WS Atkins International Ltd

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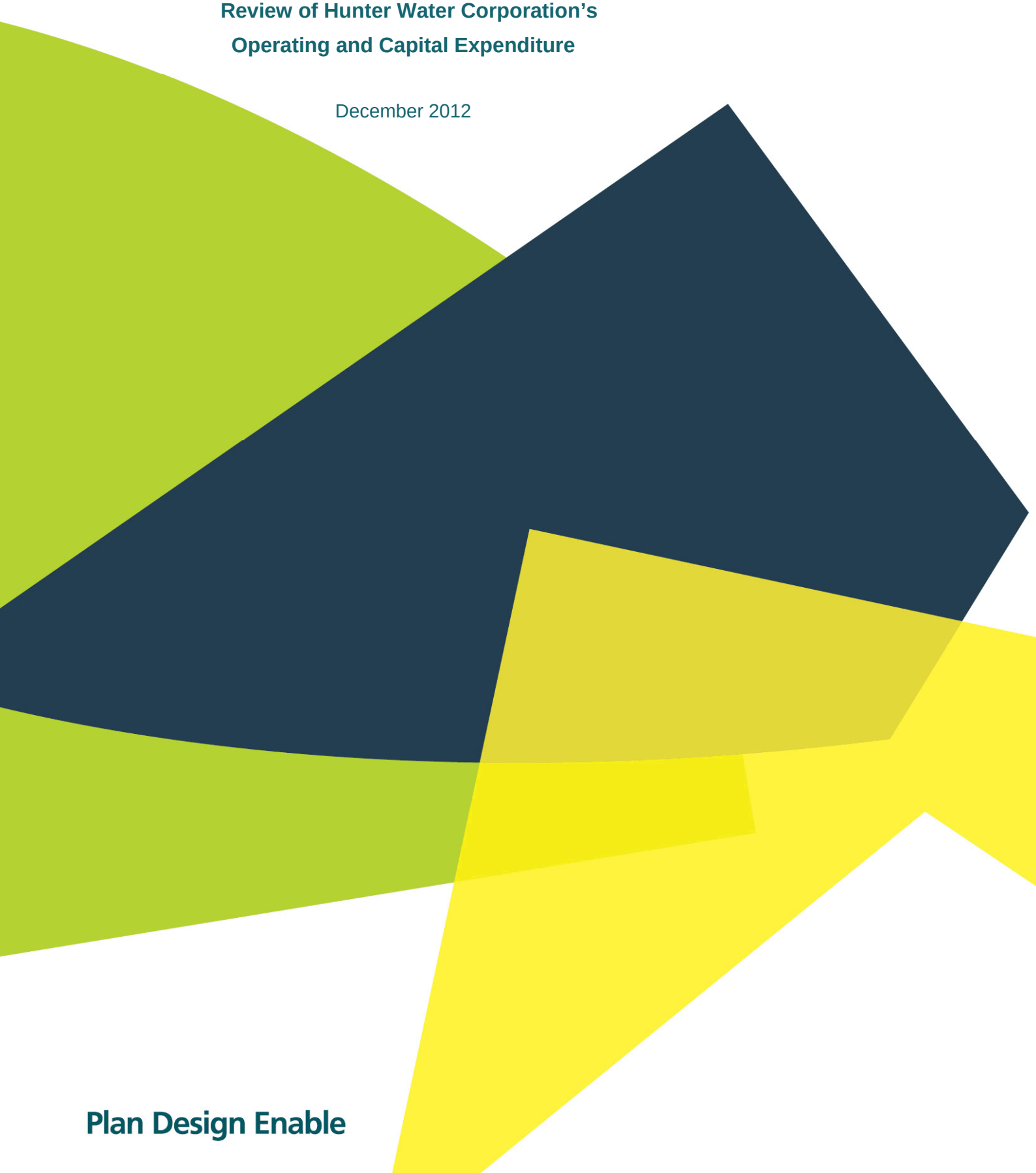
Cardno

Final Report

Review of Hunter Water Corporation's Operating and Capital Expenditure

December 2012



Plan Design Enable

Review of Hunter Water Corporation's Operating and Capital Expenditure

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Notice

This document and its contents have been prepared and are intended solely for the *Independent Pricing and Regulatory Tribunal of New South Wales (IPART)'s* information and use in relation to the *Detailed Review of Hunter Water Corporation's Operating and Capital Expenditure (2012).*

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Contents

Appendices B and D contain information that is commercial in confidence to Hunter Water.

