spend (\$million)	
			2008/09 to 2011/12	2012/13 to 2016/17	2017/18 to 2021/22
CPO007	Prospect Dam Improvement Works	C4	1,182	16,380	-
CPO033	Upper Nepean environmental flows works	P	40,549	-	-
CPO113	Warragamba Dam Crest Gates, Construction	C4	31,300		
CPO137	Burrawang Pumping Station Electrical system	C0	1	8,541	-
CPO186	Wingecarribee Dam Improvement Works	C4	6,063	4,823	-
CPO218	Hydrometric Renewals Program	CR	3,322	2,873	-
CPO222	Upper Nepean / Leonay-Emu Plains / Wallacia - groundwater works	P	5,380	-	-
CPO224	Minor Assets Renewals Program	E	4,798	4,995	-
CPO253	Warragamba Pipeline valves and controls upgrade	D0	-	5,527	-
CPO272	Shoalhaven Transfers works	P	581	-	190,927
CPO273	Tallowa Dam - fish passage and environmental flow works	P	25,656	-	-
CPO346	Metropolitan Dams Electrical system	C0	1	11,556	3,115
CPX001	Warragamba E -flow investigation	P	710	47,187	44,215
CPX008	Upper Nepean Transfer Scheme - Upper Canal Refurbishment	D0	542	29,141	-
CXA17	Warragamba Dam Reliability Upgrade	C4	-	30,146	-
CXA20	Kangaroo Tunnel Relining	D0	-	3,015	-
CXA21	Tallowa Dam Safety Upgrade	C4	-	5,024	6,029
CXA31	Heritage Program	C9	-	3,015	5,527
CXA35	SCARMS Expansion	D3	-	2,010	-

Selected projects capital expenditure	120,086	174,234	249,813
Total SCA capital expenditure	179,978	207,934	880,047
Selected projects as a percentage of total projects	67%	84%	28%

In undertaking the detailed reviews of the above projects, Halcrow sought to:

- identify the need for the project;
- identify the key drivers for investment;
- understand the approach to solution development adopted; and identify the alternative options considered and the basis for the preferred solution;
- understand the basis of the cost build-up and whether any contingencies or allowances have been applied to capital expenditure forecasts;
- understand the proposed method of procurement and delivery profile of the project;
- identify the proposed outputs of each project; and
- assess the prudence and cost effectiveness of each project.

6.3 Detailed Investigations

6.3.1 General

The findings of the detailed investigations for each of the projects reviewed are summarised in the following sections. More detailed discussion in respect of each project is presented in **Appendix A**.

6.3.2 CPO007 – Prospect Dam Improvement Works

The Prospect Dam was constructed in 1888 and was the first earth fill dam embankment in Australia. It is proposed that remedial works are undertaken along the 2.2 kilometre length of the upstream face of the dam embankment.

The driver for this project is Mandatory Standards, Dam safety. Approximately \$16.4 million (\$real 2011/12) is forecast to be expended in 2012/13 and 2013/14. Total expenditure on the project, which has been underway since 2003, is estimated to be \$17.819 million (\$real 2011/12).

The long lead time in arriving at a dam safety solution has been protracted, given that investigations have been underway since 2003. Nonetheless, dam safety is bound by statutory requirements and Halcrow considers the SCA to be exercising prudence in undertaking this job and developing a final solution.

The SCA has had ample time to develop and implement some form of dam improvement works and from this perspective it is difficult to agree that to date, expenditure has been efficient. It is, however, noted that expenditure on investigations is expected to equate to approximately 9.4 percent of forecast construction costs, which is considered efficient for a project of this size.

No change is recommended to the expenditure profile proposed by the SCA in its AIR/SIR.

6.3.3 CPO033 – Upper Nepean Environmental Flow Works

The *2004 Metropolitan Water Plan* anticipated that works would be required on the Upper Nepean dams and weirs to allow the passage of environmental flows. This project comprised of two separate portions of works:

- Portion A – new outlet works on Cataract, Cordeaux and Nepean Dams, the installation of diversion weirs at Broughton Pass and Pheasants Nest, and installation of a fishway at Pheasant's Nest; and
- Portion B – provision of environmental flow outlets and fish ladders at SCA 'compensation' weirs and other public weirs downstream of the SCA's water supply.

The NSW Government originally set a budget for this project of \$30 million in 2004 which was revised to \$33 million in 2008 to cover works required on non-SCA weirs. Total expenditure on this project, as included in the AIR/SIR, is \$41.4 million (\$real 2011/12). The driver for this project is, accordingly, the creation of a new asset driven by Government programs.

Given the works are required by both the *2004* and *2006 Metropolitan Water Plans*, expenditure is considered prudent.

Portion A was delivered marginally over the SCA budget following tender evaluation (+\$194,254 (\$2009/10)), with this increase wholly attributed to an increase in project management and technical services costs. Portion B has been delivered at a cost more than \$4.3 million over budget following tender evaluation.

The delays in implementing the project appear to be genuine; however, it appears that the project has suffered poor technical design and management. Furthermore the true cost of the project and how strictly it should be compared to the nominated Government Budget of \$33 million (\$nominal) has been masked by environmental flow from Avon Dam being undertaken in conjunction with another project. Halcrow recognises that there are many contributing factors to this project costing more than forecast, however, it is difficult to agree that it was delivered efficiently.

Reconciliation of the predicted final cost against the post tender budget shows that the most significant variation occurred in respect of project management and technical services costs. Furthermore, in Halcrow's view, the budgeted amount for this cost element, which equates to 18 percent of construction cost and excludes the SCA's program management costs, is deemed excessive; an allowance in the order of 10-15 percent of construction would normally be expected. Accordingly, any significant variation in this cost (compared to budget) exacerbates this excessive allowance. Based on the predicted final construction cost of \$30.767 million, an allowance of 15 percent amounts to \$4.615 million, which is some \$0.968 million less than the forecast final cost for project management and technical services.

On the basis of the discussion outlined above, Halcrow recommends that the excess (compared to budget) costs incurred in respect of project management and technical services, ie. \$0.81 million, be excluded when determining the efficient cost of the works.

6.3.4 CPO133 – Warragamba Dam Crest Gates; Construction

The upgrade to Warragamba Dam's drum and radial gates (CPO113) is the final component of a major \$150 million upgrade project, currently being implemented to ensure the flood capability and reliability of Warragamba Dam during a Probable Maximum Flood (PMF) event (as defined in 1999 and updated in 2007). This project is integrally linked to the effectiveness and design of the Auxiliary Spillway option and involves raising the radial gates to provide greater clearance for passing flood waters, improving drum and radial gate reliability and strength, and improving controls.

The project has a dam safety driver, which is a mandatory safety standard.

The current expenditure profile (in \$nominal) is broadly in line with the tendered price, with the exception of a slight deferral of expenditure into years 2011 and 2012, which is not surprising given the complexity of the work. The total cost of this project is \$36.5 million (\$real 2011/12) which has been included in the AIR/SIR.

In terms of dam safety and security of supply, upgrading of the Warragamba Dam Crest Gates to maintain structural integrity of the dam in the event of a PMF and maximise the benefits of the previously completed auxiliary spillway represents a sound and necessary investment decision.

Although costs have escalated significantly from that initially estimated, the SCA has adequately assessed and accounted for the reported variance, to the satisfaction of the responsible Minister. The closeness of the current tender to outturn forecast suggests effective management by the SCA during delivery and the slight reported deferral in expenditure into 2011/12 is not unusual for a project of this complexity.

However, as the PMF is regularly being reviewed (circa 1999 and 2007) there is a risk that subsequent updates to the PMF may render the recently completed improvements redundant, and as such, it could be argued that the expenditure is potentially inefficient due to the lack of future proofing provided in the solution. It may have been prudent to design an increased factor of safety into the gate hinge design, thereby providing some future proofing, however, the SCA considers (and Halcrow agrees) that the potential risks of further deferral would have been too great to ignore.

Halcrow finds the expenditure in respect of the Warragamba Dam Crest Gates; Construction project to be both prudent and efficient.

6.3.5 CPO137 – Burrawang Pumping Station Electrical System

Burrawang Pumping station was constructed in the mid 1970's as part of the Shoalhaven Scheme. The pumping station transfers water from the Fitzroy Falls Reservoir via the Wildes Meadow Canal to Wingecarribee Reservoir. The SCA has proposed that the pumping station electrical equipment be upgraded during the forthcoming price path commencing in 2012/13.

The driver listed in the 2011 AIR/SIR is 'existing mandatory standards – other'. The expenditure estimate provided in the AIR/SIR is \$8.541 million (\$real 2011/12) which aligns with the more expensive upgrade option included in the condition assessment report for this project.

The SCA has demonstrated through the electrical condition assessment for Burrawang Pumping Station that some expenditure is necessary to replace and upgrade electrical and mechanical assets which are in poor condition and have limited remaining life. Although a formal business case has not yet been developed, Halcrow is generally satisfied that the proposed expenditure is prudent, apart from the inclusion of the GST. It is noted that only a small component of the proposed electrical upgrade is for work to upgrade lighting and power (some \$90,000 (\$nominal)) which is related to meeting OHS&R statutory requirements. Halcrow recognise it is likely that the SCA may need to implement Option 2 which includes the upgrade of the existing 11kV Wound Rotor Pump Motors (to new Asynchronous Induction Motors) at a cost of an additional \$3.3 million (\$2010/11) including contingency.

Halcrow notes, however, that the work completed to date provides no understanding of whether the proposed works would actually reduce maintenance costs or improve efficiency (ie. through the motor and SCADA upgrade), however, it would be expected that this would be captured in the Business Case.

In regards to efficiency, Halcrow is of the opinion that there is some scope to improve efficiency for this project by reducing delivery from 4 years to 3 years and delaying this project 1 year to maximise the life of existing assets. A revised expenditure profile is recommended.

6.3.6 CPO218 – Hydrometric Renewals Program

The Hydrometric Renewals Program is a 5 year rolling program of renewals to maintain the reliability and accuracy of the hydrometric monitoring sites. A proactive approach to hydrometric renewals ensures that the SCA will maintain compliance with all licence and regulatory obligations, provide early warning of operational issues and ensure certainty of annual expenditure. On this basis, Halcrow considers the rolling hydrometric renewals program to be both necessary and prudent.

The forecast annual expenditure profile for 2011/12 to 2015/16, as approved in the latest business case, was nominally based on the estimated total cost of replacement over a 7 year cycle, ie. \$0.7 million per annum. In its AIR/SIR submission, the SCA has forecast an additional \$1 million expenditure for 2011/12, over and above the initial \$0.7 million forecast.

Whilst Halcrow recognises the benefits of the current delivery model (given the varied remote renewal locations), it does not consider the current delivery model to be as efficient as possible. In terms of procurement, each individual renewal is allocated to the HMSFS Contractor and quoted on individually. These quotes are then reviewed by the SCA and approved for delivery within an agreed timescale. Whilst this approach ensures that the SCA retains an element of control over the program and the use of a single contractor ensures consistency of approach, the separate procurement of each renewal is not conducive to efficient delivery. Halcrow is of the view that an ongoing, clearly defined long term program of renewals lends itself to a separately tendered framework that would potentially introduce economies of scale through reduced procurement costs and lower unit costs due to the surety of work.

On the basis of the above conclusions, Halcrow considers there may be scope to reduce the forecast annual expenditure profile for the ongoing hydrometric renewals program by approximately 2-5 percent per annum to acknowledge that a more efficient delivery mechanism may be available to the SCA.

6.3.7 CPO222 – Upper Nepean/Leonay-Emu Plains/Wallacia Groundwater

In order to assess the scope for the potential utilisation of groundwater sources within the wider Sydney basin, the SCA was requested to undertake a widespread investigation to determine the availability of reliable groundwater supplies across southern and western parts of Sydney, in order to augment surface water supplies in the event of a severe drought.

Investigations of approximately twenty (20) sites have identified three (3) potentially viable groundwater sources at Upper Nepean, Leonay/Emu Plains and Wallacia. These sites would potentially deliver 15 gigalitres of water per annum, from a depth of 200-400 metres, over a 3 year period.

This project is driven by the actions identified in the *Metropolitan Water Plan 2004* and *2006*, a Government program to improve the security of supply for the region and enhance the available sustainable yield.

On the basis that approximately \$22 million has been incurred on this project, yet no tangible assets (in terms of additional water resource yield) have been delivered, the prudence and cost effectiveness of this scheme is questionable.

Based on information made available for the purposes of this review, it appears that investigations were subject to significant scope creep and that additional funding was secured as and when additional groundwater locations were identified. Consequently, it would appear that the overall project has not been delivered as cost effectively as possible. Initial planning and definition of scope would have allowed for the clustering of similar activities and reduced procurement and investigation costs.

Halcrow also notes that the SCA proposes to capitalise all expenditure associated with this project. Whilst it is appropriate to capitalise investigation work leading to delivery of a capital asset, Halcrow queried whether expenditure against this project should be capitalised when the project was 'shelved' prior to the installation of actual production boreholes. On the basis of comment provided by the SCA, Halcrow agrees that it is reasonable to capitalise some of the expenditure associated with the Upper Nepean investigation once the scheme is delivered, however, in the interim the balance should be allocated as Operating Expenditure.

Halcrow further notes, however, that in a recent review undertaken by the Audit Office, the Auditor General was of a differing opinion; specifically that, in accordance with Australian Accounting Standard AASB 116, expenditure associated with the Upper Nepean (Kangaloon) investigation should be 'disclosed as an asset' and capitalised, on the basis that a potential increase in yield has been confirmed.

In its 2009 Determination, IPART's decision regarding past capital expenditure that was prudent included allowance for write-off of \$9.0 million (\$2008/09) that was not related to the Upper Nepean (Kangaloon) component of the project. This write-off was to be incurred in 2005/06, 2006/07 and 2007/08; on this basis, it is assumed that expenditure incurred during 2008/09 and 2009/10 relates to the Upper Nepean (Kangaloon) investigation and can be capitalised.

Accordingly, the reported expenditure has been assessed as being prudent and efficient.

6.3.8 CPO224 – Minor Assets Renewal Program

The Minor Asset Renewals Program provides an ongoing, proactive approach for the replacement of minor civil, mechanical and electrical assets that are approaching or beyond their economic useful life.

The project has an efficiency driver, enabling the SCA to comply with their *Corporate Sustainability Strategy* and *Total Asset Management Guidelines* (TAM2006). A proactive, risk based approach to asset renewals ensures that the SCA will maintain reliability of supply and surety of annual expenditure. On this basis, Halcrow considers the rolling minor asset renewal program to be both necessary and prudent.

Halcrow does not, however, consider that the SCA is delivering the program as efficiently as possible. Whilst the current approach of obtaining individual quotations for minor asset renewals ensures SCA of control over the program and consistency of approach, the separate procurement of each renewal and a process whereby a quoted price in line with the forecast renewal price would automatically secure approval for the CMEM Contractor to proceed, is not conducive to efficient delivery. An ongoing, clearly defined long term program of renewals (which this expenditure item comprises) lends itself to a separately tendered framework that would potentially introduce economies of scale through reduced procurement costs and lower unit costs. Surety of work would allow the Contractor flexibility to deliver the annual program efficiently during the year, rather than in the specific month that MAXIMO suggests.

Furthermore, MAXIMO does not appear to distinguish between those assets that are integral to maintaining supply and those assets that are ancillary to bulk water supply. A more reactive approach to these ancillary assets would potentially reduce the overall annual renewals program and give flexibility to focus on the more critical assets.

On the basis of the above conclusions, Halcrow considers that there may be scope to reduce the forecast annual expenditure profile for the minor assets renewals program. Whilst it is recognised that the SCA has already committed to the current procurement strategy and that the minor assets renewal works are part of the current contractual obligation, Halcrow proposes a nominal 2 percent per annum reduction in expenditure to acknowledge that a more efficient delivery mechanism is potentially available to the SCA.

6.3.9 CPO253 – Warragamba Pipeline Valves and Controls Upgrade

The purpose of the project is to assess the condition of all existing valves and associated infrastructure (including controls) on the Warragamba Pipelines and then refurbish, modify and replace as appropriate.

The project has an 'efficiency' driver, enabling the SCA to meet contemporary design standards and maintain security of supply. A proactive, risk based approach to asset renewals ensures that the SCA will maintain reliability of supply and surety of annual expenditure. On this basis, Halcrow considers the Warragamba Pipeline Valve and Controls Upgrade program to be both necessary and prudent.

On the basis of the high level cost estimates provided for forecasting purposes, Halcrow is broadly content with the efficiency of the estimated costs, as they are based on market tested rates, albeit based on the replacement/refurbishment of a single, one-off valve. Whilst the consolidation of the proposed annual replacements/refurbishments into a competitively tendered program may introduce further scope for efficiency, Halcrow considers the forecast expenditure to be reasonable. Halcrow notes, however, that the SCA does not appear to have allowed for shutdown/diversion costs and future inspection programs in the forecast expenditure profile, potentially understating the required expenditure.

On the basis of the above conclusions, Halcrow considers the forecast expenditure to be acceptable.

6.3.10 CPO272 – Shoalhaven Transfers Works

The Shoalhaven Transfers project involves expenditure related to:

- investigation and implementation of new environmental flow rules for improved river health;
- a change in operation of Tallowa Dam; and
- investigation of three options for water transfers from Tallowa Dam to Sydney and the Illawarra and the identification of a preferred option.

The driver for this project is ultimately the requirements set out in the *2004, 2006 and 2010 Metropolitan Water Plans* which outline the long terms supply options. The driver recorded in the 2011 AIR/SIR is 'Government Program'.

Historical expenditure presented in the AIR/SIR totals \$12.276 million (\$real 2011/12) for the period between 2005/06 to 2009/10. Expenditure in the historical period 2007/08 to 2009/10 was \$4.184 million (\$real 2011/12). All historical expenditure is related to investigations.

The options report indicates that installation of the current preferred transfer arrangement, the Burrawang to Avon Dam tunnel would result in a P90 cost of \$495 million (\$2008/09), ie. \$538.3 million (\$real 2011/12), meaning there is a 90 percent likelihood that the project will be completed for less than this amount. The current AIR/SIR forecasts that expenditure on the capital works will commence in 2018/19 with expenditure of \$4.02 million (\$real 2011/12) ramping up to \$115.6 million in 2021/22.

Historical expenditure was driven by the NSW Government's desire to secure Sydney's long term water supply and is therefore considered prudent. No information was provided regarding how historical expenditure was spent; Halcrow is unable to determine whether expenditure was executed efficiently.

Given that the project is set to commence beyond the coming price path (in 2018/19), the level of detail and supporting information contained within the options evaluation paper is considered appropriate for identification in the current AIR/SIR. Forecast expenditure is therefore considered both prudent and efficient for this assessment.

6.3.11 CPO273 – Tallowa Dam; Fish Passage and Environmental Flow Works

The Tallowa Dam Fish Passage and Environmental Flow works project involved the installation of a two-way fish passage and works to enable environmental flow releases as well as upgrade of the Tallowa Dam picnic area. The project was first introduced in the *2004 Metropolitan Water Plan*, but underwent changes when the NSW Government announced Tallowa Dam would not be raised in the *2006 Metropolitan Water Plan*.

The driver for this project is the *2004* and *2006 Metropolitan Water Plans* which establish the NSW Government's commitment to environmental flow releases and fish passage to improve the public amenity of the dam and picnic area. The SCA is obliged to comply with Government direction stated in the *Metropolitan Water Plans*. The driver listed in the AIR/SIR is 'Government Program'.

The delivery of this project is prudent as it has enabled the fish passage and environmental flows works to be implemented as required by the *2006 Metropolitan Water Plan*. The SCA has been prudent in the delivery of this "high risk" project through early contractor involvement.

It is agreed that the delivery of this project has been complex; however, it is not clear whether the decision to not raise Tallowa Dam (in 2006) had bearing on the project costs. Halcrow does, however, conclude that this project was delivered over budget. According to the P90 estimate, project management costs incurred by the SCA are well within the expected range, being approximately 3.2 percent of construction costs, however, it appears that actual project management cost amounted to approximately 13.4 percent of construction costs, which is towards the upper bound of the normally expected range.

Based on the above, Halcrow concludes that the project delivery was not as efficient as would normally be expected, however, given the Government Program driver and evidence that the SCA communicated forecast increases in costs with NSW Treasury at an appropriate stage of the project, Halcrow is satisfied that no adjustments to the expenditure reported for this project in the AIR/SIR should be made.

6.3.12 CPO346 – Metropolitan Dams Electrical System

The Metropolitan Dams include Avon, Cataract, Cordeaux, Nepean and Woronora, which were constructed between 1903 and 1941. A condition assessment of the electrical systems was prepared in September 2010. This project proposes upgrade of the dams' electrical systems to increase reliability and extend operational life by a further 20 years.

The driver listed in the 2011 AIR/SIR is 'existing mandatory standards – other'. The Project Brief Form lists the project driver as 'efficiency'.

The SCA has identified that this project will involve total expenditure of \$14.671 million (\$real 2011/12) over the six year timeframe for the project with \$11.556 million (\$real 2011/12) forecast to be expended during the coming price path.

The need for this project is well documented in the electrical condition assessment from a safety, maintenance and reliability perspective. Halcrow is satisfied that, given the age of the assets, it is prudent to replace them. The process of completing a condition assessment and preliminary cost estimate is also prudent to guide the inclusion of expenditure in the forthcoming price path.

Some components of the electrical system upgrade will involve replacing assets with SCADA capability. Undergrounding existing low voltage overhead power supplies to picnic areas and nearby buildings is also proposed.

It is understood that the SCA has completed a study which demonstrates SCADA control systems will reduce the general operational costs of operating dams by 5 percent. Halcrow agrees in principle that SCADA systems produce cost savings, as well as bringing other benefits such as safety. Given the opportunity to replace existing assets with SCADA integrated assets, Halcrow consider this to be prudent. Halcrow supports the provision of new SCADA assets where proposed, providing the financial and operational benefits outweigh maintaining existing operation methods.

In regard to the undergrounding of cables, Halcrow has not seen evidence that supports this project being critical to the SCA in meeting its core obligation of supplying water to customers. The driver to meet existing mandatory standards and for efficiency gains does not apply to the undergrounding of cables given that the cables have been assessed to have in excess of 9 years remaining life.

The contingency costs for this project are slightly higher than normal for this stage of the project. Furthermore, there is unidentified expenditure in year 2017/18 which does not tie to the cost estimate for this project.