IPART has removed the appendices from the report.

Glossary

Term	Definition
ABC	Activity Based Costing
ACF	Asset Creation Framework
ADWG	Australian Drinking Water Guidelines (2011), National Health and Medical Research Council and Agriculture and Resource Management Council
AHANA	Asset Hierarchy and Numbering Approach
AIR	Annual Information Return
AMS	Asset Management System
ANZECC	Australia and New Zealand Environment and Conservation Council
AOC	Actual Outturn Cost
AOMS	Asset Operation Management System
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
BASIX	Building Sustainability Index
BOD	Biochemical Oxygen Demand
Capex	Capital Expenditure
CCTV	Closed Circuit Television
CEO	Chief Executive Officer
CHAIR	Construction Hazard Assessment Implication Review
CMS	Customer Management System
CPI	Consumer Price Index
CRC	Current Replacement Cost
CRM	Customer Relationship Management
CTGM	Chichester Gravity Trunk Main
Determination	The price limits set by a regulator
DSP	Developer Service Plans
EDRS	Engineering Data Reporting System
ELL	Economic Level of Leakage
EMS	Environmental Management System

Term	Definition
EP	Equivalent Population
EPA	Environmental Protection Authority
ERP	Enterprise Resource Planning
ESD	Ecologically Sustainable Development
EWON	Energy and Water Ombudsman NSW
FTE	Full Time Equivalent
GIS	Geographical Information System
HACCP	Hazard Analysis and Critical Control Points
HWA	Hunter Water Australia
HWC	Hunter Water Corporation
ILI	Infrastructure Leakage Index
IPART	Independent Pricing and Regulatory Tribunal
IRP	Integrated Resource Planning
iSDP	Integrated Supply – Demand Planning
ISF	Institute of Sustainable Futures
ISO	International Organisation for Standardisation
IWA	International Water Association
KPI	Key Performance Indicator
LCD	Litres per capita per day water consumption
LHWP	Lower Hunter Water Plan
M&E	Mechanical and Electrical
MARS	Management of Assets, Resources and Systems
MCA	Multi-Criteria Analysis
MEERA	Modern Engineering Equivalent Replacement Asset
MLD	Megalitres per Day
MOU	Memorandum of Understanding
NATA	National Analytical Testing Authority
NHMRC	National Health and Medical Research Council
NOW	NSW Office of Water
NPV	Net Present Value
NSW	New South Wales

Term	Definition
NSW Health	NSW Department of Health
NWI	National Water Initiative
OEH	Office of Environment and Heritage
OFWAT	The Office of Water Services, United Kingdom
OGC	Office of Government Commerce (United Kingdom)
OH&S	Occupational Health & Safety
Opex	Operating expenditure
P_{50}	50th Percentile
P_{90}	90th Percentile
PDPs	Project Development Plans
PP	Price path
price control period	The period over which price limits are determined
price path review	The review of price limits for the price control
PSP	Priority Sewerage Program
R&D	Research & Development
RAB	Regulated Asset Base
RFP	Request for Proposals
RWQMP	Recycled Water Quality Management Plan
RWQMP	Recycled Water Quality Management Plan
SCADA	System Control and Data Acquisition
SCI	Statement of Corporate Intent
SIR	Special Information Return
SOP	Standing Operating Procedure
SWIMS	Sewer and Water Information Management System
TAG	Technical Advisory Group
TOC	Target Outturn Cost
TSS	Total Suspended Solids
WELS	Water Efficiency Labelling Standards
WERF	Water Environment Research Foundation
WES	Water Efficiency Standards

Term	Definition
WSAA	Water Services Association of Australia
WTW	Water Treatment Works
WWTW	Wastewater Treatment Works

Notes:

1. All monetary values in the text are real figures to a 2012/13 price base unless noted otherwise. All values are in Australian dollars.

2. Reference to a year in the text means the financial year 1 July to 30 June unless noted otherwise. Our convention is to reference the financial year 2012/13 as 2013 and so forth.

3. References to the 'current price path' meant he period from 2010 to 2013.

4. References to the 'future price path' mean the period from 2014 to 2017 with year 2018 also shown as the price path period has yet to be determined.

5. Values in tables may not sum to the total stated due to rounding.

Executive Summary

This report presents the findings of our review of the capital and operating expenditure for the regulated services of Hunter Water Corporation. It addresses the prudent and efficient expenditure in the current period from 2010 to 2013 and for the future period 2014 to 2018.

We have based our findings on the submission, and the annual and special information returns presented to IPART by Hunter Water Corporation. We undertook the review in two stages. The Stage 1 Review covered the long term investment plan and asset management process. Stage 2 focused on the assessment of operating and capital efficiencies and included the five days of structured interviews with the Agency General Managers and staff, information provided by the Corporation and responses to subsequent written questions. We reviewed functional activities and a representative number of capital projects in the current and future price paths.

Our view of efficiency is based on the concept of a Frontier Company competing in an open market where it has strong internal cost controls. The Frontier Company will continue to seek efficiencies from technological development and innovation. Other companies or agencies will seek greater efficiencies to catch up with the Frontier Company. This concept has been applied in previous efficiency reviews of Hunter Water in 2004 and 2008, Sydney Water in 2004, 2008 and 2012 and for State Water in 2009. The concept has also been used by Ofwat, the water sector economic regulator in England and Wales.

Context of Hunter Water's Submission

Hunter Water advised us of the key issues underlying its submission. The increasing debt level has focused the need to reduce capital expenditure in the future price path from $642m in the April 2012 proposal to $350m. The approach to a capital constrained program has focused the business on the risks of continuing to deliver performance against the Operating Licence and the EPA discharge contents. The focus on operating expenditure has been to propose challenging efficiencies over the future price path.

This context has not changed our approach to the assessment of efficient and prudent expenditure but has required us to look carefully at the impact of these reductions on the continuing ability of Hunter Water to deliver with reasonable certainty against its Operating Licence and EPA requirements. There is a greater focus on the ability of Hunter Water to manage the risks of asset failure and limit the impact on customers and the environment within the parameters of the Licence and consents. We also sought assurance that assets are not being consumed to detriment of future generations.

Strategic Review

Hunter Water has a long term capital investment strategy which sets out investment needs for the five year, ten year and longer term horizons. This has been prepared using its integrated planning framework including strategies, studies and asset lifecycle plans. There are inevitable uncertainties in long term planning which may result in changes but these can be taken into account in the planning scenarios. We found that Hunter Water's planning framework is integrated and the short term program is consistent with the longer term strategies. The recent reduction in capital expenditure proposals for the short term still needs to be worked through this long term planning process to determine its impact on the long term program.

Constrained funding is focusing the organisation on implementing an efficient capital investment strategy. We found that the supporting processes for this strategy including costs estimating, options analysis, gateway reviews, value management and risk management are well developed.

Hunter Water is aware of the increased risks associated with the reduced capital investment. The inherent risks associated with each project have been estimated and a qualitative assessment undertaken of the most likely risks that will need to be managed. Strategies to mitigate these residual risks are under

development. We were advised that risks would be managed through a holistic asset management and catchment management approach.

Asset Management

Hunter Water has a tradition of investing in asset management initiatives and continues to seek improvements in its asset management processes. Its asset management framework is comprehensive and supporting risk management processes are well developed. We note that a number of documents including the Asset Management Policy were still in final draft form and require finalization. A major weakness is the dispersed nature of the asset management information systems. The upgrade of Ellipse and migration of AOMS data into Ellipse should improve the efficiency and effectiveness of its information management.