Halcrow therefore recommends the following components included in the current AIR/SIR are removed:

- the included GST component of the works \$1,040,279 (\$real 2011/12);
- the cost of undergrounding of low voltage cables for the picnic area \$2,062,000 (\$real 2011/12); and
- the proposed expenditure in year 2017/18, ie. \$3,115,000 excluding GST.

The proposed cost of the project in the AIR/SIR should only be the direct cost plus revised project management and contingency costs to a maximum of 20 percent and 15 percent respectively. The revised amount is equal to \$8,489,082 (\$real 2011/12), which Halcrow considers to be efficient.

6.3.13 CPX001 – Warragamba E-flow Investigation

The SCA is in the process of undertaking a detailed investigation in order to assess the scope and feasibility for the provision of an environmental flow regime for Warragamba Dam. The objective is to facilitate the release of environmental flow into rivers downstream of the dam roughly equivalent to the volume of inflow from the Warragamba catchment. The purpose of this project is to deliver to the NSW Government a report and supporting business case recommending an environmental flow regime for Warragamba Dam.

This project is driven by the *Metropolitan Water Plan 2010* requirement to ensure that an environmental flow regime for Warragamba Dam is included in *Metropolitan Water Plan 2014*.

An allowance of \$1.7 million has been made to complete the investigation work by 2014, with the balance (in the order of \$90 million (\$real 2011/12)) equating to the estimated design and construction costs. This is in addition to approximately \$1.45 million (funded as Operating Expenditure) also incurred as part of the investigation work; the SCA has advised that the majority of this expenditure relates to staff labour costs.

The necessity to deliver to the NSW Government a report and supporting business case recommending an environmental flow regime for Warragamba Dam is a mandatory requirement that Halcrow considers to be both necessary and prudent.

Halcrow does, however, have concerns in respect of the magnitude of the forecast expenditure associated with this project. CPX001 is identified as an investigation project only; accordingly, Halcrow would normally only expect expenditure associated with the investigation to be allocated to this project (ie. expenditure of approximately \$1.7 million). In fact, it could be argued that the expenditure associated with this investigation should be funded as Operating Expenditure, and therefore not appear in the capital expenditure forecasts. Halcrow understands that expenditure to be incurred from 2011/12 to 2013/14 relates to early investigation and project scope definition, as opposed to project delivery.

Furthermore, Halcrow does not consider it appropriate to allocate expenditure to a project where the scope of the solution is yet to be defined. As there is still a high level of uncertainty over the extent of the environmental flow and nature of the required solution, Halcrow considers that it would be prudent to defer the majority of anticipated capital expenditure to the next pricing period. This will reduce the risk of the SCA significantly under spending against its determination, as has previously been the case.

On the basis that the lead in time for a project of this nature is likely to be significant, Halcrow considers that it would be prudent to make some allowance for nominal capital expenditure during the upcoming determination period, over and above the initial allowance for investigation. This will enable the SCA to define the actual scope of works, reach agreement with the NSW Government, prepare a cost estimate of high confidence and commence the procurement process for the delivery of the defined scope. Halcrow has proposed a revised expenditure profile accordingly.

6.3.14 CPX008 – Upper Nepean Transfer Scheme; Upper Canal Refurbishment

The Upper Canal is a raw water conduit used to supply approximately 500 megalitres per day from the Upper Nepean Dams to Prospect Reservoir; it is an integral component of the Greater Sydney water supply system. The Upper Canal is approximately 120 years old, at constant risk of structural failure and water quality contamination, and may contravene health and safety requirements.

In order to ensure the long term security of this important water supply link, the SCA proposes to replace the Upper Canal with a pipeline/tunnel solution, however, projects of this nature and complexity have an extremely long lead time. Consequently, the SCA proposes to undertake some refurbishment work to extend the life of this failing asset prior to replacement. The proposed works include critical structural repairs, renewal of a chlorine dosing facility and installation of new automated penstocks.

Within its AIR/SIR, the SCA has identified ‘Discretionary – Other’ as the primary driver for investment. Whilst the project is predominantly a base maintenance project, Halcrow understands that asset maintenance could be construed to be discretionary.

During the course of this review, Halcrow reviewed photographic evidence of a number of structural failures on route, and incidents where water quality and security was potentially compromised. In its current state, the Upper Canal is barely fit for purpose and is in critical need of refurbishment and/or replacement.

The Upper Canal is an uncovered, open waterway that flows through a combination of rural, urban and industrialised landscapes. Given the intrinsic importance of this conduit, the SCA is quite rightly considering the replacement of the current open canal with a closed conduit/tunnel.

With this in mind, the SCA has considered the various refurbishment options, as proposed by an independent Consultant, and proposed a reduced scope option involving the refurbishment of only those sections of the canal that are of major concern and in poor condition. On this basis, Halcrow considers that the SCA has adopted a prudent approach to this essential refurbishment project.

In terms of efficiency, high level unit cost estimates have been utilised; Halcrow considers the SCA’s estimates to be appropriate for forecasting purposes.

Whilst Halcrow considers the SCA estimate to be reasonable, it does not consider the proposed expenditure, a portion of which relates to what is essentially routine maintenance, to be capital in nature. The proposed refurbishment works are aimed at maintaining serviceability, and whilst they will enable the Upper Canal to remain in service for an additional period of time, they will not increase its economic value nor extend its useful life. Halcrow is of the view that the proposed works will only serve to maintain the current useful life.

Halcrow does, however, recognise that some elements of the proposed expenditure (as detailed in the SCA’s draft business case) may be considered capital in nature, although the longer term benefit of these assets may not be directly/fully realised. These

elements have been identified on the basis of guidance provided in the relevant Australian accounting standard and NSW Treasury guidelines.

In view of the discussion outlined above, Halcrow recommends that provision be made within the forecast operating (recurrent) expenditure for delivery of part of this refurbishment project. An allowance for capitalisation of expenditure related to replacement of the chlorine dosing facility and the rehabilitation of penstocks (together with a portion of indirect costs) is, however, deemed reasonable.

6.3.15 CXA17 – Warragamba Dam Reliability Upgrade

The SCA has undertaken significant capital improvement and upgrade works at Warragamba Dam to enable the dam to pass the Probable Maximum Flood (PMF). During the delivery of this project, which had a long lead time (around 13 years), various dam safety standards have been reviewed and reassessed, necessitating a further review of the reliability of Warragamba Dam. The Warragamba Dam Reliability Upgrade project follows on from the previous package of work, and involves the investigation of all risks associated with the reliability of the spillway and adequacy of the Dam to withstand updated PMF and seismic loadings. The objective of the project, which is in its infancy, is to undertake a detailed 'Failure Mode Analysis' for Warragamba Dam, assess the significance and severity of all risks and deliver appropriate measures that would address these risks.

The project has a dam safety driver (C4), which is a mandatory safety standard, to ensure the safety and reliability of Warragamba Dam and meet the requirements of the NSW Dam Safety Committee.

As the scope of work has not yet been defined, the forecast costs and timescales presented are estimates based on engineering judgement and are of a low level of confidence. The forecast cost based on these estimates is \$30.1 million (\$real 2011/12).

Whilst the need to ensure the structural integrity and safety of Warragamba Dam is undeniable, the prudence of the proposed upgrade, as it currently stands, is questionable. Halcrow believes that the SCA has adopted a prudent approach to the current investigation work, funding it as Operating Expenditure, however, does not consider it appropriate to make a significant capital allowance in the upcoming determination period for work that has not yet been defined.

On the basis that improvement works have already been completed, providing some protection against the revised impacts of PMF and seismic activity, Halcrow considers that it may be appropriate to defer the majority of the proposed capital expenditure to the next price determination period. The lead in time for projects of this nature are likely to be significant, therefore Halcrow considers it would be prudent to make some allowance for nominal capital expenditure during the upcoming determination, in order to complete any investigations, define the actual scope of works and commence the procurement process for the delivery of the defined scope. This will enable the SCA to present a project estimate of high confidence in its next pricing submission.

Halcrow's recommends adjustment of the proposed expenditure accordingly.

6.3.16 CXA20 – Kangaroo Tunnel Relining

The Kangaroo Tunnel, Shaft and Pipeline enable the transfer of water between the Bendeela Pondage and the Fitzroy Falls Reservoir. The Kangaroo Tunnel extends from the foot of the shaft to the Kangaroo Pumping and Power Station. This project involves relining the 2.64 metre diameter steel lined tunnel over its full length of 1,480 metres. This conduit transports water in both directions, depending on whether the Kangaroo Pumping and Power Station is pumping or generating.

The forecast cost to complete the Kangaroo Tunnel Relining works is \$3.015 million (\$real 2011/12) to be expended in 2013/14.

The driver listed in the AIR/SIR is 'discretionary standards 2012 – 2017 – Other'. The capital summary identifies problems with the works, but does not identify a clear driver. Halcrow notes that the pipeline is an integral component of the water supply system linking Tallowa Dam to Sydney, the Illawarra and Southern Highlands.

Maintenance is considered crucial to ensuring reliability of the SCA network. Halcrow therefore considers the relining to be necessary and prudent.

Whilst it may have been more cost effective to reline the tunnel at the same time as shaft, it is apparent that the need for tunnel relining was not recognised until the shaft relining was being undertaken; only repair of damaged areas was expected to be necessary based on the findings of the previous (2008) condition assessment.

Halcrow notes that, based on the recent Kangaroo Shaft relining project, the SCA should have a good understanding of the costs associated with relining the adjoining Kangaroo Tunnel. The proposed expenditure in respect of the proposed tunnel relining is therefore expected to be reflective of efficient costs.

6.3.17 Summary – Detailed Assessment

On the basis of the detailed review undertaken in respect of the fifteen (15) identified projects, Halcrow has recommended:

- reduction of expenditure in respect of three (3) projects, including:
 - two (2) projects for which efficiency adjustments are proposed; and
 - one (1) project for which a component of the works is not deemed prudent at this time;
- reduction of expenditure on the basis of efficiency and adjustment of the delivery timeframe (also for efficiency purposes) for one (1) project;
- deferment of expenditure for two (2) projects; and
- expensing (rather than capitalisation) of expenditure in respect of two (2) projects.

Details of the proposed adjustments are presented in **Appendix C**.

6.4 High Level Review of Capital Projects

6.4.1 General

The findings of the high level review of the identified projects are summarised in the following sections. More extensive discussion in respect of each project is presented in **Appendix B**.

6.4.2 CPO186 – Wingecarribee Dam Improvement Works

The Wingecarribee Dam Improvement Works project commenced in November 2004 and is scheduled to be completed in March 2012. Wingecarribee Dam is classified as a 'High A' Consequence Category Dam under the NSW Dams safety committee guidelines. The driver of this project is therefore to meet mandatory standards relating to dam safety.

In 1998 the collapse of the upstream peat swamp into the reservoir created a floating mass of peat, which is currently restrained by a fence to reduce the likelihood of movement further towards the outlet of the Dam. Recent dam safety studies (required every five years) have shown two critical risks to dam safety. It is possible that the peat mass could move and block the spillway and radial gate, which could lead to overtopping of the dam and possible dam failure. Piping through the embankment also has the potential to occur during flood events once the dam water level rises above the Full Supply Level (FSL).

As dam safety is a statutory requirement, the proposed works for this project are deemed prudent. It is questionable whether proposed works to date have been executed efficiently, given the project has undergone several assessments since 2004. Halcrow does, however, agree that the business case proposes a clear way forward to implementing the dam safety upgrade.

Given that the project has not yet gone to tender, the budgeted expenditure and forecast expenditure included in the AIR/SIR are deemed to represent a reasonable assessment of the work required.

6.4.3 CXA21 – Tallowa Dam Safety Upgrade

The objective of this project, which is in its infancy, is to undertake a detailed 'Failure Mode Analysis' for Tallowa Dam, assess the significance and severity of all risks and deliver appropriate measures that would address these risks.

The project has a dam safety driver (C4), which is a mandatory safety standard, to ensure the safety and reliability of Tallowa Dam and meet the requirements of the NSW Dam Safety Committee.

Activity is not anticipated on the Tallowa Dam Safety Upgrade in the upcoming price path, with expenditure not forecast until 2017. Whilst the need to ensure the structural integrity and safety of Tallowa Dam is undeniable and therefore prudent, definition of the upgrade works is at a very early stage.

Halcrow considers it would be prudent to make some allowance for investigation during the upcoming price path to ensure a clearly defined scope can be costed for the next determination. It is recommended that the forecast expenditure be deferred.

6.4.4 CXA31 – Heritage Program (Prospect, Warragamba, etc)

Expenditure related to the Heritage program is forecast to commence in 2016/17 (\$3.015 million (\$real 2011/12)), the final year of the forthcoming price determination period and then continues in 2017/18 (\$3.015 million) and 2020/21 (\$2.512 million).

Based on discussions with the SCA, it is understood that proposed capital expenditure relates to the Outlet tower and bridge in Prospect Reservoir and West Bank Tail Tower at Warragamba Dam.

Halcrow agrees that some works are necessary under the NSW Heritage Act and it is prudent to maintain the integrity of the SCA's Heritage assets. However, given the inadequacy of the information provided and the fact that expenditure on the assets is forecast to be split between the coming price path (2012/13 to 2016/17) and the following price path (2017/18 to 2021/22), it is recommended that 5 percent (\$427,000 (\$real 2011/12)) of the entire heritage budget presented in the AIR (\$8,542,000 (\$real 2011/12)) be made available to the SCA for the forthcoming price determination period. This budget will be for project management and preliminary investigations, to ensure more efficient capital expenditure planning for the 2017/18 to 2021/22 determination.

6.4.5 CXA35 – SCARMS Expansion

SCARMS (Sydney Catchment Authority Reservoir Management System) is a 3D real-time modelling tool, used to forecast changes in water quality within a reservoir. SCARMS has already been installed in Warragamba Dam and more recently at the three Shoalhaven Dams, ie. Tallowa, Fitzroy and Wingecarribee; thereby enabling the SCA to monitor water quality and adjust the point of off-take from these reservoirs and reduce the risk of a water quality incident.

The purpose of the scheme (CXA35) is to extend the coverage of SCARMS and install the technology at the Metropolitan Dams and Prospect Reservoir. The need for this scheme is driven by the increased importance of these water sources following the implementation of the Shoalhaven Transfer.

The driver established for the SCARMS expansion in the 2009 AIR is 'discretionary - water quality'. The estimated cost of the works amounts to \$2.01 million (\$real 2011/12).

Activity is not anticipated on the SCARMS extension in the upcoming price path, with expenditure not forecast until 2017. Notwithstanding this, Halcrow consider the extension of SCARMS across the SCA network of dams to be prudent and cost effective, on the basis that it will ensure continuity and reliability of supply.

6.4.6 Other Observations

In addition to the high level review of specific projects, Halcrow has undertaken an overall review of the historical and forecast expenditure identified in the SCA's AIR/SIR. This review has identified that expenditure of \$2.06 million (\$real 2011/12)

was incurred in respect of project CPO536 – Upper Nepean Transfer Scheme; Upper Canal Replacement in 2009/10. This was in addition to \$0.72 million (\$real 2011/12) incurred in 2008/09.

Given Halcrow's understanding that this expenditure relates to early planning and investigation work related to the Upper Canal Replacement project, the question arises as to whether this expenditure should be capitalised or expensed. Halcrow notes that the SCA has expensed expenditure associated with early project investigation and scope definition for other projects and considers that the \$2.06 million (\$real 2011/12) incurred in 2009/10 should also be expensed.

6.4.7 Summary – High Level Assessment

On the basis of the high level review undertaken in respect of the four (4) identified projects, Halcrow has recommended:

- deferment of expenditure for two (2) projects (CXA31 – Heritage Program and CXA21 Tallowa Dam Safety Upgrade) given the absence of detail in respect of the scope of the works and the proposed timing at the end of the proposed determination period (2016/17 and 2017/18); and
- expensing (rather than capitalisation) of expenditure for one project (CPO536 - Upper Nepean Transfer Scheme; Upper Canal Replacement).

Details of the proposed adjustments are presented in **Appendix C**.

6.5 Output Measures

6.5.1 Overview

In conjunction with the 2009 Determination, IPART identified a number of output measures related to the delivery of the forecast capital program. As part of this review, Halcrow has assessed the SCA's progress in achieving the nominated delivery targets. The findings of this assessment are set out below.

Halcrow has also considered appropriate measures for the coming price period. Recommendations are presented in **Section 6.5.3**.

6.5.2 Performance against Output Measures

6.5.2.1 1. Deliver a strategy for the future of the Upper Canal by June 2013

The Upper Canal, which currently transfers approximately 20 per cent of Sydney's water, consists of a series of tunnels, open canals and aqueducts built over 100 years ago. The canal design and age introduces risks to water quality, and limits the volume of water that can be transferred. In order to ensure both the reliability and quality of water supplied, the SCA will need to either undertake major refurbishment works or replace the canal structure. Over the forthcoming determination period, SCA will undertake longer-term water supply system planning, including developing options for the replacement of the Upper Canal.

During the course of Halcrow's review, it was found that the SCA had engaged an independent Consultant to carry out a detailed investigation of the Upper Canal, in

order to assess its condition and develop a number of viable refurbishment and replacement options.

Halcrow undertook a high level review of the Consultant's 'Project Overview Report' and confirms that the following three refurbishment and two replacement options were highlighted and considered in detail:

- Minimum (10 year) Rehabilitation – limited to sections of the canal where there were major concerns, with condition assessed as poor or fair. Designed to prolong life by 10 years; estimated cost - \$45 million (P50 estimate excluding contingency).
- Intermediate (25 year) Rehabilitation – limited to sections of the canal where there were major concerns, with condition assessed as poor, fair or moderate. Designed to prolong life by 20-25 years; estimated cost - \$300 million (P50 estimate excluding contingency).
- Full (50 year) Rehabilitation – limited to sections of the canal where there were major concerns, with condition assessed as poor, fair, moderate or good. Designed to prolong life by 50 years; estimated cost - \$658 million (P50 estimate excluding contingency).
- Various Pipeline Replacement Options – 1x1.8mØ, 2x1.8mØ, 3x1.8mØ, 1x2.1mØ, 2x2.1mØ or 1x1.8mØ and 1x2.1mØ, depending on the required capacity, which varied from 520ML/d to 1,560ML/d; estimated cost - \$749 million to \$1,900 million (P50 estimate excluding contingency).
- Tunnel Replacement Option – 1,200ML/d capacity; estimated cost - \$1,450 million (P50 estimate excluding contingency).

At the time of the review (October 2011), Halcrow found that the SCA had considered the rehabilitation options, and as the long term strategy involves the eventual replacement of the Upper Canal, were in the process of preparing a business case to progress a reduced scope refurbishment project (below the minimum scenario described above). A decision on the preferred replacement option has been deferred subject to further investigation.

6.5.2.2

2. Complete the Prospect Reservoir upstream embankment stabilisation upgrade by April 2013

This project is to comply with dam safety mandatory standards. The installation of a new raw water pumping station and the subsequent use of Prospect Reservoir as an emergency supply can lead to a drawdown of seven metres and poses stability risks for the upstream dam embankment. This project will result in stabilisation of this embankment.

As part of its review, Halcrow found that investigations for embankment stabilisation were still underway. The SCA have included expenditure in the 2011 AIR/SIR in 2012/13 and 2013/14, indicating that this project will not be delivered by April 2013. Geotechnical investigation, drawdown analysis, piping risk assessments, concept design and business risk assessments are yet to be completed. Currently the project is scheduled for review by external experts to confirm adopted design parameters. The SCA has advised a business case is expected to be complete in 2012.

Although this project has had a long lead time, Halcrow considers the SCA to be exercising prudence. Expenditure may not be efficient given the long lead time, however, given expenditure on investigations is only 9.4 percent of construction costs, Halcrow considers this project efficient for a project of this size.

It is recommended that a requirement for this project to be completed by June 2014 be nominated on the basis of the SCA's current proposals.

6.5.2.3 3. Complete the Warragamba Dam crest gates construction project by June 2011

This project involves:

- *raising the radial gates to provide greater clearance for passing of flood waters*
- *improving drum and radial gate reliability and strength*
- *updating the drum and radial gate control system, and*
- *application of protective painting.*

Worley Parsons notes that this is a critical dam safety requirement. The capacity to raise the radial gate and strengthen the facility provides greater protection against dam failure.

Halcrow found that the contract was let in 2007/08 and 'project in use' was achieved prior to June 2011. At the time of review (October 2011), the SCA was in the process of final commissioning, and Halcrow was advised that the gates had been successfully operated following a recent increase in FSL. Final completion was forecast for June 2012.

Although cost estimates have escalated significantly from that initially estimated, the SCA has adequately assessed and accounted for the reported variance, to the satisfaction of the responsible Minister. The closeness of the current tender to outturn forecast suggests effective management by the SCA during delivery and the slight reported deferral in expenditure into 2011/12 is not unusual for a project of this complexity.

6.5.2.4 4. Complete the Wingecarribee Dam safety upgrade project by June 2013

This project comprises mandatory upgrades to dam safety to meet existing safety legislation.

The SCA has been investigating this project since 2004. In January 2011, a business case which discussed four options was developed, with the option producing the highest NPV being selected for procurement. The project is currently nearing tender stage; it is understood from information reviewed that the SCA will be procuring the work under two contracts. Halcrow considers this appropriate given that the two identified packages of work require quite different contractor skills.

Expenditure included in the 2011 AIR/SIR is based on a P90 risk based assessment which is considered appropriate given the project has not yet gone to tender. Expenditure in the 2011 AIR/SIR ceases after 2012/2013, which indicates that the SCA is on track to deliver this project by the required date of June 2013.

Halcrow recommends that the requirement for this project to be completed by June 2013 be maintained.

6.5.2.5 5. Complete the Upper Nepean environmental flows works project by April 2010

The project, which is part of the NSW Government's Metropolitan Water Plan, requires SCA to undertake works to:

- *Release 80/20 environmental flows from the Upper Nepean Dams (Cataract, Cordeaux and Nepean).*
- *To maximise the environmental benefits for the Nepean and Hawkesbury Rivers by enabling the passage of these flows and of fish past two water supply weirs (at Broughton Pass and Pheasants Nest) and 13 irrigation weirs downstream*

From the documentation reviewed, Halcrow understands that environmental flows were able to be released from Upper Nepean Dams (Cataract, Cordeaux and Nepean) by November 2009.

In March 2010, the Broughton Pass and Pheasants Nest environmental flows and fish passage projects had contracts for completion varied such that the new completion date was 30 April 2010. It is therefore assumed that these projects were completed by April 2010.