Asset condition information has been assessed for a range of assets although the extent of information on water and wastewater pumping stations and treatment plants is limited.

Processes for linking asset management decisions with current and future levels of service and performance requirements are quite well developed and comparable to other major Australian water utilities. Further work is needed to model likely risk profiles of various asset classes, particularly water mains and pumping stations, over time based on level of investment.

While Hunter Water performs well against its Operating Licence, the performance of its infrastructure when compared against other larger Australian utilities can only be considered as fair. As a result of the constrained capital expenditure program it is likely that Hunter Water's performance relative to other major utilities will decline for indicators such as water main breaks, frequency of unplanned interruptions and sewerage main breaks and chokes, assuming that current trends continue in these utilities.

Processes for estimating service demand have been refined through the development of the Growth mapping tool and the iSDP end-use model. This indicates a significantly lower rate of growth than previous forecasts and has an impact of capital expenditure.

Currently, Hunter Water is adopting the *Aquamark* benchmarking tool, with the asset management framework, plans and strategies aligned. Over the next four years, Hunter Water proposes to review the new International Standard for Asset Management ISO 55000 and will consider adopting the standard with the next Operating Licence. We consider that Hunter Water's asset management framework already broadly aligns with the draft requirements of ISO 55000.

Capital Delivery Processes

From our review we concluded that Hunter Water has well developed capital delivery processes which have been refined since the last review. These processes should provide a basis for an efficient approach to capital investment.

Options analysis is appropriate and includes multi-criteria and financial analyses; assumptions are transparent. The cost estimating process has been improved over recent years.

Processes are in place for robustly challenging the need for expenditure, for example review groups and Gateway Reviews. The recently developed portfolio management process is considered leading practice.

We concluded that there is potential to derive further efficiencies through the cost estimating process and the selection of a procurement approach which is appropriate to the nature of the works planned and the sharing of risks with contractors. We consider the experience of the Hunter Water Alliance and the scope for bundling work should deliver further efficiencies. Hunter Water has assumed further efficiencies relating to scope and costs which we discuss in Section 7.

Performance

Performance is assessed though the Operational Licence measures and compliance with the EPA discharge consent licences. Performance against the Operating Licence standards in the current price path

has been well below the reference levels. Similarly, performance against EPA discharge consents is good except for two works where process upgrades are currently underway. This performance headroom allows a lower level of expenditure to be considered.

We concluded that reduced investment in mains renewals will have an impact on reticulated water main failures although, this is unlikely to result in failure against the Operating Licence in the future price path as there is adequate headroom between actual and Licence performance, as shown in Figure 1. . There is still a risk that any major trunk main break could cause failure against the Operating Licence standard. There will be some increase in risk as a result of the constrained capital expenditure.

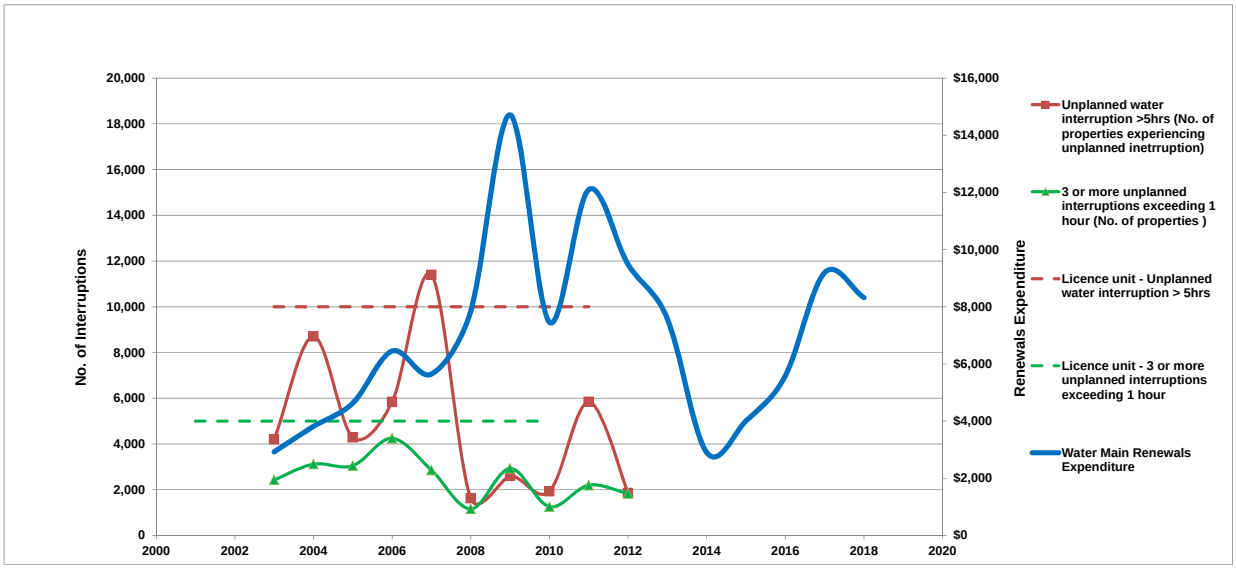


Figure 1 Water Main Renewals Expenditure and Service Interruptions

We concluded that reduced investment in sewer mains renewals is unlikely to have a significant impact on the number of dry weather sewer overflows in the future price path providing recent climatic conditions continue and the Hunter region does not experience a major drought. This is shown in Figure 2.