During the review, Halcrow found that both of these projects, which are part CPO033, incurred budget overruns. This was mainly due to increases in project management and technical services costs, works costing more than originally planned on non-SCA weirs and the remediation of Sharpes Weir. Overall CPO033 was delivered late, however, the individual components mentioned above appear to have been delivered as per IPART schedule requirements.

6.5.2.6 6. Complete the Metropolitan Dams electrical systems upgrade project by April 2013

This program comprises upgrades to meet mandatory Occupational Health and Safety standards.

An electrical condition assessment for this project was completed in September 2010. In the 2011 SIR/AIR, this project has been scheduled to be delivered over a six year period from 2012/13 to 2017/18. Given the extent of work required to perform the electrical system upgrades at the Metropolitan Dams (Nepean, Avon, Nepean Avon Tunnel, Cataract, Cordeaux and Woronora), Halcrow acknowledges that this project is now unable to be delivered by the nominated target date of April 2013.

The project also includes upgrades in excess of meeting OH&S standards, which is discussed in further detail in the detailed project summary (refer **Appendix A.11**) Halcrow agrees that the deferral of expenditure to the forecast 5 year price period is appropriate and this will allow this project to operate with improved efficiency.

Halcrow proposes a target completion date of June 2017 based on recommended changes to the SCA's proposed expenditure profile.

6.5.3 Proposed Output Measures

Halcrow has identified a number of potential output measures for the coming price path. These are based around key project delivery requirements.

It is recommended that those measures for which the target delivery dates have not yet been reached remain, with adjustments as appropriate to reflect progress achieved to date. This would specifically include:

- Deliver a strategy for the future of the Upper Canal by June 2013 (update proposed);
- Complete the Prospect Reservoir upstream embankment stabilisation upgrade by April 2013 (recommend extension of target date to June 2014);
- Complete the Wingecarribee Dam safety upgrade project by June 2013; and
- Complete the Metropolitan Dams electrical systems upgrade project by April 2013 (recommend extension of target date to June 2017).

Additional measures proposed by Halcrow are as follows:

- **Upper Canal** (update of existing output measure) – complete refurbishment works by June 2016 and agree a replacement option for the Upper Canal by June 2016.
- **Warragamba E-Flows** – agree a viable and sustainable environmental flow regime with the NSW Government and confirm a means of cost effectively delivering the required environmental flow releases by June 2014.
- **Warragamba Pipeline Valves and Controls** – establish and deliver a five year capital program to refurbish, modify and replace all existing valves and associated infrastructure (including controls) on the Warragamba pipeline by December 2012.
- **Warragamba Dam Reliability Upgrade** – complete investigations associated with the reliability of Warragamba Dam to sustain latest estimates of PMF and seismic impact by June 2013.
- **Shoalhaven Transfers Works** – complete preparation of and gain approval of a business case for implementation of the preferred option for the transfer of water from the Shoalhaven River to Sydney (currently identified as ‘Burrawang to Avon Dam Tunnel’) by June 2016.

Nomination of target dates has been based on:

- Proposed expenditure profiles (Upper Canal, Warragamba Pipeline Valves and Controls, Warragamba Dam Reliability Upgrade);
- The need to feed into the 2014 Metropolitan Water Plan (Warragamba E-flows); and
- The need to feed into the next price determination (Upper Canal, Shoalhaven Transfers Works) [Note: it may be appropriate to bring these target dates forward by one (1) year if a 4 year determination is to be made].

6.6 Overview of Findings

Of the fifteen (15) projects reviewed in detail, in general expenditure related to both historic and future projects is prudent. For both historic and future projects, there has been little consistency in documenting business needs, however, in general Halcrow has been able to follow the background to why the SCA has proposed expenditure.

Several projects selected for review are driven by decisions made by the NSW Government in its series of *Metropolitan Water Plans* released in 2004, 2006 and 2010. Where the NSW Government has set budgets, the SCA has in general exceeded them, however, has remained transparent in communicating where actual expenditure has been higher than forecast.

Halcrow has observed a consistent lack of scope definition and costing of proposed capital expenditure for projects in the coming price path. This observation leads Halcrow to believe that projects are not being delivered as efficiently as they could be, and this may also be a contributing reason for historic underspend. Adjustments to the allowed expenditure are recommended in some cases.

Where future projects still lack definition, and in order to promote efficiency, it is Halcrow's finding that expenditure should only be permitted for detailed investigation/early procurement activities in the upcoming period. This would place the SCA in a better position to accurately cost a known program for the following determination period. Alternatively, a shorter determination of 3 or 4 years for may be considered appropriate. This would allow sufficient time for the SCA to better prepare detailed business cases and commence early procurement activities such as tendering.

6.7 Recommended Capital Expenditure

The SCA's recorded actual and proposed capital expenditure for the period 2008/09 to 2016/17, together with Halcrow's recommended level of capital expenditure, is summarised in **Table 5.10**.

Table 6.4: Actual/Forecast and Recommended Capital Expenditure – 2008/09 to 2016/17 (\$million 2011/12)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
SCA Forecast Expenditure Profile (AIR/SIR)	80.333	53.812	27.164	18.669	31.497	32.877	36.627	45.883	61.049	207.934
Recommended Adjustments	-0.742	-2.912	-0.389	-0.971	-6.595	-3.250	-7.373	-25.113	-36.702	-79.033
Halcrow Recommended Forecast Expenditure Profile	79.589	50.900	26.775	17.698	24.902	29.627	29.254	20.771	24.347	128.901

Halcrow's recommended adjustments are based on:

- reduction of expenditure in respect of three (3) projects, including:
 - two (2) projects for which efficiency adjustments are proposed; and
 - one (1) project for which a component of the works is not deemed prudent at this time;
- reduction of expenditure on the basis of efficiency and adjustment of the delivery timeframe (also for efficiency purposes) for one (1) project;
- deferment of expenditure for four (4) projects; and
- expensing (rather than capitalisation) of expenditure in respect of three (3) projects.

Details of the recommended adjustments are presented in **Appendix C**.

7 Conclusions and Recommendations

7.1 Overview

Halcrow's review of the Sydney Catchment Authority's operating and capital expenditure has been principally based on information contained in its Pricing Submission (including Annual Information Return) and information provided by the SCA in response to formal information requests. Halcrow has also conducted interviews/discussions with SCA representatives in order to gain an understanding of its adopted planning processes and the justification for the proposed levels of investment.

From an overall perspective, the SCA's historical and forecast expenditure for the period 2012/13 to 2016/17 is generally deemed prudent and efficient. Halcrow does, however, have concerns regarding the efficiency of expenditure for elements of some capital projects and the lack of supporting definition for some capital expenditure forecast to be incurred later in the period.

7.2 Management Systems and Processes

The Sydney Catchment Authority operates in an environment defined by a range of legislative and related instruments. The SCA's expenditure proposal is driven by the obligations that these instruments impose.

The SCA has recently initiated and continues to implement changes to its management systems and approach. These changes are aimed at better aligning the organisation and its operations with the strategies identified in its *Corporate Sustainability Strategy*.

Halcrow's detailed review of a sample of capital projects indicates that updated capital planning and project management are not yet fully implemented. Shortfalls in the planning processes were observed, although this may, in at least some cases, be a product of the extensive lead times involved in typical project development compared to the timeline over which the new processes have been developed and implemented.

As part of the review and realignment of its business systems, the SCA is in the process of developing and implementing a new Asset Management Framework and the supporting processes and guidelines. Whilst not yet fully implemented in respect of its entire asset portfolio, it appears that the management systems, tools and processes that are now in place provide an effective basis for the development of the SCA's expenditure proposals across the forthcoming price path.

The SCA's business processes will continue to become more effective as its entire asset portfolio is captured within its asset management system and the implementation of its updated approaches to planning and project management are fully implemented.

7.3 Operating Expenditure

The cost levels recorded by the SCA over the current price path are less than allowed for by IPART at the 2009 Determination. At the same time, the SCA has met its service level obligations.

There was a significant reduction in staff numbers to that forecast in 2009 during the Determination period. The 2011/12 number of staff (250 FTE) is to be maintained over the period of the next price path.

The annual forecast operating expenditure is, however, 7 percent (\$6 million) greater than the annual average for current price path. No substantive change in the SCA's level of activities is expected over this period with the exception of a recommencement of pumping from the Shoalhaven and taking of supply from the Fish River Scheme.

At the aggregate level, the increase in operating costs can be explained by:

- an increase in average staff numbers;
- an increase in real wage rates;
- lifting of the moratorium on Shoalhaven pumping;
- recommencement of supply from the Fish River;
- additional licence fees payable to the Water Administration Ministerial Corporation (Office of Water); and
- a new levy to be imposed by Sydney Water for calibration services.

At the aggregate level of operating expenditure, the SCA proposes to maintain the substantial labour efficiencies achieved over the current price path. Additional non-labour expenses will be incurred which will increase the level of efficient costs.

Unlike the 2009 Determination, the SCA is not proposing a blanket reduction in operating expenditure reflecting additional efficiency savings.

Halcrow has identified current shortfalls in the SCA's capital planning and management systems. Full development and implementation of its recently updated processes may attract additional expenditure.

It can be expected, however, that the SCA will make continuing efficiency gains. Halcrow has set an annual efficiency target of 0.3 percent per annum (cumulative) against core operating expenditure (\$87 million per year) over the determination period. In making this judgment, Halcrow has considered:

- about \$0.5 million in projects were delayed to 2011/12 (refer **Section 5.10.5**), thereby boosting the level of expenditure in the base year;
- the SCA has identified \$1 million per year in efficiency savings from projects (refer **Section 5.12.3**), claiming that these efficiency savings are already reflected in the projected figures. This implies that the core expenditure would have increased from \$87 million to \$88 million in the absence of these projects; and

- the late notice and absence of detail provided on the proposed new levy by Sydney Water for calibration services which will see Customer Service costs increase by \$0.9 million over the period to 2015/16.

The allowed operating expenditure will need to be adjusted to take account of the carbon tax. Further adjustments may also be required for movements in the market price of electricity.

Halcrow also proposes the expensing of expenditure proposed to be capitalised by the SCA.

The level of expenditure allowed is sufficient for the SCA to meet its service level commitments.

7.4 Capital Expenditure

Of the fifteen (15) projects reviewed in detail, in general expenditure related to both historic and future projects is prudent. For both historic and future projects, there has been little consistency in documenting business needs, however, in general Halcrow has been able to follow the background to why the SCA has proposed expenditure.

Several projects selected for review are driven by decisions made by the NSW Government in its series of *Metropolitan Water Plans* released in 2004, 2006 and 2010. Where the NSW Government has set budgets, the SCA has in general exceeded them, however, have remained transparent in communicating where actual expenditure has been higher than forecast.

Halcrow has observed a consistent lack of scope, definition and costing of proposed capital expenditure for projects in the coming price path. This observation leads Halcrow to believe projects are not being delivered as efficiently as they could be, and this may also be a contributing reason for historic underspend. Adjustments to the allowed expenditure are recommended in some cases.

Where future projects still lack definition, in order to promote efficiency, it is Halcrow's recommendation that expenditure should only be permitted for detailed investigation/early procurement activities in the upcoming period. This would place the SCA in a better position to accurately cost a known program for the following determination. Alternatively, a shorter determination of 3 years for may be considered appropriate. This would allow sufficient time for the SCA to better prepare detailed business cases and commence early procurement activities such as tendering.

On the basis of the review, Halcrow has recommended adjustments amounting to \$4.272 million (\$real 2011/12) for the current determination period (2009/10 to 2011/12) and \$79.033 million (\$real 2011/12) for the period 2012/13 to 2016/17. These adjustments are based on:

- reduction of expenditure in respect of three (3) projects, including:
 - two (2) projects for which efficiency adjustments are proposed; and
 - one (1) project for which a component of the works is not deemed prudent at this time;
- reduction of expenditure on the basis of efficiency and adjustment of the delivery timeframe (also for efficiency purposes) for one (1) project;
- deferment of expenditure for four (4) projects; and
- expensing (rather than capitalisation) of expenditure in respect of three (3) projects.



Appendix A. Capital Project Summaries – Detailed Review

A.1 CPO007 – Prospect Dam Improvement Works

A.1.1 Project Description

The Prospect Dam was constructed in 1888 and was the first earth fill dam embankment in Australia. It is proposed that remedial works are undertaken along the 2.2 kilometre length of the upstream face of the dam embankment. The dam improvement works would involve developing and implementing appropriate works to ensure upstream embankment slope stability in the event of a 7 metre rapid drawdown of the Prospect Reservoir and to ensure that the embankment has an acceptable risk of piping. It is envisaged the works would likely involve work on the downstream face (of the upstream embankment), whereby a new 3 metre wide (average width) by 5.6 metre deep (vertical height) filter extension is proposed to be installed to connect to the existing filter. An additional weighting berm of 9.6 metres width will be placed downstream of this new filter extension to aid with structural stability of the embankment.

A.1.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- SCA Prospect Reservoir Upstream Embankment Stabilisation: Updated Project Brief form, Activity No. C1221201.000, dated 9 December 2010.
- Additional information included in email from SCA to Halcrow dated 21 October 2011.

A.1.3 Key Drivers and Obligations

The driver for this project is Mandatory Standards, Dam safety.

A.1.4 Solution Development

A project brief has been prepared which classifies Prospect Dam as an 'Extreme' Consequence Category Dam under the NSW Dams Safety Committee Guidelines. Once the Prospect Raw Water Pumping Station is implemented, Prospect Reservoir (the water body impounded by the dam) has the potential to be drawn down by 7 metres. Based on discussions with the SCA, it is understood that drawdown may compromise the clay core of the upstream embankment. The project brief cites the remedial work undertaken on the downstream face of the dam which was designed and constructed in the 1970's; there is a risk that embankment piping could potentially occur due to the existing embankment core and filters not meeting current design practice.

The scope of work identified in the project brief includes several engineering and financial investigations and the SCA approval processes. The benefits of the project are identified as meeting Dam Safety, Regulatory and current design practice and minimising potential liability and operational risks to the SCA.

Some of these investigations have been completed to date (as shown in **Table A.1**); this includes a reliability study to determine the risk posed to the safety of the dam embankment under a range of scenarios and the external review of the reliability study.

Table A.1: Prospect Dam Improvement works, Investigations completed to date⁹⁹

Year	Description of Work	Approximate Expenditure to Date (\$'000)
2003	Prospect Dam Spillway Investigation	60
2004/05	Drawdown Analysis for Prospect Dam	165
2005	Cost Estimating for Drawdown Enhancement Works	
2006 to Present	Upstream Geotechnical Investigation and Drawdown Analysis Enhancement Works	420
2010 to Present	Piping Risk Toolbox, Concept Design, Operational Business Risk and Overall Dam Safety Risk Assessment	165
2011	External Review Panel	30
	Total Expenditure	840

During interviews, the SCA representatives stated that they envisage a medium size contractor undertaking the works with good quality control processes. It is understood that appropriate filter sand media must be located and its availability for construction confirmed early in the design process.

A formal business case is due to be completed in 2012.

A.1.5 Project Delivery

At the time of the 2009 Determination, it was reported that this project was scheduled to be delivered by April 2013. Based on the Board approved budget shown in the *Updated Project Brief Form*,¹⁰⁰ it appears that the bulk of expenditure was originally planned for 2008/09 and 2009/10. This was revised in February 2008 (refer *Updated Project Brief Form*), with a further delay of one year. This delay was due to review panel requirements for additional geotechnical investigations to be undertaken. It is noted that delays were also experienced in 2007, due to the high demand for drilling contractors (required for the geotechnical investigation).

The delivery period has been again revised in the current AIR/SIR, with the bulk of expenditure forecast to occur in 2012/13 and 2013/14, some four years later than originally scheduled.

A.1.6 Cost Estimate

An estimate of the cost of the required deliverables has been included in the project brief; this is shown in **Table A.2**.

⁹⁹ Table adapted from email from Sydney Catchment Authority to Halcrow, 21 October 2011.

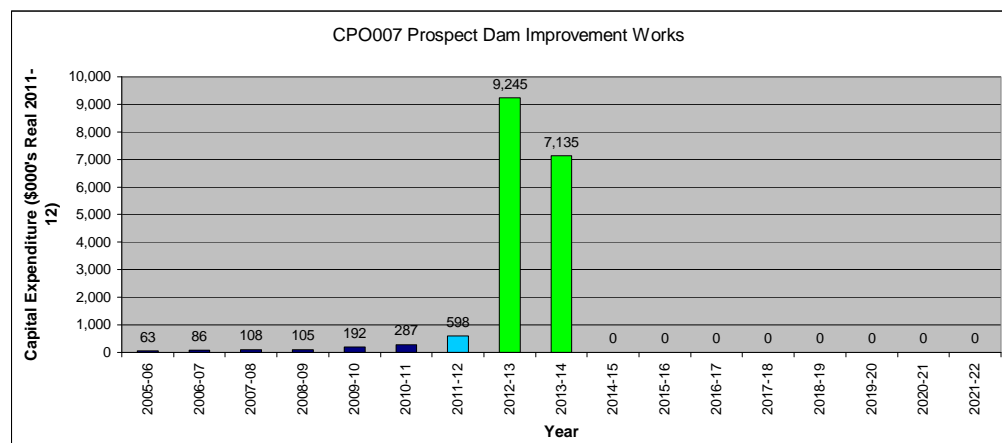
¹⁰⁰ Sydney Catchment Authority, Prospect Reservoir Upstream Embankment Stabilisation: Updated Project Brief form, Activity No. C1221201.000, dated 9 December 2010.

Table A.2: Cost Estimate – Prospect Dam Improvement Works

	Fee Estimate (\$Real 2011/12)*	Percentage of direct construction cost
Drawdown analysis	141,558	
Upstream stream face stability enhancement	363,636	
Value Management	45,455	
Economic Evaluation	22,727	
Risk Comms Study	22,727	
Expert Review Panel	45,455	
Environmental Study (EIS/REF)	190,909	
Downstream Piping Options	90,909	
Implementation Design	590,909	
Subtotal Design and Investigation Costs	1,514,285	9.4%
SCA Project Costs	122,727	0.8%
Implementation Construction	16,181,818	
Total	17,818,831	

* it is assumed that all dollars presented in the project brief are in \$real 2011/12 given that the project brief estimate of \$17,818,831 closely matches expenditure in AIR once converted to \$real 2011/12 totalling \$17,819,000.

The bulk of the proposed expenditure in the forecast price is scheduled to occur in 2012/13 and 2013/14, as shown in **Figure A.1**.

**Figure A.1: Expenditure profile – Prospect Dam Improvement Works**

A.1.7 Assessment of Prudence and Efficiency

Expenditure to date has been on investigations and reviews that are integral to forming an understanding of what form the proposed works may take. Although investigations have been undertaken over a long period of time, the order in which the expenditure has been incurred is logical. Dam safety is bound by statutory requirements and Halcrow considers the SCA to be exercising prudence in undertaking this job and developing a final solution.

The long lead time in arriving at a dam safety solution has been protracted, given that investigations have been underway since 2003. The SCA has had ample time to develop and implement some form of dam improvement works and from this perspective it is difficult to agree that to date, expenditure has been efficient. It is, however, noted that expenditure on investigations is expected to equate to approximately 9.4 percent of forecast construction costs, which is considered efficient for a project of this size.

No change is recommended to the expenditure profile included in the AIR/SIR as shown in **Table A.3**.

Table A.3: Actual/Forecast Capital Expenditure – CPO007 Prospect Dam Improvement Works (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	0.105	0.192	0.287	0.598	9.245	7.135	-	-	-	16.380
Halcrow Forecast Expenditure Profile (\$2011/12)	0.105	0.192	0.287	0.598	9.245	7.135	-	-	-	16.380

A.2 CPO033 – Upper Nepean Environmental Flow Works

A.2.1 Project Description

Environmental flows are water flows released from storages to help restore ecological processes and biodiversity of water dependent ecosystems. The *2004 Metropolitan Water Plan* anticipated that works would be required on Upper Nepean dams and weirs to allow the passage of environmental flows. In reaching the decision to proceed with releasing environmental flows, the NSW Government approved expenditure in 2004 of \$30 million (\$nominal) for new works at dams and weirs. The SCA was responsible for controlling all expenditure and managing the required works program. Under direction of the SCA, project management, technical design and construction was contracted to various parties.

This project comprised of two separate portions of works.

Portion A of the project comprised:

- new outlet works on Cataract, Cordeaux and Nepean water supply dams;
- installation of water supply diversion weirs at Broughton Pass and Pheasants Nest; and
- Installation of a fishway at Pheasants Nest.

Portion B of the project comprised:

- Provision of environmental flow outlets and fish ladders at SCA ‘compensation’ weirs and other public weirs downstream of the SCA’s water supply, (jointly with the NSW Office of Water).

The Business Case also establishes a monitoring and evaluation program (of the above) which was allocated separately in the division works program. This project was reviewed by Worley Parsons as part of the expenditure review in support of the 2009 Determination, however at the time, the budget was ‘Commercial-In-Confidence’.

Environmental flow works relating to Avon Dam were managed separately as part of the Avon Dam Deep Storage Access project (project reference: CB089) and are not discussed as part of this project.¹⁰¹

A.2.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- SCA Plan and Implement Business Case, Upper Hawkesbury-Nepean environmental flows and weirs project – C3310601, dated 16 September 2008.

¹⁰¹ Total historical expenditure on the Avon Deep Water Storage Access Project (CB089) was approximately \$9 million (\$nominal). After querying the SCA regarding additional e-flow related costs on Avon Dam, the SCA advised (on 27 October 2011) that approximately \$1.7 million (\$nominal) of the \$9 million Deep Water Storage Project was related to e-flow works. The SCA has advised efficiencies were achieved by combining the Avon Deep Water Storage Access and e-flow construction activities together.

- Work Schedule, Nepean River, Weirs, Design and Tender Phase, unknown author, undated.
- Determination of Activity by Sydney Catchment Authority dated 9 September 2008.
- Cost Estimate for Environmental Flow Releases for the Upper Hawkesbury -Nepean River Project – Preliminary Cost Estimate for Portion A Works, prepared by SMEC, dated 14 April 2008.
- Cost Estimate for Environmental Flow Releases for the Upper Hawkesbury -Nepean River Project –Cost Estimate for Portion B Works, prepared by SMEC, dated 14 April 2008.
- Worley Parsons, Review of Capital and Operating Expenditure, Sydney Catchment Authority (2009 Determination), dated 15 January 2009.
- SCA Board Meeting, Nepean River Environmental Flows: Supplementary Paper, dated 26 November 2009.
- SCA Board Standing Committee on Asset Management, Nepean River Environmental Flows: Project Status Report, dated 27 November 2009.
- Agreement to Amend Contract between Sydney Catchment Authority and Macmahon Contractors Pty Ltd, dated 24 March 2010.
- Letter from Minister Phillip Costa to SCA Chairman, dated 3 March 2011.

A.2.3 Key Drivers and Obligations

The 2004 and 2006 Metropolitan Water Plans required that, by the beginning of 2010, works were in place to release new environmental flows from the Cataract, Cordeaux, Nepean and Avon Dams to the Nepean River. The 2004 Metropolitan Water Plan also identified that works may be required for weirs located downstream of water supply dams to allow full passage of the flows and fish passage. The driver for this project is thus the creation of a new asset driven by Government programs.

The Worley Parsons 2009 expenditure review identifies that:

“the 2006 MWP required works at the Avon Dam are to be commissioned by October 2006, while works at the other three dams are to permit releases by 2009. The MWP also required the releases from Pheasant Nests and Broughtons Pass weirs to commence sometime earlier than 2009. Works to permit the new releases at the Avon Dam were completed as part of the deep storage project. The basis of project justification is ultimately the achievement of operational performance requirements set by parties external to SCA.”

A.2.4 Solution Development

The Business Case dated 16 September 2008 documents project deliverables, outcomes scope, provides an evaluation of options, identifies preferred options and presents a concept level financial appraisal. The preferred options were selected as they provide for the greatest range of environmental flow releases and improve fish passage throughout rivers.

The consultant responsible for 'Project Management and Technical design Services' was engaged for a lump-sum amount of \$ 1,385,135 (assumed to be \$2008/09) for Portion B and \$ 3,508,845 (assumed to be \$2008/09) for the combined portions, thereby totalling \$4,893,980.

Delivery of the 'Portion A' construction works was through two contracts, which separated works at dams and water supply weirs. Both contracts were awarded to the same contractor in November 2008 (dams) and February 2009 (weirs). At the time of the Board report¹⁰² in November 2009, both projects were 97 percent complete and were scheduled for completion in December 2009 and commissioning in February 2010, approximately 2 months behind schedule.

Delivery of 'Portion B'¹⁰³ was through a single lump sum contract awarded to a different contractor to Portion A. The contract included several schedule of rates items and three provisional sums. The contract was for construction only of the civil and hydraulic works and design and construct of the electrical component.

On 26 November 2009, the Board was provided information regarding the need to increase the budget and a proposal to change the cost structure of the contractual arrangements for delivery of works on the Nepean weirs (Portion B of the project).

In March 2010, the contract for Portion B was varied from \$15,982,861 (excluding GST) to \$18,956,308 to take account of variations, with the largest being for remediation of Sharpes Weir. The initial time for completion of Portion B (all weirs) was a 40 week period concluding 16 January 2010. The contract varied this to 30 April 2010 for seven (7) of the weirs, 25 June 2010 for Douglas Park, 17 September 2010 for Menangle and 29 October 2010 for Sharpes Weir.

A.2.5 Project Delivery

The business case developed in September 2008 established August 2009 for commissioning of Portion A, and December 2009 for commissioning of Portion B, with final monitoring evaluation reports to be delivered in June 2012.

It is understood that delays for Portion A were associated with the late delivery of valves, however, the project was still due for operation (as at November 2009).

Components of Portion B were delivered up to 10 months late (Douglas Park), given the 2006 requirement for the works to be completed in 2009.

A.2.6 Cost Estimate

The budget originally set by the NSW Government in 2004 was \$30 million (\$nominal) which covered works described in Portion A, Portion B and for environmental flows released from Avon Dam.

¹⁰² SCA Nepean River Environmental Flows: Project Status Report, dated 27 November 2009.

¹⁰³ The scope of work on the compensation / irrigation weirs (Portion B) was only able to be confirmed in August 2008 when it was finally agreed this work could proceed ahead of the release of the Water Sharing Plan.

The planned expenditure presented in the business case (which excluded works associated with Avon Dam) was \$29.43 million (\$2008/09), with a contingency of \$5,454,545¹⁰⁴ (\$2008/09) for all SCA owned weirs and non-SCA weirs. Approval from the SCA CEO to proceed with expenditure of \$29 million (\$2008/09) as part of the 2008/2009 and 2009/10 Capital Works Programs was granted on 17 September 2008.¹⁰⁵ This amount was included in the current price path.

According to the Board paper dated 26 November 2009, the project budget was revised at some stage before November 2008 when a request was made to the NSW Government to increase the budget of the project to \$33 million (\$nominal). It is understood that this was a result of higher than anticipated tender prices being received for Portion B, which included \$4.9 million (\$2008/09) for works on non-SCA weirs.

Table A.4 provides a breakdown included on the 27 November 2009 Board paper.

Table A.4: Budget Reconciliation for Revised Project Total

Item	SCA Budget (Post Tender)		Predicted Final Cost at 27 November 2009		Variance from Budget
	Total	% of Portion Total	Total	% of Portion Total	
Portion A					
Project Management and Technical Services Costs	1,270,000	16.2%	1,582,257	19.7%	+312,257
Construction Costs – Dams + 2 x Weirs	6,330,000	80.6%	6,261,997	77.8%	(68,003)
SCA Program Management	250,000	3.2%	200,000	2.5%	(50,000)
Portion A Total	7,850,000		8,044,254		+194,254
Portion B					
Project Management & Technical Costs	3,500,000	13.9%	4,000,865	13.6%	+500,865
Construction Costs – 10 x Weirs	20,450,000	81.3%	24,504,881	83.2%	+4,054,881
SCA Direct Project Items & Program Management Costs	1,200,000	4.8%	950,000	3.2%	(250,000)
Portion B Total	25,150,000		29,455,746		+4,305,746
Portion A + Portion B					
Project Management and Technical Services Costs	4,770,000	14.5%	5,583,122	14.9%	+813,122
Construction*	26,780,000	81.2%	30,766,878	82.0%	+3,986,878
SCA Program management + direct costs	1,450,000	4.4%	1,150,000	3.1%	(300,000)
Project Total Portion A+B	33,000,000		37,500,000		+4,500,000

¹⁰⁴ Contingency is presented in the business case as \$6,000,000 including GST.

¹⁰⁵ A further opex component of \$180,000 (\$2008/09) in 2008-09 and \$400,000 (\$2008/09) in 2008-09 to 2011-12 was approved by the SCA CEO for the monitoring and evaluation of this project as Project No. 23120801.

Portion A major contract variations are cited in the 27 November Board paper as “*additional piling for the new retaining wall at Nepean Dam because of unfavourable site conditions, replacement of the existing scour valve at Pheasants Nest Weir, and the planned addition of IICATS / SCADA related work*”. This is unclearly presented in the Board paper, as construction costs reduced for Portion A between the budget (post tender) and predicted final cost at 27 November. The exception was the increase in costs being due to an increase of Project Management and Technical Services costs which were estimated to total 19.7 percent of the predicted final cost. This is considered to be a high cost for these services, especially given that the SCA incurred further program management costs (2.5 percent of project cost) such that the total project management and design costs mounted to 22.3 percent of the total Portion A costs.

Table A.5 summarises proposed expenditure in the business case versus actual expenditure presented in AIR/SIR (\$real 2011/12).

Table A.5: CPO033 Comparison between proposed and actual yearly expenditure profile (\$'000's real 2011/2012)

	Scope	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	Total
Approved NSW Gov't budget (\$2004)	All SCA dams* and weirs only							30,000^
Business Case (Sep-2008)	SCA dams* and weirs only excluding Avon	-	956	12,505	17,403	155	-	31,018
Revised NSW Government budget (April 2009)	All SCA dams* and weirs + non-SCA weirs							35,885
Supp Board Paper (Nov 2009)	SCA dams* and weirs + non-SCA weirs excluding Avon							41,145
AIR (Sep-2011)	SCA dams* and weirs + non-SCA weirs excluding Avon	8	35	1,030	7,850	27,512	5,032	41,468

^ Nominal

* excluding Avon Dam.

It is noted that the estimated cost for environmental flow works related to Avon Dam are not included in the totals presented in the business case, supplementary Board paper or AIR/SIR. These works were estimated by the SCA to be in the order of \$1.7 million (\$nominal) as part of the Avon Dam Deep Water Storage Access Project.

A.2.7 Assessment of Prudence and Efficiency

Given the works are required by both the 2004 and 2006 *Metropolitan Water Plans*, expenditure is considered prudent.

According to the 2006 *Metropolitan Water Plan*, works related to the delivery of environmental flows (covered in Portion A) should have been completed by

October 2008. Works were, however, commissioned in February 2009, some four months late due to a delay in sourcing valves. Works on the Broughtons Pass and Pheasants Nest Weirs (also part of Portion A) were finalised in 2009 as required by the *2006 Metropolitan Water Plan*. Portion A was delivered marginally over the SCA budget following tender evaluation (+\$194,254 (\$2009/10)), with this increase wholly attributed to an increase in project management and technical services costs.

Portion B has been delivered at a cost more than \$4.3 million over budget following tender evaluation.

From the information reviewed it is understood that the \$30 million (\$nominal) budget in 2004 was for assets to be added to the regulatory asset base. In April 2009, the budget was approved to \$33 million to allow the SCA to fund the full cost of constructing SCA infrastructure on weirs owned by the SCA and also non-SCA weirs.

The delays in implementing the project appear to be genuine; however, it appears that the project has suffered poor technical design and management. Furthermore the true cost of the project and how strictly it should be compared to the nominated Government Budget of \$33 million (\$nominal) has been masked by environmental flow from Avon Dam being undertaken in conjunction with another project. Halcrow recognises there are many contributing factors to this project costing more than forecast, however, it is difficult to agree that it was delivered efficiently.

It is reasonable that the SCA has included \$4.9 million (\$2008/09), ie. \$5.34 million (\$real 2011/12), for works completed on non-SCA weirs in the AIR/SIR, given that the driver for this project was a 'Government Program'. It is important that IPART considers whether it is appropriate for this expenditure to be included within the Regulatory Asset Base (RAB).

The budget reconciliation presented in **Table A.4** shows that the most significant variation from the post tender budget occurred in respect of project management and technical services costs. At 18 percent of construction cost (26.780 million), the budgeted amount for this cost element (which excludes the SCA's program management costs) is deemed excessive; an allowance in the order of 10-15 percent of construction would normally be expected. Accordingly, any significant variation in this cost (compared to budget) exacerbates this excessive allowance. Based on the predicted final construction cost of \$30.767 million, an allowance of 15 percent amounts to \$4.615 million, which is some \$0.968 million less than the forecast final cost for project management and technical services.

On the basis of the discussion outlined above, Halcrow recommends that the excess (compared to budget) costs incurred in respect of project management and technical services, ie. \$0.81 million, be excluded when determining the efficient cost of the works, as shown in **Table A.6** (and also in **Appendix C**).

**Table A.6: Actual/Forecast Capital Expenditure – CPO033 Upper Nepean
Environmental Flow Works (\$million)**

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	7.850	27.512	5.032	0.155	-	-	-	-	-	-
Halcrow Forecast Expenditure Profile (\$2011/12)	7.850	26.702	5.032	0.155	-	-	-	-	-	-

A.3 CPO113 – Warragamba Dam Crest Gates; Construction

A.3.1 Project Description

The upgrade to Warragamba Dam's drum and radial gates (CPO113) is the final component of a major \$150 million upgrade project, currently being implemented to ensure the flood capability and reliability of Warragamba Dam during a Probable Maximum Flood (PMF) event (as defined in 1999 and updated in 2007).

The broader project was originated in 1998, prior to the creation of the SCA, in response to dam safety concerns that the existing spillway at Warragamba Dam was only capable of passing 75 percent of PMF.

At the time, a number of potential options were considered, including:

- Mass concrete dam, encapsulating the existing dam;
- Larger dam wall, constructed in front of existing dam wall; and
- Auxiliary spillway, with associated upgrade to the dam crest drum and radial gates [preferred option].

As alluded to above, CPO113 is integrally linked to the effectiveness and design of the Auxiliary Spillway option and involves raising the radial gates to provide greater clearance for passing flood waters, improving drum and radial gate reliability and strength, and improving controls.

Whilst the Auxiliary Spillway was completed prior to this determination period, CPO113 was commenced in 2006/2007.

A.3.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Ministerial Briefing for budget approval; and
- SCA Board briefing paper.

A.3.3 Key Drivers and Obligations

The project has a dam safety driver, which is a mandatory safety standard. Failure of the dam crest gates during a PMF event would reduce dam capacity by 5 metres or 40 percent by volume.

A.3.4 Solution Development

CPO113 was procured by the SCA through open tender, which was initially advertised in November 2006. Due to the complexity of working on an operating dam, and the nature of the market at the time whereby many of the larger contractors (with relevant experience) were already committed on other long term projects, the SCA only received one compliant tender; a design and construct cost of \$35.5 million, including \$3.5 million for project management (\$real 2007).

In order to evaluate the single tender, comparisons were made with estimates prepared by independent cost consultants; differences in the estimates were assessed, quantified and justified through the impact of inflation, changing work methods and contingency allowance.

A.3.5 Project Delivery

The contract was let in 2007/08 and 'project in use' was achieved during the current year (2010/11). At the time of review, the SCA was in the process of final commissioning; Halcrow was advised that the gates had been successfully operated following a recent increase in Full Supply Level (FSL) of the storage.

A.3.6 Cost Estimate

The current expenditure profile (in \$nominal) is broadly in line with the tendered price, with the exception of a slight deferral of expenditure into years 2011 and 2012, which is hardly surprising given the complexity of the work.

As demonstrated in **Table A.7**, overall expenditure is broadly in line with the tender price, but approximately 50 percent higher than the preliminary estimate. The SCA accounts for this increase as follows:

- Construction price inflation, resulting from the buoyant state of the construction industry in Australia, and lack of viable alternative contractors;
- Modified work methods, necessary to ensure operational readiness of the gates within 72 hours; and
- Additional contingency allowance (in the order of 10 percent) reflecting increased risks associated with operating on a live dam and the unique nature of the technique adopted.

Table A.7: Actual/Forecast Capital Expenditure – CPO113 Warragamba Dam Crest Gates (\$million)

Project ID	Description	Expenditure Profile (\$value)	Prior Years	2008	2009	2010	2011	2012	Total Cost
CPO133	Warragamba Dam Crest Gates; Construction	Current Spend Profile (2011)	1	6	10	10	9	1	36.50
		Delivery Profile at Tender (2008)	1	5	14.4	14.1	2		35.50
		Preliminary Forecast (2005)	1	9	9	5.5			24.50

A.3.7 Assessment of Prudence and Efficiency

In terms of dam safety and security of supply, upgrading of the Warragamba Dam Crest Gates to maintain structural integrity of the dam in the event of a PMF and maximise the benefits of the previously completed auxiliary spillway represents a sound and necessary investment decision.

Although costs have escalated significantly from that initially estimated, the SCA has adequately assessed and accounted for the reported variance, to the satisfaction of the responsible Minister. The closeness of the current tender to outturn forecast suggests effective management by the SCA during delivery and the slight reported deferral in expenditure into 2011/12 is not unusual for a project of this complexity.

However, as PMF is regularly being reviewed (circa 1999 and 2007) there is a risk that subsequent updates to PMF may render the recently completed improvements redundant, and as such, it could be argued that the expenditure is potentially inefficient due to the lack of future proofing provided in the solution. It may have been prudent to design an increased factor of safety into the gate hinge design, thereby providing some future proofing, however, the SCA considers (and Halcrow agrees) that the potential risks of further deferral would have been too great to ignore.

No change is recommended to the expenditure profile included in the AIR/SIR as shown in **Table A.8**.

Table A.8: Actual/Forecast Capital Expenditure – CPO113 Warragamba Dam Crest Gates (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	10.767	10.922	8.846	0.766	-	-	-	-	-	-
Halcrow Forecast Expenditure Profile (\$2011/12)	10.767	10.922	8.846	0.766	-	-	-	-	-	-

A.4 CPO137 – Burrawang Pumping Station Electrical System

A.4.1 Project Description

Burrawang Pumping station was constructed in the mid 1970's as part of the Shoalhaven Scheme. The pumping station transfers water from the Fitzroy Falls Reservoir via the Wildes Meadow Canal to Wingecarribee Reservoir. The SCA has proposed that the pumping station electrical equipment be upgraded during the forthcoming price path commencing in 2012/13.

A.4.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- NSW Public Works, NSW Water Solutions, Burrawang Pumping Station, Draft Electrical Condition Assessment, WSR 10043, dated April 2011.

A.4.3 Key Drivers and Obligations

The driver listed in the 2011 AIR/SIR is 'existing mandatory standards – other'.

A.4.4 Solution Development

An electrical condition assessment was undertaken by the NSW Department of Public Works and delivered in April 2011. The report involved a site audit and identification of future capital and operating expenditure requirements to maintain reliable operation of the Pumping Station. Overall, the report found that current electrical, electronic instrumentation and control systems are operational and in fair condition. Some components have only 3-10 years life remaining and these have been earmarked for replacement. The current system does not, however, meet current statutory conformance and OHS&R (statutory) requirements. Risks of not proceeding with the works were identified along with two future options. The report identifies that if work proceeds, asset lives will be extended for a further 20-25 years, there would be reduced operational interruptions and an improvement in reliability and maintainability. The works will also enable the implementation of a SCADA system.

The components of Option 1 and Option 2, the future capital options (described in the options report) are presented in **Table A.9**. The difference between Option 1 and Option 2 is the line item *Upgrade existing 11kV Main Pump Motor Starters (new VSD type motor starters)*. This difference involves replacing the existing pumpset motors. The argument for replacement is that the slip rings in the existing motors require frequent maintenance and have a higher maintenance cost. The new motors would also provide flow control, less energy usage and reduced maintenance costs. The existing motors are said to have reached the end of their design life, but have a fair asset condition with minor defects.

A draft proposal to develop a combined business case covering the Metropolitan Dams and Burrawang Pumping Station Electrical Upgrades and Project Management Plan was prepared by the NSW Government Public Works department and submitted to the SCA in May 2011.

A.4.5 Project Delivery

This project is scheduled to be delivered over four years commencing in 2012/13, although it is noted that a full business case has not yet been completed/approved.

A.4.6 Cost Estimate

The cost estimate provided in the AIR/SIR is \$8.541 million (\$real 2011/12). This cost estimate broadly aligns with Option 2 proposed by the NSW Public Works¹⁰⁶ (including GST), which includes the installation of new pump motors (refer **Table A.9** for scope of work).

Table A.9: Burrawang Pumping Station Scope of Proposed Work

Item	Asset condition	Years Life Remaining	Reason for upgrade recommendation		Risk
			Statutory	Non Statutory	
Upgrade existing 11kV Main Switchboard and associated system	Poor (with many defects)		None	Difficulty in finding (ie. not readily available) replacement/ spare parts.	Service interruption due to long maintenance time and potential unavailability of replacement/spare parts.
Upgrade existing 11kV Wound Rotor Pump Motors (new Asynchronous Induction Motors)	Fair (with minor defects)		None	Difficulty in finding (ie. not readily available) replacement/ spare parts.	Service interruption due to long maintenance time and potential unavailability of replacement/spare parts.
Upgrade existing 11kV Main Pump Motor Starters (new VSD type motor starters)	Mostly fair (with minor defects) with some components in poor condition.		None	Difficulty in finding (ie. not readily available) replacement/ spare parts.	Service interruption due to long maintenance time and potential unavailability of replacement/spare parts.
Replacement of existing 11kV power cables	Not assessed but cable insulation is damaged		None	Longer down time due to maintenance and safety.	(a) Failure of power supply to the main pump motors causing severe plant shut down. (b) Electrical shock hazard due to insulation breakdown;
Upgrade existing Transformer yard fencing	Not assessed			Do not comply with the requirements of AS/NZS 2067.	

¹⁰⁶ Refer to table on page 56 of NSW Public Works, NSW Water Solutions, Burrawang Pumping Station, Draft Electrical Condition Assessment, WSR 10043, dated April 2011. Provide a local SCADA system at the PS Control Room should be \$3500,000 as per the cost presented on page 54 of the report.

Item	Asset condition	Years Life Remaining	Reason for upgrade recommendation		Risk
			Statutory	Non Statutory	
Upgrade Pump Units 1 and 2 Valve Control Panels	Poor (with many defects)		None	Improve reliability of operations.	None
Upgrade LV Main Switchboard (MVD03)	Fair (with minor defects) to poor		None	Improve reliability of operations and maintenance.	None
Upgrade existing LV Light & Power Distribution Boards	Unserviceable		Non conformance to the requirements of the current Australian Standard AS/NZS 3000:2007 in regards to RCD protection for lighting and power.	None	OH&S issue associated with electrical shock due to lack of RCD protection to power outlets.
Upgrade existing Lighting and General Power Outlets	Not assessed		Non conformance to the requirements of the current Australian Standards (e.g. AS/NZS 3000 and AS/NZS 3439.1) in regards to RCD protection for lighting and power circuitry.	None	Electrical shock due to lack of RCD protection to lighting and power outlets.
Provide a local SCADA system at the PS Control Room	New infrastructure		None	None	None

A.4.7 Assessment of Prudence and Efficiency

The SCA has demonstrated through the electrical condition assessment for Burrawang Pumping Station that some expenditure is necessary to replace and upgrade electrical and mechanical assets which are in poor condition and have limited life remaining. Although a formal business case has not yet been developed, Halcrow is generally satisfied that the proposed expenditure is prudent, apart from the inclusion of the GST. It is noted that only a small component of the proposed electrical upgrade is for work to upgrade lighting and power (some \$90,000 (\$nominal)) which is related to meeting OHS&R statutory requirements. Halcrow recognises it is likely that the SCA may need to implement Option 2 which includes the upgrade of the existing 11kV Wound Rotor Pump Motors (to new Asynchronous Induction Motors) at a cost of an additional \$3.3 million (\$2010/11) including contingency.

Halcrow notes, however, that the work completed to date provides no understanding of whether the proposed works would actually reduce maintenance costs or improve efficiency (ie. through the motor and SCADA upgrade), however, it would be expected that this would be captured in the Business Case.

In regards to efficiency, Halcrow is of the opinion that there is some scope to improve efficiency for this project by reducing delivery from 4 years to 3 years and delaying this project by one (1) year to maximise the life of existing assets. A revised expenditure profile showing Halcrow's recommendation is shown in **Table A.10** (and also in **Appendix C**).