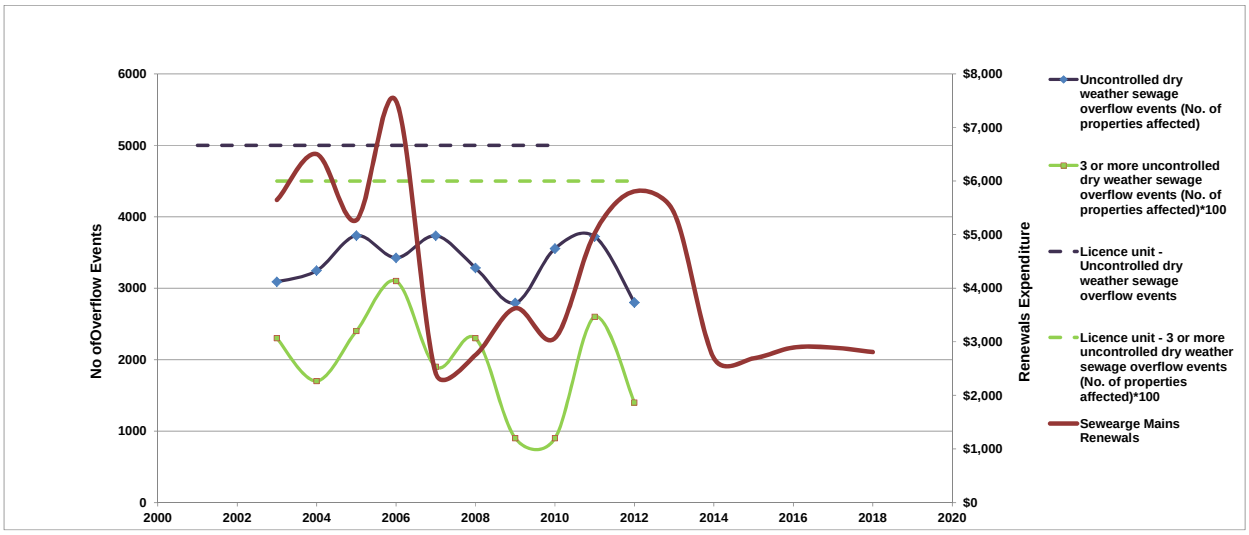


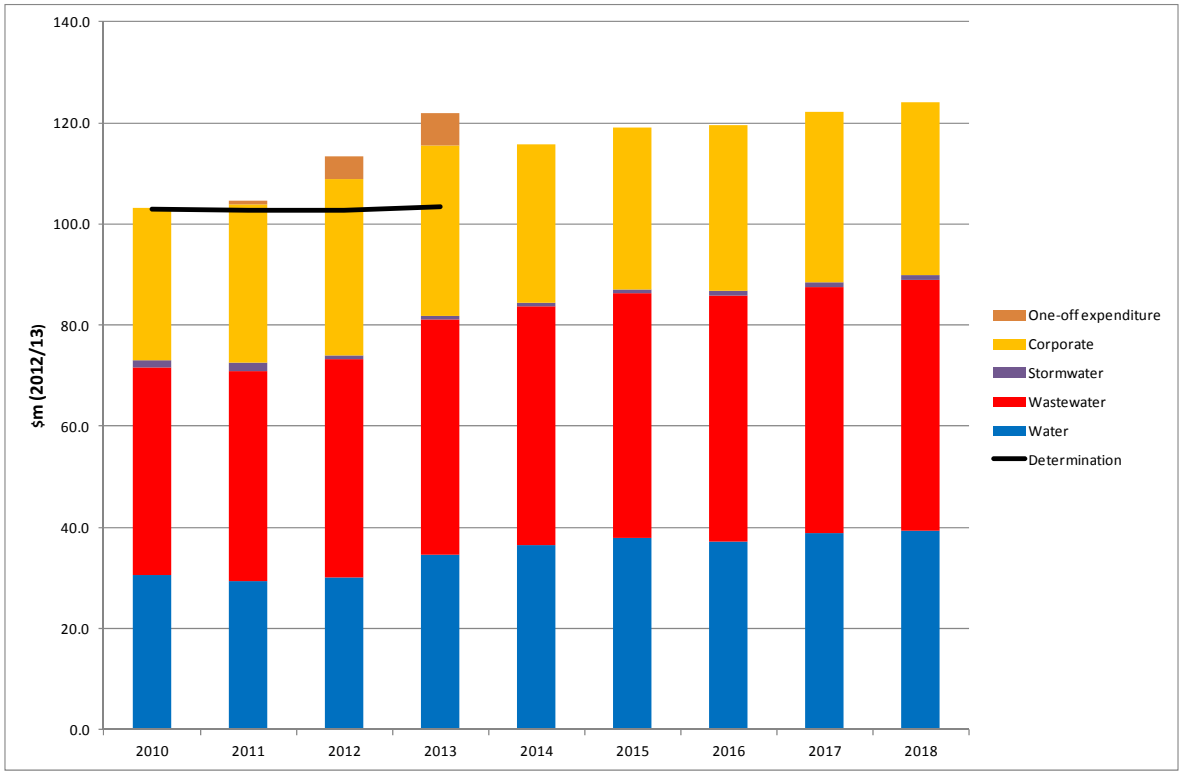
Figure 2 Sewerage Mains Renewals Expenditure and Dry-Weather Overflow Events

Further work is needed to develop the relationship between expenditure and performance. The current headroom allows this relationship to be developed and tested over the future price path. There is still a risk of low frequency and high consequence failures such as on large diameter trunk mains.

We recommend that Hunter Water should have detailed contingency plans in place to mitigate against risk of failure for low frequency but high consequence events.

Operating Expenditure

Hunter Water's actual performance over the current and future price path and a comparison with the 2009 Determination is shown in Figure 3. The increase in the 2012 and 2013 expenditure is due mainly to expenditure driven by one-off external requirements including the Lower Hunter Water Plan (LHWP) which winds out in 2014.



Source: HWC Submission

Figure 3 Hunter Water Actual and Proposed Operating Expenditure 2010 to 2018

Performance in the Current Price Path

Hunter Water has performed well against the Operational Licence targets with performance in 2012 being 25% of low pressure reference level, 20% of the interruptions reference level and 56% of the dry weather sewage overflow measure. While this is a spot view of performance, it is indicative of the headroom achieved over the current price path. There is still a risk of low frequency but high consequence events impacting on this performance as discussed above.