Table A.10: Forecast Capital Expenditure – CPO137 Burrawang Pumping Station Electrical System (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)	0.001	-	-	-	0.502	2.010	4.020	2.010	-	8.541
Halcrow Forecast Expenditure Profile (\$2011/12)	0.001	-	-	-	-	2.340	3.732	1.868	-	7.940

A.5 CPO218 – Hydrometric Renewals Program

A.5.1 Project Description

The Hydrometric Renewals Program is a 5 year rolling program of renewals to maintain the reliability and accuracy of the SCA's 270 hydrometric monitoring sites (each of which contains a range of hydrometric equipment).

The ongoing renewal of hydrometric monitoring equipment ensures the timely response to operational incidents in order to maintain compliance with all licence and regulatory obligations.

The program allows for the replacement of all hydrometric monitoring equipment over a 7 year period, equating to an annual program in the order of 87 instruments.

A.5.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Hydrometric Renewals Program – Project Brief;
- Hydrometric Renewals Program – Business Case (2004);
- Hydrometric Renewals Program – Business Case (2010); and
- Hydrometric Renewals Program – Project Review Panel Report.

A.5.3 Key Drivers and Obligations

The project has an efficiency driver, enabling the SCA to comply with the Water Management Licence, Bulk Water Supply Agreements and the National Water Initiative.

A.5.4 Solution Development

As the hydrometric monitoring equipment has an economic service life of 7 to 10 years, the SCA has developed a 7 year rolling program, whereby all monitoring equipment is replaced over a 7 year period (with the exception of some meteorological equipment that is replaced on a 10 year cycle).

The annual renewals program is based on the Company's hydrometric database, "Hydstra", which includes details of the hydrometric asset base, and "Maximo", which is used to schedule the replacement program.

A.5.5 Project Delivery

The majority of the Hydrometric Renewals work will be undertaken by the SCA's existing Hydrometric Monitoring and Sampling Field Services (HMSFS) Contractors. The SCA maintains two (2) regional HMSFS Contractors, both of whom are employed on a 3 year basis (with a possible 2 year extension).

For each individual asset programmed for replacement during the year, quotations will be sought from the HMSFS Contractor. Work will only commence after approvals are provided by the SCA.

A.5.6 Cost Estimate

The forecast annual expenditure profile for 2011/12 to 2015/16, as approved in the latest business case, was nominally based on the estimated total cost of replacement over a 7 year cycle, ie. \$0.7 million per annum. In its AIR/SIR submission, the SCA has forecast an additional \$1 million expenditure for 2011/12, over and above the initial \$0.7 million forecast; the respective expenditure profiles are shown in **Table A.11**.

Halcrow queried the reason for this variation; the SCA advised that a recent asset audit confirmed that catch up expenditure was required following under spend during the previous determination period. It is noted that the program for the previous five years was based on an annual expenditure profile of approximately \$0.35 million per annum. The SCA further advised that the additional \$1 million 'catch up' package of work was separately tendered to ensure that a competitive price was incurred.

Halcrow also notes that the SCA has not proposed any expenditure beyond 2015/16, which is surprising given that this is intended to be an ongoing program of renewals.

Table A.11: Actual/Forecast Capital Expenditure – CPO218 Hydrometric Renewals Program (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
AIR/SIR Forecast Expenditure Profile (\$2011/12)	0.276	0.718	0.654	1.674	0.718	0.718	0.718	0.718	-	2.873
Business Case Expenditure Profile (\$2010/11)	-	-	-	0.7	0.7	0.7	0.7	0.7	0.7	3.5
Halcrow Forecast Expenditure Profile (\$2011/12)	0.270	0.700	0.635	1.640	0.700	0.700	0.700	0.700	0.700	3.500

A.5.7 Assessment of Prudence and Efficiency

A proactive approach to hydrometric renewals ensures that the SCA will maintain compliance with all licence and regulatory obligations, provide early warning of operational issues and ensure certainty of annual expenditure. On this basis, Halcrow considers the rolling hydrometric renewals program to be both necessary and prudent.

However, Halcrow questions the magnitude of the forecast expenditure profile (\$0.7 million per annum), based on the fact that the SCA has only incurred an average expenditure of \$0.45 million per annum over the previous five years on what is

effectively a rolling program of a similar scope. In response, the SCA advised that the scope of the forward program includes items such as auto samplers, compressors and control structure remediation, which had not previously been included.

Furthermore, whilst Halcrow recognises the benefits of the current delivery model (given the varied remote renewal locations), it does not consider the current delivery model to be as efficient as possible. In terms of procurement, each individual renewal is allocated to the HMSFS Contractor and quoted on individually. These quotes are then reviewed by the SCA and approved for delivery within an agreed timescale. Whilst this approach ensures that the SCA retains an element of control over the program and the use of a single contractor ensures consistency of approach, the separate procurement of each renewal is not conducive to efficient delivery. Halcrow is of the view that an ongoing, clearly defined long term program of renewals lends itself to a separately tendered framework that would potentially introduce economies of scale through reduced procurement costs and lower unit costs due to the surety of work.

On the basis of the above conclusions, Halcrow considers there may be scope to reduce the forecast annual expenditure profile for the ongoing hydrometric renewals program. Accordingly, a nominal 2-5 percent per annum reduction in expenditure (as shown in **Table A.11** and **Appendix C**) is proposed to acknowledge the view that a more efficient delivery mechanism may be available to the SCA.

A.6 CPO222 – Upper Nepean/Leonay-Emu Plains/Wallacia Groundwater

A.6.1 Project Description

In order to assess the scope for the potential utilisation of groundwater sources within the wider Sydney basin, the SCA was requested to undertake a widespread investigation to determine the availability of reliable groundwater supplies across southern and western parts of Sydney, in order to augment surface water supplies in the event of a severe drought.

Investigations of approximately twenty (20) sites have identified three (3) potentially viable groundwater sources at Upper Nepean, Leonay/Emu Plains and Wallacia. These sites would potentially deliver 15 gigalitres of water per annum, from a depth of 200-400 metres, over a 3 year period.

A.6.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Upper Nepean Borefield – Business Case;
- Upper Nepean Borefield – Economic Appraisal; and
- Upper Nepean Borefield – Value Management Workshop.

A.6.3 Key Drivers and Obligations

This project is driven by the actions identified in the *Metropolitan Water Plan 2004* and *2006*, a government program to improve the security of supply for the region and enhance the available sustainable yield.

A.6.4 Solution Development

This extensive program of investigations appears to have been developed on a reactive basis, whereby the scope of works has expanded significantly over time as potential new groundwater sources are identified and investigated.

A.6.5 Project Delivery

The project has delivered detailed investigations at a number of sites and progressed to concept design stage, the Upper Nepean Borefield (including business case preparation). In addition to this, a value management study and economic appraisal was developed for the three identified groundwater options.

As drought conditions eased in 2008/09, the NSW Government directed the SCA to complete investigations up to completion of the concept design report and then park the project. On this basis, work was completed and the project ‘shelved’ in 2009/10.

A.6.6 Cost Estimate

When compared to the estimated expenditure profile in the 2009 Determination, overall expenditure is significantly higher than initially forecast. This highlights the reactive nature of the project, which has been subject to scope creep as and when alternative groundwater sources have been identified.

The proposed and actual expenditure are summarised in **Table A.12**.

Table A.12: Proposed/Actual Capital Expenditure – Upper Nepean/Leonay-Emu Plains/Wallacia Groundwater (\$million)

Project ID	Description	Expenditure Profile (\$value)	2005/06	2006/07	2007/08	2008/09	2009/10	Total Cost
CPO222	Upper Nepean/Leonay/Wallacia Groundwater	Current Spend Profile (\$2011)	2.2	1.8	12.4	5.0	0.4	21.80
		Proposed Delivery Profile (\$2009)	1.8	1.6	4.5	5.0		12.90

A.6.7 Assessment of Prudence and Efficiency

On the basis that approximately \$22 million has been incurred on this project, yet no tangible assets (in terms of additional water resource yield) have been delivered, the prudence and cost effectiveness of this scheme is questionable.

Based on information made available for the purposes of this review, it appears that investigations were subject to significant scope creep and that additional funding was secured as and when additional groundwater locations were identified. Consequently, it would appear that the overall project has not been delivered as cost effectively as possible. Initial planning and definition of scope would have allowed for the clustering of similar activities and reduced procurement and investigation costs.

Halcrow also notes that the SCA proposes to capitalise all expenditure associated with this project. Whilst it is appropriate to capitalise investigation work leading to delivery of a capital asset, Halcrow queried whether expenditure against this project should be capitalised when the project was ‘shelved’ prior to the installation of actual production boreholes. In response to this challenge, the SCA advised that *“there are physical assets on the ground in the form of boreholes in the Kangaloon area. However, the majority of the asset is in the form of knowledge and information gained as a result of the investigation ... eliminating the need to conduct lengthy investigation and research.”* On the basis of the SCA’s explanation, Halcrow agrees that it is reasonable to capitalise some of the expenditure associated with the Upper Nepean investigation once the scheme is delivered, however, in the interim the balance should be allocated as Operating Expenditure.

Halcrow further notes, however, that in a recent review undertaken by the Audit Office, the Auditor General was of a differing opinion; specifically that, in accordance with Australian Accounting Standard AASB 116,¹⁰⁷ expenditure associated with the Upper Nepean (Kangaloon) investigation should be ‘disclosed as an asset’ and capitalised, on the basis that a potential increase in yield has been confirmed.

¹⁰⁷ Australian Accounting Standards Board, AASB 116 *Property, Plant and Equipment*, 30 October 2009.

In its 2009 Determination,¹⁰⁸ IPART's decision regarding past capital expenditure that was prudent included allowance for write-off of \$9.0 million (\$2008/09) that was not related to the Upper Nepean (Kangaloon) component of the project.¹⁰⁹ This write-off was to be incurred in 2005/06, 2006/07 and 2007/08; on this basis, it is assumed that expenditure incurred during 2008/09 and 2009/10 relates to the Upper Nepean (Kangaloon) investigation and can be capitalised.

Notwithstanding the above factors, Halcrow acknowledges the potentially desperate water resource situation facing Sydney at that time and the need to identify alternate water resources. Halcrow also notes that the project has delivered considerable information on the viability and availability of alternative groundwater sources within the SCA's area of operation, which should enable the SCA to acquire additional yield at relatively short notice in the event of a severe drought in the future. Furthermore, the future delivery of the Upper Nepean, Leonay/Emu Plains and Wallacia groundwater project may enable augmentation of the desalination plant to be deferred; this would improve the overall prudence of this costly investigation.

The SCA's proposed expenditure and Halcrow's recommended expenditure are as shown in **Table A.13**.

Table A.13: Actual/Forecast Capital Expenditure – CPO222 Upper Nepean/ Leonay-Emu Plains/ Wallacia Groundwater (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	5.021	0.360	-	-	-	-	-	-	-	-
Halcrow Forecast Expenditure Profile (\$2011/12)	5.021	0.360	-	-	-	-	-	-	-	-

¹⁰⁸ IPART, *Review of prices for the Sydney Catchment Authority, From 1 July 2009 to 30 June 2012*, June 2009, pg55.

¹⁰⁹ Ibid, pg58.

A.7 CPO224 – Minor Assets Renewal Program

A.7.1 Project Description

The Minor Asset Renewals Program provides an ongoing, proactive approach for the replacement of minor civil, mechanical and electrical assets that are approaching or beyond their economic useful life.

The program is based primarily on asset condition information stored in “Maximo”, including asset age, type, condition, criticality and an estimate of the number of years remaining before the asset needs to be replaced.

A 5 year rolling program has been established, which is updated annually, based on an average annual expenditure of approximately \$1 million per annum.

A.7.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Minor Asset Renewals Program – Business Case;
- Minor Asset Renewals Program – Project Review Panel Report; and
- Asset Renewals Program – 2011/12 and 2012/13 to 2016/17.

A.7.3 Key Drivers and Obligations

The project has an efficiency driver, enabling the SCA to comply with their *Corporate Sustainability Strategy* and *Total Asset Management Guidelines* (TAM2006).

A.7.4 Solution Development

The annual renewals program is based on asset condition information stored in “Maximo”, including the estimated number of years remaining before the asset needs to be replaced. Halcrow reviewed “Maximo” during the course of the review of the SCA’s asset management processes and believe it to be an appropriate and useful tool.

The value of the annual program is based on the assumed cost of each programmed renewal, including a SCA management allowance of approximately 6 percent.

In developing its preferred approach, the SCA has considered a number of replacement strategies, including a reactive only and preventative replacement strategy, but discounted these on the basis of cost effectiveness.

A.7.5 Project Delivery

The majority of the Asset Renewals work will be undertaken under the Civil, Mechanical and Electrical Maintenance (CMEM) Contract. Each individual asset programmed for replacement is quoted on by the CMEM Contractor; three (3) quotations are required for renewals greater than \$30,000. All quotations are reviewed and approved by the SCA prior to delivery by the CMEM Contractor.

A.7.6 Cost Estimate

The annual forecast expenditure profile is based on the assumed replacement costs for each of the minor assets identified for replacement each year within “Maximo”. Historical and forecast expenditure is summarised in **Table A.14**.

Halcrow notes that the SCA has not proposed any expenditure beyond 2015/16, which is surprising given that this is intended to be an ongoing program of renewals.

Table A.14: Actual/Forecast Capital Expenditure – CPO224 Minor Assets Renewal Program (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Historical Expenditure Profile (\$2011/12)	0.685	1.362	1.508	1.242	-	-	-	-	-	-
Forecast Expenditure Profile (\$2011/12)	-	-	-	-	1.399	1.068	1.349	1.178	-	4.995
Halcrow Forecast Expenditure Profile (\$2011/12)	0.670	1.335	1.480	1.215	1.370	1.045	1.320	1.155	1.200	6.090

A.7.7 Assessment of Prudence and Efficiency

A proactive, risk based approach to asset renewals ensures that the SCA will maintain reliability of supply and surety of annual expenditure. On this basis, Halcrow considers the rolling minor asset renewal program to be both necessary and prudent.

Halcrow does not, however, consider that the SCA is delivering the program as efficiently as possible. In terms of procurement, each individual minor asset renewal is allocated to the CMEM Contractor and quoted on individually. These quotes are then reviewed by the SCA and approved for delivery within an agreed timescale. Whilst this approach ensures that the SCA retains an element of control over the program, and the use of a single contractor ensures consistency of approach, the separate procurement of each renewal, and a process whereby a quoted price in line with the forecast renewal price would automatically secure approval for the CMEM Contractor to proceed, is not conducive to efficient delivery. An ongoing, clearly defined long term program of renewals (which this expenditure item comprises) lends itself to a separately tendered framework that would potentially introduce economies of scale through reduced procurement costs and lower unit costs. Surety of work would allow the Contractor flexibility to deliver the annual program efficiently during the year, rather than in the specific month that “Maximo” suggests.

Furthermore, “Maximo” does not appear to distinguish between those assets that are integral to maintaining supply and those assets that are ancillary to bulk water supply. A more reactive approach to these ancillary assets would potentially reduce the overall annual renewals program and give flexibility to focus on the more critical assets.

On the basis of the above conclusions, Halcrow considers that there may be scope to reduce the forecast annual expenditure profile for the minor assets renewals program. Whilst it is recognised that the SCA has already committed to the current procurement strategy and that the minor assets renewal works are part of the current contractual obligation, Halcrow proposes a nominal 2 percent per annum reduction in expenditure, as shown in **Table A.14** (and also in **Appendix C**), to acknowledge that a more efficient delivery mechanism is potentially available to the SCA.

A.8 CPO253 – Warragamba Pipeline Valves and Controls Upgrade

A.8.1 Project Description

The purpose of the project is to assess the condition of all existing valves and associated infrastructure (including controls) on the Warragamba Pipelines and then refurbish, modify and replace as appropriate.

The SCA proposes a 5 year upgrade program, whereby approximately three (3) valves will be replaced and a further forty (40) valves (approximately) will be refurbished. In addition, bank stabilisation work (adjacent to pipeline) will also be incorporated into the contract.

This project also incorporates (and replaces) the requirements of Project CPO246, that was initiated to assess and upgrade the electrical monitoring and controls along the pipeline.

A.8.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Warragamba Pipeline Valves and Controls – Project Summary Statement; and
- Warragamba Pipeline Valve Inspection Report – Warragamba Pipeline No 2 located at Cross Connection No 1, Cross Connection No 2 and Orchard Hills Offtake (KBR 09/10).

A.8.3 Key Drivers and Obligations

The project has an ‘efficiency’ driver, enabling the SCA to meet contemporary design standards and maintain security of supply.

A.8.4 Solution Development

The SCA intends to appoint a consultant to develop a 5 year capital program to refurbish, modify and replace all existing valves and associated infrastructure (including controls) on the Warragamba pipeline.

It is anticipated that this will be undertaken on a rolling basis, due to the logistics of undertaking internal inspections of the pipeline and valves (ordinarily in low demand periods during winter) and subsequent upgrade works. A section of pipe will be inspected each winter and recommended refurbishment/replacements completed during the same and/or next winter window.

Halcrow considers this to be a sensible and manageable way forward.

A.8.5 Project Delivery

At the time of review, investigations and the condition assessment had been completed on the valves within the section of Warragamba Pipeline No 2 between Cross Connection No 1, Cross Connection No 2 and the Orchard Hills Offtake.

The SCA anticipates completing the business case by December 2011, following which a consultant would be appointed to develop and deliver the 5 year capital program.

It is anticipated that CPO253 will be delivered over the period 2012/13 to 2015/16.

A.8.6 Cost Estimate

The annual forecast expenditure profile is broadly based on order of cost estimates provided by the Consultant¹¹⁰ for the refurbishment or replacement of the DN2400 valves.

Halcrow's review of the initial inspection report indicates that eight (8) valves were inspected on Warragamba Pipeline No 2, of which six (6) required remedial works. Whilst the Consultant had not specified a solution, Halcrow assumes that the SCA expenditure profile for 2013 is based on one (1) valve replacement and five (5) valve refurbishments.

Halcrow was unable to confirm the basis of the subsequent expenditure profile, however, this should become more apparent when the business case is prepared later this year.

The proposed expenditure is summarised in **Table A.15**.

Table A.15: Proposed Capital Expenditure – CPO253 Warragamba Pipeline Valves and Controls Upgrade (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)	-	-	-	-	0.502	1.005	2.010	2.010	-	5.527
Halcrow Forecast Expenditure Profile (\$2011/12)	-	-	-	-	0.502	1.005	2.010	2.010	-	5.527

A.8.7 Assessment of Prudence and Efficiency

A proactive, risk based approach to asset renewals ensures that the SCA will maintain reliability of supply and surety of annual expenditure. On this basis, Halcrow considers the Warragamba Pipeline Valve and Controls Upgrade program to be both necessary and prudent.

¹¹⁰ The Consultant obtained qualified quotations from local suppliers.

On the basis of the high level cost estimates provided for forecasting purposes, Halcrow is broadly content with the efficiency of the estimated costs, as they are based on market tested rates, albeit based on the replacement/refurbishment of a single, one-off valve. Whilst the consolidation of the proposed annual replacements/refurbishments into a competitively tendered program may introduce further scope for efficiency, Halcrow considers the forecast expenditure to be reasonable. Halcrow notes, however, that the SCA does not appear to have allowed for shutdown/diversion costs and future inspection programs in the forecast expenditure profile, potentially understating the required expenditure.

On the basis of the above conclusions, Halcrow considers the forecast expenditure to be reasonable, as shown in **Table A.15**.

A.9 CPO272 – Shoalhaven Transfers Works

A.9.1 Project Description

The Shoalhaven Transfers project involves expenditure related to:

- Investigation and implementation of new environmental flow rules for improved river health;
- A change in operation of Tallowa Dam; and
- Investigation of three options for water transfers from Tallowa Dam to Sydney and the Illawarra and the identification of a preferred option.

A separate project for the design and construction of a new fishway on Tallowa Dam has also been reviewed by Halcrow (refer Project CPO273).

The rules governing Sydney's water storages have been in effect since mid 2009. As part of this, pumping from Tallowa Dam will commence when Sydney's water supply drops to 75 percent of full capacity. Water will only be drawn from Tallowa Dam if the water level is higher than 1.0 metre below the Tallowa Dam Spillway (Full Supply Level), to be increased to 3.0 metres in times of severe drought.

Some expenditure relating to the change in operation of Tallowa Dam was approved at the time of the 2006 Determination. In the 2009 Determination, it was reported that expenditure on the project was delayed due to the Government's decision in the *2006 Metropolitan Water Plan* not to raise Tallowa Dam, consequently resulting in this part of the project not proceeding.

A.9.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- NSW Government, Shoalhaven Water Supply Transfers and Environmental Flows, Shoalhaven River – Water Supply Transfers and Environmental Flows, dated August 2006.
- Options Evaluation for Shoalhaven Transfers, Options Paper for Sydney Catchment Authority, prepared by NSW Department of Commerce, Cabinet in Confidence, Version 2_1 Final Client Draft, July 2008.
- Worley Parsons, Review of Capital and Operating Expenditure, Sydney Catchment Authority (2009 Determination), dated 15 January 2009.

A.9.3 Key Drivers and Obligations

The driver for this project is ultimately the requirements set out in the *2004*, *2006* and *2010 Metropolitan Water Plans* which outline the long terms supply options. The driver recorded in the 2011 AIR/SIR is 'Government Program'.

A.9.4 Solution Development

Investigations undertaken as part of the development of the *Metropolitan Water Plans* have shown that more water could be sourced from the Shoalhaven system by transferring water when it is readily available rather than accessing low flows during times of drought.¹¹¹ In the *2006 Metropolitan Water Plan*, the NSW Government gave an undertaking to the SCA that it would examine options for:

- operational changes to existing Shoalhaven Water Supply Transfer Arrangements to increase the long term available water supply to greater Sydney by around 30 billion litres per year; and
- measures to mitigate the impacts of using rivers as conduits for transfer of water.

In November 2006, the Government announced that it would not proceed with those options that rely on run-of-river to transfer additional water from Tallowa Dam to the SCA's metropolitan dams. Technical studies showed that using the Wingacarribee/Wollondilly and Upper Nepean river systems as conduits for further water supply transfers is not environmentally sustainable and limits maximum access to water from Tallowa Dam.¹¹²

Six options for possible transfer arrangements from the Shoalhaven to Sydney were presented to the community, with three options shortlisted for further development. Several supporting studies covering, engineering, systems, energy, environment, financial/economic impacts were undertaken. The options evaluation paper prepared by the NSW Department evaluated the three shortlisted options using a range of criteria and identifies a 'Burrawang to Avon Dam tunnel' as the best option for transferring Shoalhaven water to Sydney, noting that it was the only option that met all of the evaluation criteria.

The solution development was largely driven by pressure from the NSW Government to secure long term water supply arrangements. The process of identifying options and short listing these options for further investigation in conjunction with community input appears to be reasonable and transparent.

A.9.5 Project Delivery

The investigations over the historical period 2005/06 to 2009/10 enabled a better understanding of the Shoalhaven River catchment behaviour, and facilitated change to the environment flow rules and the operation of Tallowa Dam. This was delivered within the regulatory timeframe.

No expenditure is forecast on this project within the potential five-year price path. The majority of the capital works associated with this option¹¹³ is forecast to be expended beyond the forthcoming price path (ie. commencing in 2018/19).

¹¹¹ This is described in further detail on page 24 of the 2010 NSW Government Metropolitan Water Plan.

¹¹² This is further described in the Department of Commerce Options Evaluation Paper.

¹¹³ Based on discussions with the SCA, it is understood that the forecast expenditure is representative of detailed design and construction of this project.

A.9.6 Cost Estimate

Historical expenditure presented in the AIR/SIR totals \$12.276 million (\$real 2011/12) for the period between 2005/06 to 2009/10. Expenditure in the historical period 2007/08 to 2009/10 was \$4.184 million (\$real 2011/12). All historic expenditure is related to investigations.

Of the three shortlisted options, a preliminary budget cost estimate was only undertaken for the preferred option, ie. the Burrawang to Avon Tunnel. The cost estimate developed is risk based and required decisions to be made about the likely range of costs for each of the components of the estimate. Items with well defined scope, where quotes were available, typically were considered to have a range of $\pm 5\%$. Items where no quotations were obtained or where market prices exist have a much larger variation range of -25% to $+50\%$.

Based on the options evaluation paper, the preferred option has an estimated direct construction cost of \$363 million¹¹⁴ (\$2008/09) and P90 cost of \$495 million (\$2008/09), ie. \$538.3 million (\$real 2011/12), meaning there is a 90 percent likelihood that the project will be completed for less than this amount. The current AIR/SIR forecasts that expenditure on the capital works will commence in 2018/19 with expenditure of \$4.02 million (\$real 2011/12) ramping up to \$115.6 million in 2021/22. Over the period 2018/19 to 2021/22, approximately \$190.9 million (\$real 2011/12) representing 48 percent of the estimated direct construction cost estimate and 35 percent of the P95 estimate will be expended. For a project of this size, it would be expected that construction would take place over a number of years, indicating that the bulk of the expenditure will be beyond the 10 year outlook of the AIR/SIR (refer **Figure A.2**).

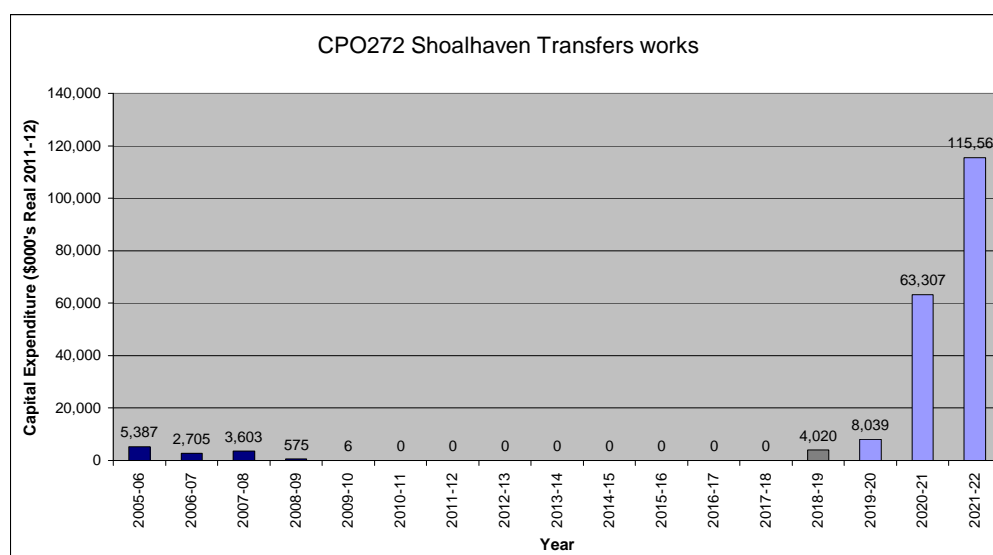


Figure A.2: Expenditure Profile – Shoalhaven Transfer Works

¹¹⁴ Based on cost estimate prepared by C J Zanelli Pty Ltd (2008), *Shoalhaven Transfer Scheme Burrawang – Avon Tunnel Basic Feasibility Estimate*, January 2008. This document was not available for review by Halcrow.

A.9.7 Assessment of Prudence and Efficiency

Historical expenditure was driven by the NSW Government's desire to secure Sydney's long term water supply and is therefore considered prudent. No information was provided regarding how historical expenditure was spent; Halcrow is unable to determine whether expenditure was executed efficiently.

Given that the project is set to commence beyond the coming price path (in 2018/19), the level of detail and supporting information contained within the options evaluation paper is considered appropriate for identification in the current AIR/SIR. Forecast expenditure is therefore considered both prudent and efficient for the purposes of this assessment.

It is recommended that a formal business case is prepared for the next regulatory assessment to better establish the actual costs associated with this project.

No change is recommended to the expenditure profile included in the AIR/SIR as shown in **Table A.16**.

Table A.16: Actual/Forecast Capital Expenditure – CPO272 Shoalhaven Transfers Works (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	0.575	0.006	-	-	-	-	-	-	-	-
Halcrow Forecast Expenditure Profile (\$2011/12)	0.575	0.006	-	-	-	-	-	-	-	-

A.10 CPO273 – Tallowa Dam; Fish Passage and Environmental Flow Works

A.10.1 Project Description

The Tallowa Dam Fish Passage and Environmental Flow works project involved the installation of a two-way fish passage and works to enable environmental flow releases as well as upgrade of the Tallowa Dam picnic area. The project was first introduced in the *2004 Metropolitan Water Plan*, but underwent changes when the NSW Government announced in the *2006 Metropolitan Water Plan* that Tallowa Dam would not be raised.

The SCA has advised that investigative works for the Tallowa Dam fishway and offtake investigation are captured in separated project CB034.

A.10.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- SCA Board meeting Agenda Item 12, Fish Passage and Environmental Flow Releases at Tallowa Dam, dated 23 February 2007.
- Submission: Metropolitan Water Plan – Contract for Environmental Works at Tallowa Dam, ref: D2007/03464, approved 19 April 2007.
- SCA Submission: Approval of Tender Recommendation for Tallowa Dam Environmental Flows and Fish Passage Contract, Ref: D2007/08940, dated 28 December 2007.
- Worley Parsons, Review of Capital and Operating Expenditure, Sydney Catchment Authority (2009 Determination), dated 15 January 2009.

A.10.3 Key Drivers and Obligations

The driver for this project is the *2004* and *2006 Metropolitan Water Plans* which establish the NSW Government's commitment to environmental flow releases and fish passage to improve the public amenity of the dam and picnic area. The SCA is obliged to comply with Government direction stated in the *Metropolitan Water Plans*. The driver listed in the AIR/SIR is "P" Government Program.

A.10.4 Solution Development

In February 2004, the SCA Board had approved \$7 million (\$2003/2004) for a multi-level offtake and fish passage, based on operating rules at the time, and design of the required infrastructure commenced. Later in 2004, the *2004 Metropolitan Water Plan* proposed raising Tallowa Dam. The SCA with the Department of Commerce and specialist subconsultants commenced a redesign of fish lift infrastructure compatible with the proposal to raise the Dam. In the *2006 Metropolitan Water Plan*, the Government abandoned raising the Dam. The 23 February 2007 SCA Board meeting minutes thus document the new project scope which resulted in a P90 risk based cost estimate of \$25 million (\$2006/07), of which \$18.9 million (\$2006/07) was for construction works.

In February 2007, the SCA Board discussed amending the capital expenditure program to accommodate the requirement of the *Metropolitan Water Plan* for fish passage and

environmental flow release. In May 2007, Expressions of Interest (EOI) were invited for the Tallowa Dam Environmental Flows and Fish Passage Project from the Department of Commerce's accredited contractor panel. Four submissions were received in September 2007, three of which were invited to participate in early contractor involvement (ECI) to discuss the project and the potential risks in the contract.

A.10.5 Project Delivery

This project has taken longer than originally scheduled. This is in part due to:

- In the *2006 Metropolitan Water Plan*, the plan (at the time) to raise Tallowa Dam was abandoned by the NSW Government, which consequently required redesign of the fish passage;
- Longer than expected construction period; and
- A retrofit of the fish passage lift was required to stop the lift shaking during operation.

The 2009 expenditure review by Worley Parsons identified March 2009 completion. The SCA confirmed works were completed in May 2009, two months late.

It is noted that further expenditure of \$1,655,000 (\$real 2011/12) was incurred in 2009/10 and \$48,000 (\$real 2011/12) in 2010/11, indicating that the project wasn't complete until after July 2011. It is assumed this related to the retrofit of the fish lift described by the SCA during interviews.

A.10.6 Cost Estimate

The pre-tender P90 risk based cost estimate¹¹⁵ for the project was \$25 million (\$2006/07), ie. \$28 million (\$real 2011/12), which includes a contingency allowance of \$2.430 million (\$real 2011/12) as an additional line item. Halcrow would argue that no further contingency should have been included in the project budget estimate as each P90 should have already captured contingency. Furthermore, escalation was included as a separate line item, which should also have already been captured in a P90 cost estimate.

Formal tenders were received from the three contractors for design and construction. The winning tender was awarded to the contractor who offered the lowest price (\$25.47 million (\$2007/08)) and scored a close second in the non-price ranking. The other price submissions received for construction amounted to \$32.62 million and \$37.97 million. The final agreed design and construct contract price, as recommended by the SCA, was \$26,208,658 (\$2007/08) (excluding GST), ie. \$29,468,517 (\$real 2011/12). This is approximately 14 percent higher than the equivalent costs included in the pre-tender P90 risk based cost estimate.

¹¹⁵ The P90 risk based estimate means that there is a 90 percent likelihood that the project would be completed for less than this amount.

Agreement from NSW Treasury was sought and later received on 7 January 2008 for a predicted 24 percent increase over the approved project funding. At the time the 2009 AIR was received by IPART, total project costs had been forecast at \$33,416,082 (\$real 2011/12); it is assumed that this value reflects the 24 percent increase.

In the 2011 AIR/SIR, actual expenditure of \$34.033 million (\$real 2011/12) is reported for the period 2007/08 to 2010/11. Historical expenditure for investigative works prior to 2007/08 is captured under a previous project CB034¹¹⁶ and amounts to some \$2.560 million (\$real 2011/12). Overall, combining projects CPO273 and CB034, total expenditure amounts to \$36.593 million. The total combined investigation, project management and tender costs from the SCA and the Department of Commerce should therefore equate to the difference between the design and construction contract and the predicted project completion presented in the 2009 AIR/SIR, ie. \$36,593,000 minus \$29,468,517, or \$7,124,483 (approximately 24.2 percent of construction costs). Excluding the investigation project CB034, total project management and tender costs represent 13.4 percent of construction costs.

The difference between the actual expenditure on the project and the forecast shown in the 2009 AIR/SIR, ie. some \$616,918, is assumed to be due to the retrofit of the fish lift.

A.10.7 Assessment of Prudence and Efficiency

The delivery of this project is prudent as it has enabled the fish passage and environmental flows works to be implemented as required by the *2006 Metropolitan Water Plan*. The SCA has been prudent in the delivery of this “high risk” project through early contractor involvement.

It is agreed that the delivery of this project has been complex; however, it is not clear whether the decision to not raise Tallowa Dam (in 2006) had bearing on the project costs. Halcrow does, however, conclude that this project was delivered over budget. According to the P90 estimate, project management costs incurred by the SCA are well within the expected range, being approximately 3.2 percent of construction costs, however, it appears that actual project management cost amounted to approximately 13.4 percent of construction costs, which is towards the upper bound of the normally expected range.

Based on the above, Halcrow concludes that the project delivery was not as efficient as would normally be expected, however, given the Government Program driver and evidence that the SCA communicated forecast increases in costs with NSW Treasury at an appropriate stage of the project, Halcrow is satisfied that no adjustments to the expenditure reported for this project in the AIR/SIR should be made. This is reflected in **Table A.17**.

¹¹⁶ Based on email correspondence between Halcrow and SCA dated 27 October 2011.

Table A.17: Actual/Forecast Capital Expenditure – CPO273 Tallowa Dam; Fish Passage and Environmental Flow Works (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	23.954	1.655	0.048	-	-	-	-	-	-	-
Halcrow Forecast Expenditure Profile (\$2011/12)	23.954	1.655	0.048	-	-	-	-	-	-	-

A.11 CPO346 – Metropolitan Dams Electrical System

A.11.1 Project Description

The Metropolitan Dams include Avon, Cataract, Cordeaux, Nepean and Woronora, which were constructed between 1903 and 1941. A condition assessment of the electrical systems was prepared in September 2010.

A.11.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- SCA, Project Brief Form, Metropolitan Dams Electrical Condition Assessment, undated.
- Public works, Metropolitan Dams Electrical Condition Assessment (Final Draft) for SCA, Report No WSR 10018, dated September 2010.
- Public Works, Proposal for Metropolitan Dams and Burrawang Pumping station Electrical Upgrades, Preparation of Preliminary Business Case and Project Management Plan, dated May 2011.

A.11.3 Key Drivers and Obligations

The driver listed in the 2011 AIR/SIR is 'existing mandatory standards – other'. The project brief form lists the project driver as 'efficiency'.

A.11.4 Solution Development

The asset condition assessments found the Electrical, Electronic, Instrumentation and Control equipment at the Metropolitan Dam sites is in fair condition and is operational. Due to its age, however, the equipment fails to meet current statutory conformance (including OHS&R), with spare parts no longer available. It uses outdated, manually operated technology which has a low effectiveness for monitoring dam safety processes.

The condition assessment identified that implementation of the proposed upgrade works would increase reliability and extend operational life by a further 20 years, reduce interruptions and unplanned outages, improve safety and reduce the risk to the SCA of not meeting client water requirements as a result of failure of electrical and control systems equipment.

Included in this project is a proportion of new works relating to the installation of a SCADA system at the dams and for underground cabling.

A.11.5 Project Delivery

The target dates for the Operating Expenditure funded investigation project was 31 December 2010. This was met within the timeframe.

Currently there is proposal to develop a business case covering the Metropolitan Dams and Burrawang Pumping station which was nominated (in the proposal) to be completed by July 2011. The business case was not available at the time of project review.

Delivery of the project over six (6) years is planned.

A.11.6 Cost Estimate

The SCA has identified that this project will involve a total expenditure of \$14.671 million (\$real 2011/12) over the six year timeframe for the project, with \$11.556 million (\$real 2011/12) forecast to be expended during the coming price path, as shown in **Figure A.3**.

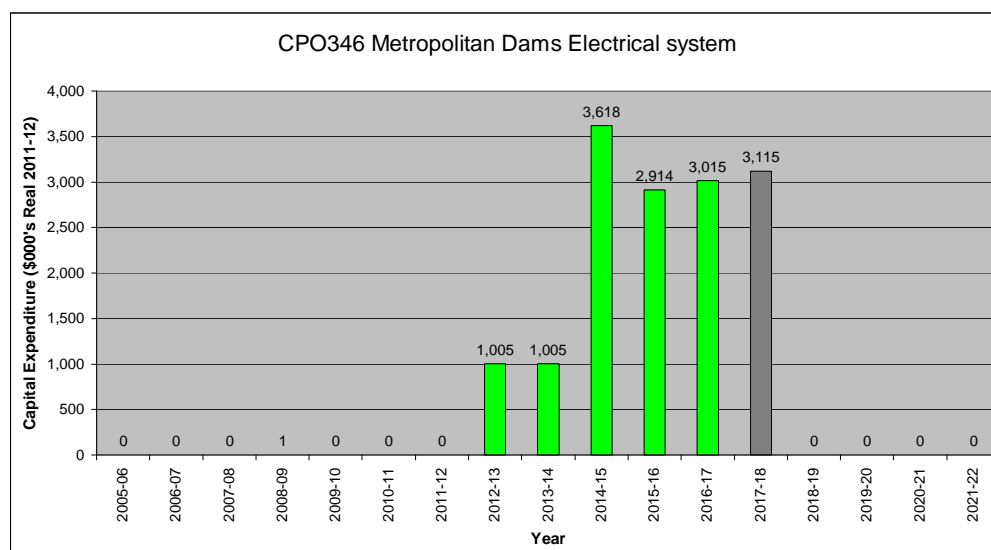


Figure A.3: Expenditure Profile – Metropolitan Dams Electrical Systems

The estimates shown in **Table A.18** list the project cost for each metropolitan dam. The expenditure included in the AIR/SIR in the coming price period broadly aligns with the estimate by Public Works, ie. \$11.443 million (including GST). The GST component is equal to \$1,040,279 (\$real 2011/12).

Table A.18: Metropolitan Dams Electrical Systems - Summary of estimated costs (\$real 2011/12)

Dam Site	Project Cost (excl. GST)	Project Cost (incl. GST)
Nepean Dam	1,922,815	2,115,097
Avon Dam	2,144,480	2,358,928
Nepean-Avon Tunnel (Nepean End)	670,150	737,165
Cataract Dam	1,783,630	1,961,993
Cordeaux Dam	2,165,100	2,381,610
Woronora Dam	1,716,615	1,888,277
Total	10,402,790	11,443,069

Note: Figures shown in brackets are a percentage of the direct cost.

Total estimated project management costs as a percentage of the direct costs is approximately 16 percent, which is considered appropriate.

Some of the components for the electrical system upgrade will involve replacing assets with SCADA capability. New SCADA assets will also be installed; these represent 11 percent of the electrical systems upgrade cost. Assets with SCADA capability are listed in **Table A.19**.

Table A.19: SCADA Assets included in Metropolitan Dams Upgrade (\$2010/11)

	Nepean Dam	Nepean Avon tunnel	Avon Dam	Cataract Dam	Cordeaux Dam	Woronora Dam	Comment/ Total
Upgrade Penstock operating mechanism	✓		✓	✓	✓		Replace existing asset with SCADA system integration
Upgrade Ring Follower Gate Valves Monitoring	✓				✓		Replace existing asset with SCADA system integration
upgrade piezometers for downstream groundwater measurement					✓		Replace existing asset with SCADA system integration
Upgrade flood warning system	✓		✓	✓	✓	✓	Replace existing asset with SCADA system integration
Subtotal – Replacement Assets with SCADA capability	365,000		300,000	415,000	395,000	15,000	1,490,000
Automation of flow measurement through v-notches	✓		✓	✓	✓	✓	New asset with SCADA integration
automation of foundation uplift pressure measurement system	✓		✓		✓		New asset with SCADA integration
Upgrade communication system of the dam	✓		✓	✓	✓	✓	New asset with SCADA integration
Subtotal – New SCADA assets	270,000		270,000	150,000	270,000	150,000	1,110,000

It is noted that, as part of the SCA SCADA business case, capital expenditure totalling \$100,000 nominal (unknown year)¹¹⁷ for dam safety monitoring is proposed for installation of ultrasonic sensors for v-notch weirs and 2No CCTV cameras at each of 10 sites (\$10,000 nominal per site). It is unclear from the information provided, why the cost of automating flow measurement through v-notches, as identified in **Table A.19**, amounts to \$100,000 per site.

As part of the proposed electrical upgrade works, undergrounding of low voltage power supply to picnic areas and nearby buildings will be undertaken. There is no mention in the electrical condition assessment that the current overhead wires in the picnic areas are critical to SCA operations. Public works in their assessment noted that the

¹¹⁷ Page 46 of SCA SCADA Business Case, prepared by Langdale Consultants.

NSW Government has a policy of encouraging authorities to put all electrical cables underground. The cost of the undergrounding the existing cables amounts to some \$2 million (\$real 2010/11), ie. \$2.062 million (\$real 2011/12); this represents some 20 percent of the cost of the proposed Metropolitan Dams electrical systems upgrade. The remaining life of all of the overhead wiring is in excess of nine years, as shown in **Table A.20**.

Table A.20: Undergrounding of low voltage wiring – remaining life assessment

Site	Condition	Remaining Life (years)	Scope
Nepean Dam	Fair Condition (with minor defects)	12	To conduit the existing overhead power supply for the forestry substation to the picnic area underground.
Nepean Avon tunnel			
Avon Dam	Fair Condition (with minor defects)	14	To conduit the existing overhead 415kV power supply and communication cables spanning 2.7km with over 50 poles underground.
Cataract Dam	Fair Condition (with minor defects)	15	To conduit the existing overhead 415kV power supply and communication cables spanning 0.5km with over 16 poles underground.
Cordeaux Dam	Fair Condition (with minor defects)	9	To conduit the existing low voltage overhead power supply for the picnic area and local building spanning 0.3km over 10 poles underground.
Woronora Dam	Fair Condition (with minor defects)	13	To conduit the existing low voltage overhead power supply for the picnic area and local building spanning 9 steel poles underground.

A.11.7 Assessment of Prudence and Efficiency

The need for this project is well documented in the electrical condition assessment from a safety, maintenance and reliability perspective. Halcrow is satisfied that, given the age of the assets, it is prudent to replace them. The process of completing a condition assessment and preliminary cost estimate is also prudent to guide the inclusion of expenditure in the forthcoming price path.

It is understood that the SCA has completed a study which demonstrates SCADA control systems will reduce the general operational costs of operating dams by 5 percent.¹¹⁸ Halcrow agrees in principle that SCADA systems produce cost savings, as well as bringing other benefits such as safety. Given the opportunity to replace existing assets with SCADA integrated assets, Halcrow considers this to be prudent. Halcrow supports the provision of new SCADA assets where proposed, providing the financial and operational benefits outweigh maintaining existing operation methods.

¹¹⁸ This report has not been made available for Halcrow's review. A saving of 5% is referred to on page 76 of Public Works, *Metropolitan Dams Electrical Condition Assessment (Final Draft) for SCA, Report No WSR 10018*, dated September 2010.

In regard to the undergrounding of cables, Halcrow has not seen evidence that supports this project being critical to the SCA in meeting its core obligation of supplying water to customers. The driver to meet existing mandatory standards and for efficiency gains would not apply to the undergrounding of cables. Noting the NSW Government policy of encouraging authorities to put all electrical cables underground, it would be more efficient to underground cables when the overhead cables reach the end of their remaining life, which for all overhead cables is in excess of nine years (refer **Table A.20**).

The contingency costs for this project are slightly higher than normal for this stage of the project. Furthermore, there is unidentified expenditure in year 2017/18 which does not tie to the cost estimate for this project.

Halcrow therefore recommends that the following components included in the current AIR/SIR are removed:

- the included GST component of the works \$1,040,279 (\$real 2011/12);
- the cost of undergrounding of low voltage cables for the picnic area \$2,062,000 (\$real 2011/12); and
- the proposed expenditure in year 2017/18, ie. \$3,115,000 excluding GST.

The proposed cost of the project in the AIR/SIR should only be the direct cost plus revised project management and contingency costs to a maximum of 20 percent and 15 percent respectively. The revised amount is equal to \$8,489,082 (\$real 2011/12), which Halcrow considers to be efficient.

The SCA's proposed expenditure and Halcrow's recommended expenditure are as shown in **Table A.21** and **Appendix C**.

Table A.21: Forecast Capital Expenditure – CPO346 Metropolitan Dams Electrical System (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	0.001	-	-	-	1.005	1.005	3.618	2.914	3.015	11.556
Halcrow Forecast Expenditure Profile (\$2011/12)	0.001	-	-	-	0.738	0.738	2.657	2.141	2.215	8.489

A.12 CPX001 – Warragamba E-flow Investigation

A.12.1 Project Description

The SCA is in the process of undertaking a detailed investigation in order to assess the scope and feasibility for the provision of an environmental flow regime for Warragamba Dam. The objective is to facilitate the release of environmental flow into rivers downstream of the dam roughly equivalent to the volume of inflow from the Warragamba catchment.

The purpose of this project is to deliver to the NSW Government a report and supporting business case recommending an environmental flow regime for Warragamba Dam.

A.12.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Warragamba E-flow Investigation – Project Summary Statement.

A.12.3 Key Drivers and Obligations

This project is driven by the *Metropolitan Water Plan 2010* requirement to ensure that an environmental flow regime for Warragamba Dam is included in *Metropolitan Water Plan 2014*.

A.12.4 Solution Development

The SCA advised that the investigation is due to commence in 2011/12 with a recommended environmental flow regime proposal to be submitted to the NSW Government by 30 June 2014.

Depending upon the results of the investigation and recommendations carried forward into the *Metropolitan Water Plan 2014*, a capital project will then be initiated for delivery by 2018/19.

Mutual agreement with the NSW Government is imperative as the magnitude of the environmental flow could adversely impact on the available yield of Warragamba Dam and potentially accelerate the implementation of alternative supply schemes.

A.12.5 Project Delivery

At the time of review, the investigation was underway. A potential option has already been identified, whereby an existing hydro-electricity outlet would permit the discharge of approximately 5000 megalitres per day, subject to inlet and outlet modifications to enable a variable flow discharge.

A.12.6 Cost Estimate

An allowance of \$1.7 million has been made to complete the investigation work by 2014, with the balance (in the order of \$90 million (\$real 2011/12)) equating to the estimated design and construction costs, as demonstrated by the expenditure profile shown in **Table A.22** and **Appendix C**. This is in addition to approximately \$1.45 million (funded as Operating Expenditure) also incurred as part of the

investigation work; the SCA has advised that the majority of this expenditure relates to staff labour costs.

Halcrow was unable to establish the basis for the investigation cost (capital) estimate, however, the majority of the forecast expenditure was based on a high level Public Works Department estimate to modify the inlet and outlet structures of the existing hydro-electricity outlet pipe that already passes through the dam wall.

Halcrow anticipates these estimates, which are summarised in **Table A.22** and **Appendix C** (expenditure beyond 2016/17), to be of a relatively low level of confidence.

Table A.22: Forecast Capital Expenditure – CPX001 Warragamba E-flow Investigation (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Cost 2012/13 to 2016/17
Forecast Expenditure Profile – Construction (\$2011/12)	-	-	-	-	-	-	1.005	15.073	30.146	46.224
Forecast Expenditure Profile – Investigation (\$2011/12)	-	-	-	0.710	0.744	0.219				0.963
Halcrow Forecast Expenditure Profile (\$2011/12)	-	-	-	0.000	0.000	0.000	1.000	4.000	5.000	10.000

A.12.7 Assessment of Prudence and Efficiency

The necessity to deliver to the NSW Government a report and supporting business case recommending an environmental flow regime for Warragamba Dam is a mandatory requirement that Halcrow considers to be both necessary and prudent.

Halcrow does, however, have concerns in respect of the magnitude of the forecast expenditure associated with this project. CPX001 is identified as an investigation project only; accordingly, Halcrow would normally only expect expenditure associated with the investigation to be allocated to this project (ie. expenditure of approximately \$1.7 million). In fact, it could be argued that the expenditure associated with this investigation should be funded as Operating Expenditure, and therefore not appear in the capital expenditure forecasts. Halcrow understands that expenditure to be incurred from 2011/12 to 2013/14 relates to early investigation and project scope definition, as opposed to project delivery.

Furthermore, Halcrow does not consider it appropriate to allocate expenditure to a project where the scope of the solution is yet to be defined. As there is still a high level of uncertainty over the extent of the environmental flow and nature of the required solution, Halcrow considers that it would be prudent to defer the majority of anticipated capital expenditure to the next pricing period. This will reduce the risk of the SCA significantly under spending against its determination, as has previously been the case.

On the basis that the lead in time for a project of this nature is likely to be significant, Halcrow considers that it would be prudent to make some allowance for nominal capital expenditure during the upcoming determination period, over and above the initial allowance for investigation. This will enable the SCA to define the actual scope of works, reach agreement with the NSW Government, prepare a cost estimate of high confidence and commence the procurement process for the delivery of the defined scope. Halcrow's proposed expenditure profile is shown in **Table A.22** and **Appendix C**.

A.13 CPX008 – Upper Nepean Transfer Scheme; Upper Canal Refurbishment

A.13.1 Project Description

The Upper Canal is a raw water conduit used to supply approximately 500 megalitres per day from the Upper Nepean Dams to Prospect Reservoir; it is an integral component of the Greater Sydney water supply system. The Upper Canal is approximately 120 years old, at constant risk of structural failure and water quality contamination, and may contravene health and safety requirements.

In order to ensure the long term security of this important water supply link, the SCA proposes to replace the Upper Canal with pipeline/tunnel solution, however, projects of this nature and complexity have an extremely long lead time. Consequently, the SCA proposes to undertake some refurbishment work to extend the life of this failing asset prior to replacement. The proposed works include critical structural repairs, renewal of a chlorine dosing facility and installation of new automated penstocks.

A.13.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Upper Nepean Transfer Scheme – Refurbishment of Upper Canal – Draft Business Case; and
- Upper Nepean Transfer Scheme – Rehabilitation and/or Replacement of the Upper Canal – Consultant Overview Report.

A.13.3 Key Drivers and Obligations

Within its AIR/SIR, the SCA has identified ‘Discretionary – Other’ as the primary driver for investment. Whilst the project is predominantly a base maintenance project, Halcrow understands that asset maintenance could be construed to be discretionary.

A.13.4 Solution Development

In order to assess the condition of the Upper Canal and develop a number of viable refurbishment/replacement options, the SCA engaged an independent Consultant to carry out a detailed investigation (including a condition assessment). As a part of the investigation, the Consultant was required to develop a number of short term refurbishment options to ensure the structural integrity of the Upper Canal until such time when the replacement option could be completed.

Halcrow undertook a high level review of the Consultant’s *Project Overview Report*¹¹⁹ and confirms that the following three refurbishment options were detailed and considered:

- Minimum (10 year) Rehabilitation – limited to sections of the canal where there were major concerns, with condition assessed as poor or fair. Designed to prolong life by 10 years; estimated cost - \$45 million (P50 estimate excluding contingency).

¹¹⁹ SKM, *Upper Nepean Transfers Scheme; Investigations for the Rehabilitation and/or Replacement of the Upper Canal; Project Overview Report (Final)*, September 2010.

- Intermediate (25 year) Rehabilitation – limited to sections of the canal where there were major concerns, with condition assessed as poor, fair or moderate. Designed to prolong life by 20-25 years; estimated cost - \$300 million (P50 estimate excluding contingency).
- Full (50 year) Rehabilitation – limited to sections of the canal where there were major concerns, with condition assessed as poor, fair, moderate or good. Designed to prolong life by 50 years; estimated cost - \$658 million (P50 estimate excluding contingency).

The report also confirmed that much of the structure of the Upper Canal was fast approaching the end of its engineering life and was in need of replacement. The Consultant recommended that the Minimum Rehabilitation option is delivered in order to maintain the operation (and heritage aspects) of the Upper Canal until a replacement solution can be implemented.

Rather than just adopt the minimum scenario, as defined by the Consultant, the SCA undertook a critical assessment of various elements of the Minimum Rehabilitation option, and picked out those areas considered to be of major concern, ie. only those areas with condition assessed as poor. The SCA also considered the upgrade to the existing chlorine dosing facility (that was not considered by the Consultant). On this basis, the following scope of works was defined:

- Wall repairs/refurbishment;
- Security fencing;
- Drain refurbishment;
- Penstock rehabilitation;
- Roadworks;
- Chlorine Dosing Facility;
- Other; and
- Indirect Costs.

This revised option, which was costed using the Consultant's order of cost estimates and includes an allowance for contingency, resulted in a forecast estimate of \$33 million.

A.13.5 Project Delivery

At the time of review, a draft business case had been prepared with formal approval anticipated by March 2012.

Design activities are scheduled to commence in June 2012, with construction work completed by June 2016.

The method of procurement has not yet been determined.

A.13.6 Cost Estimate

It is Halcrow's understanding that the estimated cost was derived from unit cost estimates provided by the consultant within its options report, and that the cost estimate has been disaggregated on a similar basis to that adopted by the consultant.

Within its cost estimate, the SCA has included an 8 percent adjustment for SCA project management and a 15 percent contingency allowance.

When compared to the AIR/SIR, the expenditure profile proposed in the draft business case has been back end loaded, as shown in **Table A.23**.

Table A.23: Proposed Capital Expenditure – CPX008 Upper Nepean Transfer Scheme; Upper Canal Refurbishment (\$million)

Expenditure Profile (\$value)	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Total Cost
Forecast Expenditure Profile AIR/SIR (\$2011/12)	0.342	0.200	7.034	10.049	10.049	2.010	29.684
Forecast Expenditure Profile Business Case (\$2011/12)	-	0.29	2.6	14.0	9.9	6.1	33.0

A.13.7 Assessment of Prudence and Efficiency

The Upper Canal is integral to the ongoing supply of raw water to the Sydney metropolitan area, providing a link of more than 500 megalitres per day capacity between the Upper Nepean/Shoalhaven systems and the Prospect Water Filtration Plant.

During the course of this review, Halcrow reviewed photographic evidence of a number of structural failures on route, and incidents where water quality and security was potentially compromised. In its current state, the Upper Canal is barely fit for purpose and is in critical need of refurbishment and/or replacement.

The Upper Canal is an uncovered, open waterway that flows through a combination of rural, urban and industrialised landscapes. Similar assets in other parts of the world would have been covered/sealed in order to minimise the risk of the contamination (both deliberate and accidental), although this risk is reduced with the presence of downstream treatment. Given the intrinsic importance of this conduit, however, the SCA is quite rightly considering the replacement of the current open canal with a closed conduit/tunnel.

With this in mind, the SCA has considered the various refurbishment options, as presented in the Consultant report, and proposed a reduced scope option involving the refurbishment of only those sections of the canal that are of major concern and in poor condition.

Halcrow considers that the SCA has adopted a prudent approach to this essential refurbishment project on the basis that a full replacement will be required in the near

future. The proposed work is the bare minimum required and does not offset the need to replace the asset. The above defined scope of works will do nothing more than maintain the status quo, and ensure that supply through to Prospect is maintained when needed. The fact that the Upper Canal will remain uncovered following refurbishment, and that repairs will only be completed on sections of fencing in the poorest condition, means that water quality is and will remain potentially compromised.

In terms of efficiency, high level unit cost estimates have been utilised, which Halcrow would consider to be normally accurate to within ± 25 percent. In addition, the SCA has applied a 15 percent contingency allowance, potentially overstating the estimated cost by up to 40 percent. For the purposes of forecasting, however, Halcrow considers the SCA estimate to be appropriate.

Whilst Halcrow considers the SCA estimate to be reasonable, it does not consider the proposed expenditure, a portion of which relates to what is essentially routine maintenance, to be capital in nature. The proposed refurbishment works are aimed at maintaining serviceability, and whilst they will enable the Upper Canal to remain in service for an additional period of time, they will not increase its economic value nor extend its useful life. Halcrow is of the view that the proposed work will only serve to maintain the current useful life.

Halcrow does, however, recognise that some elements of the proposed expenditure (as detailed in the SCA's draft business case) may be considered capital in nature, although the longer term benefit of these assets may not be directly/fully realised. The specific works that are considered to be capital in nature have been identified in **Table A.24**; of the \$33.0 million total cost, Halcrow has assessed that \$20.0 million correlates to works that are capital in nature and the remainder (\$13.0 million) should be considered as operating expenditure.

In Halcrow's view, the activities identified as operating expenditure in **Table A.23** relate to the repair of failed sections of an existing asset, and do not:¹²⁰

- increase capacity of the canal;
- improve the quality of service provided by the facility (neither the quantity or quality raw water transferred in the canal is increased/improved); nor
- extend the useful life of the canal.

These particular activities serve only to maintain the current level of serviceability of the Upper Canal.

¹²⁰ Australian Accounting Standards Board, AASB 116 *Property, Plant and Equipment*, 30 October 2009 and NSW Treasury, *Guidelines for Capitalisation of Expenditure on Property, Plant and Equipment*, (TPP 06-6), June 2006 provide guidance in respect of the capitalisation of expenditure on physical non-current assets. Key criteria to be considered include assessment as to whether there have been additions or enhancements to service capacity, service quality or useful life of the asset.

**Table A.24: CPX008 Upper Nepean Transfer Scheme; Upper Canal Refurbishment
– Proposed Cost Allocation based on SCA Business Case**

Description	Capital Expenditure	Operating Expenditure
<i>Direct Cost Elementss</i>		
Render/Refurbish walls		✓
Access platforms		✓
Fencing		✓
Storm water cross drains		✓
Coping drain restoration		✓
Repair cracks		✓
Inlet/Outlet rehabilitation		✓
Props		✓
Automated penstocks	✓	
Roadworks		✓
Chlorine Dosing Facility	✓	
Sundries	✓	✓
<i>Indirect Costs Elements</i>		
Procurement, construction & design etc	✓	✓
SCA PM	✓	✓
Other indirect costs (wet weather etc)	✓	✓
Contingency	✓	✓

Note: Indirect cost elements assumed to be proportionally allocated.

In view of the discussion outlined above, Halcrow recommends that provision be made within the forecast operating (recurrent) expenditure for delivery of part of this refurbishment project. An allowance for capitalisation of expenditure related to replacement of the chlorine dosing facility and the rehabilitation of penstocks (together with a proportion of indirect costs) is, however, deemed reasonable.

The SCA's forecast and Halcrow's recommended expenditure in respect of the Upper Canal Refurbishment project is shown in **Table A.25** (and also in **Appendix C**).

Table A.25: Actual/Forecast Capital Expenditure – CPX008 Upper Nepean Transfer Scheme; Upper Canal Refurbishment (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile AIR/SIR (\$2011/12)	-	-	0.342	0.200	7.034	10.049	10.049	2.010	-	29.141
Forecast Expenditure Profile Business Case (\$2011/12)				0.29	2.6	14.0	9.9	6.1		33.0
Halcrow Forecast Expenditure Profile (\$2011/12)	-	-	0.000	0.000	2.000	8.000	8.000	2.000	-	20.000

A.13.8 Interaction between Refurbishment and Replacement

A question arises as to the interrelationship between the two projects, ie. the Upper Canal Refurbishment (CPX008) and the Upper Canal Replacement (CPO536). Halcrow is of the view that, whilst both projects are related to maintaining the ability to transfer flows from the Upper Nepean Dams to Sydney, the two projects should be considered separately, justified separately and funded separately. The replacement project is not dependent on the completion of the refurbishment project; the principal requirement is that the functionality must be provided by either the existing or the replacement facility at all times.

The Upper Canal Replacement project is likely to involve the construction of a completely different asset that would make the existing canal redundant. On this basis it could be argued that the refurbishment is not cost effective or prudent, and that all effort should be made to fast track the replacement option. However, the long lead time on a project of this magnitude and complexity means that the SCA will remain reliant on the Upper Canal for a few more years.

In its current state, the Upper Canal is not fit for purpose and is at a constant risk of structural failure that would compromise its ability to supply water. It would be poor stewardship for the SCA not to maintain the functionality of the Upper Canal in the short term, and although the proposed refurbishment works will attract significant expenditure, ongoing maintenance is necessary even if the Upper Canal is going to eventually be decommissioned. It could be argued that, had the SCA been undertaking more extensive regular maintenance over the years, additional expenditure may not be required at this point in time.

The proposed works will do nothing more than maintain the status quo, and ensure supply through to Prospect is maintained when needed. As previously noted, the fact that the Upper Canal is uncovered, and will remain uncovered following refurbishment, means that water quality is and will remain potentially compromised. The proposed refurbishment works that the SCA is proposing is the bare minimum required to keep the Upper Canal operational.

A.14 CXA17 – Warragamba Dam Reliability Upgrade

A.14.1 Project Description

As discussed in the project summary for CPO113, the SCA (and its predecessor organisation) has undertaken significant capital improvement and upgrade works at Warragamba Dam to enable the dam to pass the Probable Maximum Flood (PMF). During the delivery of this project, which had a long lead time (around 13 years), various dam safety standards have been reviewed and reassessed, necessitating a further review of the reliability of Warragamba Dam.

The Warragamba Dam Reliability Upgrade project follows on from the previous package of work, and involves the investigation of all risks associated with the reliability of the spillway and adequacy of the Dam to withstand updated PMF and seismic loadings.

The objective of the project, which is in its infancy, is to undertake a detailed 'Failure Mode Analysis' for Warragamba Dam, assess the significance and severity of all risks and deliver appropriate measures that would address these risks.

A.14.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Warragamba Dam Reliability & Risk Investigations – Business Case; and
- Warragamba Dam Reliability & Risk Investigations – Project Review Panel Report.

A.14.3 Key Drivers and Obligations

The project has a dam safety driver (C4), which is a mandatory safety standard, to ensure the safety and reliability of Warragamba Dam and meet the requirements of the NSW Dam Safety Committee.

A.14.4 Solution Development

This project is currently in pre-definition phase. The scope and timing for the project (CXA17) will be developed following the completion of an investigation, funded as Operating Expenditure.

The SCA advised that the risk and reliability study is due to commence in 2012 with recommendations to address any deficiencies made by 30 June 2013.

A.14.5 Project Delivery

At the time of review, the reliability and risk assessment of Warragamba Dam was due to commence in 2012. A business case for this Operating Expenditure funded investigation was completed and approved in May 2011.

A.14.6 Cost Estimate

As the scope of work has not yet been defined, the forecast costs and timescales summarised in **Table A.26** are estimates based on engineering judgement and are of a low level of confidence.

Table A.26: Proposed Capital Expenditure – CXA17 Warragamba Dam Reliability Upgrade (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)						1.005	5.024	15.073	9.044	30.146
Halcrow Forecast Expenditure Profile (\$2011/12)						-	1.000	2.000	2.000	5.000

A.14.7 Assessment of Prudence and Efficiency

The SCA is nearing completion of a significant suite of projects (expenditure totalling approximately \$160 million) designed to upgrade the capability of Warragamba Dam to pass the PMF (as defined in 1999) and thus ensure the structural integrity of the Dam. This project (CXA17) follows on from this project/s, and will assess and remedy the potential impact that recent revisions to dam safety standards may have had in respect of the structural integrity of Warragamba Dam.

Whilst the need to ensure the structural integrity and safety of Warragamba Dam is undeniable, the prudence of the proposed upgrade, as it currently stands, is questionable. Halcrow believes that the SCA has adopted a prudent approach to the current investigation work, funding it as Operating Expenditure, however, does not consider it appropriate to make a significant capital allowance in the upcoming determination period for work that has not yet been defined.

On the basis that improvement works have already been completed, providing some protection against the revised impacts of PMF and seismic activity, Halcrow considers that it may be appropriate to defer the majority of the proposed capital expenditure to the next price determination period. The lead in time for projects of this nature are likely to be significant, therefore Halcrow considers it would be prudent to make some allowance for nominal capital expenditure during the upcoming determination, in order to complete any investigations, define the actual scope of works and commence the procurement process for the delivery of the defined scope. This will enable the SCA to present a project estimate of high confidence in its next pricing submission.

Halcrow's recommended expenditure profile is as shown in **Table A.26** (and also in **Appendix C**).

A.15 CXA20 – Kangaroo Tunnel Relining

A.15.1 Project Description

The Kangaroo Tunnel, Shaft and Pipeline enable the transfer of water between the Bendeela Pondage and the Fitzroy Falls Reservoir. The Kangaroo Tunnel extends from the foot of the shaft to the Kangaroo Pumping and Power Station. This project involves relining the 2.64 metre diameter steel lined tunnel over its full length of 1,480 metres. This conduit transports water in both directions, depending on whether the Kangaroo Pumping and Power Station is pumping or generating.¹²¹

The Kangaroo Shaft is 330 metres long with a 2.64 metre diameter steel liner whilst the pipeline is a 3.1 metre diameter rigid steel line, 2,494 metres long.

A.15.2 Documentation Reviewed

Documentation reviewed in respect of this project included:

- Invitation to tender. Tender no. T02792271 Kangaroo Pipeline Internal Relining, 10 March 2010.
- Kangaroo Tunnel Relining, Capital Summary (CPOTBA), undated.
- Kangaroo Pipeline – Shaft – Relining, Capital Expenditure Program Quarterly Report.

A.15.3 Key Drivers and Obligations

The driver listed in the AIR/SIR is 'discretionary standards 2012-2017 – Other'. The capital summary identifies problems with the works, but does not identify a clear driver. Halcrow notes that the pipeline is an integral component of the water supply system linking Tallowa Dam to Sydney, the Illawarra and Southern Highlands.

A.15.4 Solution Development

A project involving the relining of the Kangaroo Shaft and patchwork repairs to the Kangaroo Pipeline was completed in December 2010. The Kangaroo Shaft relining and Pipeline patchwork component was completed for \$2.496 million (\$real 2011/12) based on the AIR/SIR. The capital expenditure program quarterly report indicates that the budget was \$2.940 million (\$2010/11) with approved expenditure up to \$3.800 million. The tender that related to this similar project closed on 25 April 2010; it was noted that the works required were *“to extend the useful operational life of the Kangaroo Shaft for the next 30 years and repair the damaged areas of the pipeline and the tunnel to maximise time till major relining is required”*.

A report completed in October 2010 found that the internal lining of the tunnel had deteriorated more rapidly than previously identified in an inspection undertaken in 2008. Furthermore, during the Kangaroo Shaft relining project it had been found that the previous relining works undertaken in the early 1990's were likely to have been of poor quality resulting in the delamination of a large section of the lining.

¹²¹ Invitation to tender. Tender no. T02792271 Kangaroo Pipeline Internal Relining, 10 March 2010.

The SCA has advised that the project now proposed (CXA20) will involve relining the tunnel using a similar construction methodology to the shaft relining.

A.15.5 Project Delivery

Given the relining and patchwork project was completed in six months with the bulk of the expenditure in one year, delivery inside one year should be possible as proposed in the AIR/SIR. The SCA has advised that a business case for the project CXA20 is still in the process of preparation.

A.15.6 Cost Estimate

The forecast cost to complete the Kangaroo Tunnel Relining works is \$3.015 million (\$real 2011/12) to be expended in 2013/14. It is not possible to directly compare the costs associated with the historical Kangaroo Tunnel Relining project and the Kangaroo Shaft Relining and Pipeline Patchwork project as the SCA has been unable to provide a disaggregated cost for the completed historical project for review.

A.15.7 Assessment of Prudence and Efficiency

Maintenance is considered crucial to ensuring reliability of the SCA network. Halcrow therefore considers the relining to be necessary and prudent.

Whilst it may have been more cost effective to reline the tunnel at the same time as shaft, it is apparent that the need for tunnel relining was not recognised until the shaft relining was being undertaken; only repair of damaged areas was expected to be necessary based on the findings of the previous (2008) condition assessment.

Halcrow notes that, based on the recent Kangaroo Shaft relining project, the SCA should have a good understanding of the costs associated with relining the adjoining Kangaroo Tunnel. The proposed expenditure in respect of the proposed tunnel relining is therefore considered to be reflective of efficient costs, as shown in **Table A.27**.

Table A.27: Proposed Capital Expenditure – CXA20 Kangaroo Tunnel Relining (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)	-	-	-	-	-	3.015	-	-	-	3.015
Halcrow Forecast Expenditure Profile (\$2011/12)	-	-	-	-	-	3.015	-	-	-	3.015



Appendix B. Capital Project Summaries – High Level Review

B.1 CPO186 – Wingecarribee Dam Improvement Works

The Wingecarribee Dam Improvement Works project commenced in November 2004 and is scheduled to be completed in March 2012. Wingecarribee Dam is classified as a 'High A' Consequence Category Dam under the NSW Dams Safety Committee guidelines. The driver of this project is therefore to meet mandatory standards relating to dam safety.

In 1998 the collapse of the upstream peat swamp into the reservoir created a floating mass of peat, which is currently restrained by a fence to reduce the likelihood of movement further towards the outlet of the Dam. Recent dam safety studies (required every five years) have shown two critical risks to dam safety. It is possible that the peat mass could move and block the spillway and radial gate, which could lead to overtopping of the dam and possible dam failure. Piping through the embankment also has the potential to occur during flood events once the dam water level rises above the Full Supply Level (FSL).

Following completion of necessary background studies investigating dam failure, the SCA prepared a business case dated 19 January 2011 which was assessed by the SCA Project Review Panel on 21 January 2011. The business case outlines options evaluated and provides economic and financial appraisal of four options. The option producing the highest NPV (Option 3) was selected for procurement.

The procurement method proposed in the business case puts forward two contracts for the design and construction of the required works. The first, for the construction of remedial works to upgrade the dam for piping failure; and the second, to restrain the peat.

Historical expenditure recorded in the AIR/SIR from 2005/06 to 2010/11 was \$1.209 million (\$real 2011/12) with \$5.200 million real budgeted for 2011/12 and \$4.829 million real forecast for 2012/13. Total expenditure included in the AIR/SIR is \$11.232 million (\$real 2011/12).

The cost estimate for the project is a P90 risk based cost estimate totalling \$11.970 million (\$2010/11), ie. \$12.342 million (\$real 2011/12) which has formed the project budget set internally by the SCA. The cost estimate included in the business case covers pre-implementation and pre-construction activities which represent 12 percent of the estimated construction costs. Halcrow notes that SCA project management costs are not visible in this estimate.

The business case states that the original estimate was conservative and a more detailed P90 estimate is \$9,842,878 (\$2010/11) excluding pre-implementation expenditure with a risk profile of 14 percent. Given pre-implementation expenditure was \$802,268 (\$2010/11) when the business case was prepared, the total forecast expenditure should amount to \$10,645,146 (\$2010/11), ie. \$10,975,145 (\$real 2011/12). This is approximately \$256,855 (\$real 2011/12) less than the amount included in the AIR/SIR.

As dam safety is a statutory requirement, the proposed works for this project are deemed prudent. It is questionable whether proposed works to date have been executed efficiently, given the project has undergone several assessments since 2004. Halcrow does, however, agree that the business case proposes a clear way forward to implementing the dam safety upgrade.

Given that the project has not yet gone to tender, the budgeted expenditure and forecast expenditure included in the AIR/SIR represent a reasonable assessment of the work required. The SCA has had ample time to prepare a business case and seek the necessary approval for expenditure in the forthcoming price path. If the forecast fails to include expenditure related to SCA program management, IPART should not allow this to be capitalised at a later time.

The SCA's proposed expenditure and Halcrow's recommended efficient expenditure are as shown in **Table B.1**.

Table B.1: Proposed Capital Expenditure – CPO186 Wingecarribee Dam Improvement Works (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)	0.115	0.136	0.611	5.200	4.823	-	-	-	-	4.823
Halcrow Forecast Expenditure Profile (\$2011/12)	0.115	0.136	0.611	5.200	4.823	-	-	-	-	4.823

B.2 CXA21 – Tallowa Dam Safety Upgrade

B.2.1 Project Description

The objective of this project, which is in its infancy, is to undertake a detailed 'Failure Mode Analysis' for Tallowa Dam, assess the significance and severity of all risks and deliver appropriate measures that would address these risks.

B.2.2 Documentation Reviewed

No documentation was available at the time of review.

B.2.3 Key Drivers and Obligations

The project has a dam safety driver (C4), which is a mandatory safety standard, to ensure the safety and reliability of Tallowa Dam and meet the requirements of the NSW Dam Safety Committee.

B.2.4 Solution Development

This project is currently in pre-definition phase. The scope and timing for the project will be developed following the completion of a similar investigation for Warragamba Dam.

B.2.5 Project Delivery

At the time of review, the reliability and risk assessment of Warragamba Dam was due to commence in 2012. A business case for this Operating Expenditure funded investigation was completed and approved in May 2011. The results of this study will inform the Tallowa Dam review.

B.2.6 Cost Estimate

As the scope of work has not yet been defined, the forecast costs and timescales summarised **Table B.2** and **Appendix C** are estimates based on engineering judgement and are of a low level of confidence.

Table B.2: Proposed Capital Expenditure – CXA21 Tallowa Dam Safety Upgrade (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)	-	-	-	-	-	-	-	-	5.024	5.024
Halcrow Forecast Expenditure Profile (\$2011/12)	-	-	-	-	-	-	-	-	2.000	2.000

B.2.7 Assessment of Prudence and Efficiency

Activity is not anticipated on the Tallowa Dam Safety Upgrade in the upcoming price path, with expenditure not forecast until 2017. Whilst the need to ensure the structural integrity and safety of Tallowa Dam is undeniable and therefore prudent, definition of the upgrade works is at a very early stage.

Halcrow considers it would be prudent to make some allowance for investigation during the upcoming price path to ensure a clearly defined scope can be costed for the next determination. Deferment of the proposed expenditure is, however, recommended as shown in **Table B.2** and **Appendix C**.

B.3 CXA31 – Heritage Program (Prospect, Warragamba, etc)

Expenditure related to the Heritage program is forecast to commence in 2016/17 (\$3.015 million (\$real 2011/12)), the final year of the forthcoming price determination period and then continues in 2017/18 (\$3.015 million) and 2020/21 (\$2.512 million). IPART has requested a high level understanding of the purpose of this expenditure.

Based on discussions with the SCA, it is understood that proposed capital expenditure relates to the

- Outlet tower and bridge in Prospect Reservoir: This tower constructed in 1888 is still used as part of current SCA operations. Works on the tower are necessary to permit Prospect Reservoir to be drained rapidly. Works are also required to remove red lead paint similar to works completed on the lower valve house. This structure is listed in under the NSW Heritage Act and is referred to in the Statement of Significance for the Prospect Reservoir and surrounding area.¹²²
- West Bank Tail Tower at Warragamba Dam. This tower has not been in operation since the 1980's. The tower has a red lead paint that needs to be removed. This item is listed in under the NSW Heritage Act and is referred to in the Statement of Significance for the Warragamba Supply Scheme.¹²³

These items are both listed in the State Heritage Register which lists heritage items of particular importance to the people of NSW. It includes items of particular importance to specific groups in the community, such as Aboriginal communities, religious groups or people with a common ethnic background. An item is listed on the Register when the Minister for Planning agrees to the Heritage Council's recommendation that it is of State heritage significance.

Part 6 of the NSW Heritage Act 1977 under Division 5 – Maintenance and Repair, lists various aspects relating to maintenance and repair of Heritage items. Minimum standards require (section 118):¹²⁴

- the protection of the building, work or relic from damage or deterioration due to weather (including such matters as the weatherproofing of roof, doors and windows);
- the prevention of and the protection of the building, work or relic from damage or destruction by fire;
- security (including fencing and surveillance measures to prevent vandalism); and
- essential maintenance and repair (being maintenance and repair necessary to prevent serious or irreparable damage or deterioration).

¹²² NSW Office of Environment and Heritage – Prospect Reservoir and surrounding area, http://www.heritage.nsw.gov.au/07_subnav_04_2.cfm?itemid=5045336, accessed 20 October 2011.

¹²³ NSW Office of Environment and Heritage – Warragamba Supply Scheme, http://www.heritage.nsw.gov.au/07_subnav_04_2.cfm?itemid=4580161 accessed 20 October 2011.

¹²⁴ New South Wales Heritage Act 1977 as at 1 October 2011, http://www.austlii.edu.au/au/legis/nsw/consol_act/ha197786/.

Expenditure on Heritage assets is therefore considered prudent as the SCA is required to maintain these assets under the NSW Heritage Act. It would be expected that the SCA would maintain a good level of understanding of their requirements under the Heritage Act and given that each of the two aforementioned assets have been the subject of several heritage investigations as listed in the NSW Environment and Heritage database.

It is not possible to determine whether expenditure related to Heritage assets is efficient as no further cost disaggregation, condition assessment or evidence demonstrating costs of work of a similar nature, was provided as part of this review. The SCA during the interviews said that the red lead paint issue has, however, been experienced on the valve house attached to the Prospect Reservoir outlet.

Given that part of the expenditure on the outlet tower in Prospect Reservoir is to maintain operations, the driver for this shouldn't entirely be attributed to meeting existing mandatory standards.

Halcrow agrees that some works are necessary under the NSW Heritage Act and it is prudent to maintain the integrity of the SCA's Heritage assets. However, given the inadequacy of the information provided and the fact that expenditure on the assets is forecast to be split between the coming price path (2012/13 to 2016/17) and the following price path (2017/18 to 2021/22), it is recommended that 5 percent (\$427,000 (\$real 2011/12)) of the entire heritage budget presented in the AIR (\$8.542 million (\$real 2011/12)) be made available to the SCA for the forthcoming price determination period. This budget will be for project management and preliminary investigations, to ensure more efficient capital expenditure planning for the 2017/18 to 2021/22 determination.

The SCA's proposed expenditure and Halcrow's recommended efficient expenditure are as shown in **Table B.3** and **Appendix C**.

Table B.3: Proposed Capital Expenditure – CXA31 Heritage Program (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Total Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)					-	-	-	-	3.015	3.015
Halcrow Forecast Expenditure Profile (\$2011/12)					-	-	-	-	0.427	0.427

B.4 CXA35 – SCARMS Expansion

B.4.1 Project Description

SCARMS (Sydney Catchment Authority Reservoir Management System) is a 3D real-time modelling tool, used to forecast changes in water quality within a reservoir. SCARMS has already been installed in Warragamba Dam and more recently at the three Shoalhaven Dams, ie. Tallowa, Fitzroy and Wingecarribee; thereby enabling the SCA to monitor water quality and adjust the point of off-take from these reservoirs and reduce the risk of a water quality incident.

The purpose of the scheme (CXA35) is to extend the coverage of SCARMS and install the technology at the Metropolitan Dams and Prospect Reservoir. The need for this scheme is driven by the increased importance of these water sources following the implementation of the Shoalhaven Transfer.

B.4.2 Documentation Reviewed

No documentation was available at the time of review.

B.4.3 Key Drivers and Obligations

The project has a discretionary water quality driver (D3), on the basis that it will enable SCA to predict changes in water quality and control which sources are utilised during water quality incidents.

B.4.4 Solution Development

This project is currently in pre-definition phase. The scope and timing for the project will be developed on the same basis as the SCARMS installations already completed at the Warragamba and Shoalhaven Dams.

B.4.5 Project Delivery

This project is forecast for delivery in 2017.

B.4.6 Cost Estimate

As the scope of work has not yet been defined, the forecast cost summarised in **Table B.4** and **Appendix C** is broadly based on the actual cost to install SCARMS at the three Shoalhaven Dams (in the order of \$1.4 million, ie. \$450,000 per dam). In the case of the Metropolitan Dams, ie. Upper Nepean, Avon, Cordeaux and Cataract, as well as Prospect Reservoir, an estimate of approximately \$2.3 million appears to be reasonable.

Table B.4: Proposed Capital Expenditure – CXA35 SCARMS Expansion (\$million)

Expenditure Profile (\$value)	2008/09	2009/10	2009/10	2010/11	2012/13	2013/14	2014/15	2015/16	2016/17	Total Forecast Cost 2012/13 to 2016/17
Forecast Expenditure Profile (\$2011/12)	-	-	-	-	-	-	-	-	2.010	2.010
Halcrow Forecast Expenditure Profile (\$2011/12)	-	-	-	-	-	-	-	-	2.010	2.010

B.4.7 Assessment of Prudence and Efficiency

Activity is not anticipated on the SCARMS extension in the upcoming price path, with expenditure not forecast until 2017. Notwithstanding this, Halcrow considers the extension of SCARMS across the SCA network of dams to be prudent and cost effective, on the basis that it will ensure continuity and reliability of supply.



Appendix C. Assessment of Capital Projects

ID	Project Title		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Forecast Projects																	
CPO218	Hydrometric Renewals Program	Actual (\$A 2011/12)	487	276	718	654	1,674	718	718	718	718	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	475 ^c	270 ^c	700 ^c	635 ^c	1,640 ^c	700 ^c	700 ^c	700 ^c	700 ^c	700 ^c	700 ^c	700 ^c	700 ^c	700 ^c	700 ^c
CPO253	Warragamba Pipeline valves and controls upgrade	Actual (\$A 2011/12)	10	-	-	-	-	502	1,005	2,010	2,010	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	10	-	-	-	-	502	1,005	2,010	2,010	-	-	-	-	-	-
CPO186	Wingecarribee Dam Improvement Works	Actual (\$A 2011/12)	17	115	136	611	5,200	4,823	-	-	-	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	17	115	136	611	5,200	4,823	-	-	-	-	-	-	-	-	-
CPX001	Warragamba E - flow investigation	Actual (\$A 2011/12)	-	-	-	-	-	710	744	219	1,005	15,073	30,146	24,117	20,098	-	-
		Halcrow (\$A 2011/12)	-	-	-	-	0 ^b	0 ^b	0 ^b	1,000 ^d	4,000 ^d	5,000 ^d	20,000 ^d	20,000 ^d	20,000 ^d	20,000 ^d	20,000 ^d
CPO272	Shoalhaven Transfers works	Actual (\$A 2011/12)	3,603	575	6	-	-	-	-	-	-	-	-	-	4,020	8,039	63,307
		Halcrow (\$A 2011/12)	3,603	575	6	-	-	-	-	-	-	-	-	-	4,020	8,039	63,307
CPO346	Metropolitan Dams Electrical system	Actual (\$A 2011/12)	-	1	-	-	-	1,005	1,005	3,618	2,914	3,015	3,115	-	-	-	-
		Halcrow (\$A 2011/12)	-	1	-	-	-	738 ^f	738 ^f	2,657 ^f	2,141 ^f	2,215 ^f	0 ^f	-	-	-	-
CPO007	Prospect Dam Improvement Works	Actual (\$A 2011/12)	108	105	192	287	598	9,245	7,135	-	-	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	108	105	192	287	598	9,245	7,135	-	-	-	-	-	-	-	-
CPO137	Burrawang Pumping Station Electrical system	Actual (\$A 2011/12)	-	1	-	-	-	502	2,010	4,020	2,010	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	-	1	-	-	-	0 ^a	2,340 ^a	3,732 ^a	1,868 ^a	-	-	-	-	-	-
CPO224	Minor Assets Renewals Program	Actual (\$A 2011/12)	645	685	1,362	1,508	1,242	1,399	1,068	1,349	1,178	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	630	670	1,335	1,480	1,215	1,370	1,045	1,320	1,155	1,200	1,200	1,200	1,200	1,200	1,200
CPX08	Upper Nepean Transfer Scheme - Upper Canal Refurbishment	Actual (\$A 2011/12)	-	-	-	342	200	7,034	10,049	10,049	2,010	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	-	-	-	0 ^a	0 ^a	2,000 ^a	8,000 ^a	8,000 ^a	2,000 ^a	-	-	-	-	-	-
CXA17	Warragamba Dam Reliability Upgrade	Actual (\$A 2011/12)	-	-	-	-	-	-	1,005	5,024	15,073	9,044	-	-	-	-	-
		Halcrow (\$A 2011/12)	-	-	-	-	-	-	0	1,000 ^d	2,000 ^d	2,000 ^d	10,000 ^d	15,000 ^d	-	-	-
CXA21	Tallowa Dam Safety Upgrade	Actual (\$A 2011/12)	-	-	-	-	-	-	-	-	-	5,024	6,029	-	-	-	-
		Halcrow (\$A 2011/12)	-	-	-	-	-	-	-	-	-	2,000 ^d	4,000 ^d	5,000 ^d	-	-	-
CXA31	Heritage Program (prospect, warragamba etc)	Actual (\$A 2011/12)	-	-	-	-	-	-	-	-	-	3,015	3,015	-	-	2,512	-
		Halcrow (\$A 2011/12)	-	-	-	-	-	-	-	-	-	427 ^d	2,801 ^d	2,801 ^d	-	2,512	-
CXA35	SCARMS Expansion	Actual (\$A 2011/12)	-	-	-	-	-	-	-	-	-	2,010	-	-	-	-	-
		Halcrow (\$A 2011/12)	-	-	-	-	-	-	-	-	-	2,010	-	-	-	-	-
CXA20	Kangaroo Tunnel Relining	Actual (\$A 2011/12)	-	-	-	-	-	-	3,015	-	-	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	-	-	-	-	-	-	3,015	-	-	-	-	-	-	-	-

Historical Projects:

CPO273	Tallowa Dam - fish passage and environmental flow works	Actual (\$A 2011/12)	8,376	23,954	1,655	48	-	-	-	-	-	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	8,376	23,954	1,655	48	-	-	-	-	-	-	-	-	-	-	-
CPO033	Upper Nepean environmental flows works	Actual (\$A 2011/12)	1,030	7,850	27,512	5,032	155	-	-	-	-	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	1,030	7,850	26,702 ^e	5,032	155	-	-	-	-	-	-	-	-	-	-
CPO222	Upper Nepean / Leonay-Emu Plains / Wallacia - groundwater works	Actual (\$A 2011/12)	12,419	5,021	360	-	-	-	-	-	-	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	8,723 ^b	5,021	360	-	-	-	-	-	-	-	-	-	-	-	-
CPO113	Warragamba Dam Crest Gates, Construction	Actual (\$A 2011/12)	6,308	10,767	10,922	8,846	766	-	-	-	-	-	-	-	-	-	-
		Halcrow (\$A 2011/12)	6,308	10,767	10,922	8,846	766	-	-	-	-	-	-	-	-	-	-

Additional Project:

CPO573	Upper Nepean Transfer Scheme - Upper Canal Replacement	Actual (\$A 2011/12)	-	720	2,058	-	-	-	-	-	-	-	15,073	15,073	40,195	150,732	301,463
		Halcrow (\$A 2011/12)	-	0 ^a	0 ^a	-	-	-	-	-	-	-	15,073	15,073	40,195	150,732	301,463

- a Majority of expenditure associated with the repair of an existing infrastructure asset (Upper Canal) to maintain current levels of serviceability; should be considered OPEX (recurrent expenditure).
- b Investigation/project scoping expenditure; should be considered OPEX (recurrent expenditure).
- c Efficiency adjustment.
- d Estimated expenditure profile in absence of defined scheme. Subject to change following completion of investigation.
- e Efficiency adjustment and adjustment to timing of expenditure proposed.
- f Adjustment primarily for prudence in respect of one component (undergrounding of overhead cables) of the proposed work.

	Item		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2013-2017
	Total Actual/Forecast Expenditure (from AIR/SIR)	Actual (\$A 2011/12)	81,956	80,333	53,812	27,164	18,669	31,497	32,877	36,627	45,883	61,049	69,875	58,814	62,751	245,297	443,309	207,934
	Total Adjustments		-3,722	-742	-2,912	-389	-971	-6,595	-3,250	-7,373	-25,113	-36,702	2,425	24,604	21,900	21,900	1,900	-79,033
	Halcrow Recommended Capital Expenditure		78,234	79,590	50,900	26,775	17,698	24,902	29,627	29,254	20,771	24,347	72,300	83,418	84,651	267,197	445,209	128,901