Operating Expenditure in the Current Price Path

Increased expenditure in 2012 and 2013 is due in part to one-off external drivers, external cost pressures such as electricity and reallocation of some expenditure into the regulated business. Expenditure in 2013

is a forecast value and we formed the view that this is likely to outturn below budget mainly due to the current level of labour vacancies.

The 2009 Determination set a challenging efficiency target including Hunter Water's own efficiencies. Hunter Water has reported efficiencies in the current price path including restructuring and corporate labour reductions, demand management costs and reactive maintenance fieldwork amounting to $13.4m over the period. When we take the additional external and Shareholder cost drivers and the likely lower outturn for 2013, total expenditure is generally consistent with the 2009 Determination.

The efficiency of expenditure on spoil removal ($2.0m) and water treatment residuals ($1.1m) has not been demonstrated and we note that further studies and investigations are planned for the future price path to identify minimum total cost solutions. Unaccounted for variance is a balancing item which reflects other cost pressures which Hunter Water explains in general terms within the Submission.

We have identified expenditure specifically related to Tillegra. The expenditure is $0.4m for property maintenance and a land use strategy for the Tillegra land holdings. This is considered as a one-off expenditure and has not been continued into the future price path. We do not consider this as prudent expenditure within the core business

We conclude that actual operating expenditure in the current price path is efficient and prudent. This is on the basis of the information we have seen and subject to the exceptions for spoil and waterworks residuals.

Operating Expenditure in the Future Price Path

Hunter Water's proposed operating expenditure is shown by product in Table 1 below. We have identified one-off expenditure in 2013 separately when drawing comparisons.

HUNTER WATER CORPORATION FUTURE PRICE PATH - OPEX							
($m 2012/13)	2013	2014	2015	2016	2017	2018	Total Price Path
HWC Proposed Expenditure							
One-off expenditure (1)	6.6	0.0	0.0	0.0	0.0	0.0	
Water	34.6	36.4	37.9	37.1	38.8	39.3	150.3
Wastewater	46.5	47.2	48.3	48.8	48.8	49.6	193.0
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	32.7	33.7	34.3	129.7
Total opex in Regulated Business	**122.0**	**115.8**	**119.1**	**119.5**	**122.1**	**124.1**	476.4
1: One-off expenditure comprises the Lower Hunter Water Plan, Tillegra lands and buildings and development of a credit and hardship program							

Table 1 Hunter Water Future Price Path Operating Expenditure (Source HWC AIR)

Hunter Water has taken a proactive approach to identifying cost savings across the business in the future price path. Hunter Water has explained that continuing cost increases are a total $28.0m driven by labour-related costs, rising electricity and carbon costs which are mainly uncontrollable, and controllable costs including wastewater operations, maintenance and water strategies and treatment. To offset these increases, Hunter Water has proposed efficiencies of a total $19.6m over the period with the greater part related to vacancy management, electricity optimisation and operational improvements.

We have applied a continuing efficiency of 0.25% per annum on controllable costs in base operating expenditure. Examples of continuing efficiency include opportunities from the implementation of upgraded business systems such as Ellipse and greater penetration of the activity based costing processes which drive efficiency. This continuing improvement element of efficiency relates to the increased productivity derived from process innovation and new technology that all well performing businesses should achieve. We have assumed that controllable costs are 50% of the base operating costs.

We noted that a significant element of catch-up efficiency on base expenditure relates to labour salaries and wages from managing a defined vacancy rate. This is evident from 2012 and continues through the future price path. These efficiencies should be considered as part of the catch-up efficiency in the current

price path. Other efficiency proposals are in areas of the business where we agree there is scope for catch-up efficiencies. We have therefore accepted these areas of catch-up efficiency for the future price path and have made no further adjustments.

In the additional expenditure proposed by Hunter Water we have identified opportunities for further cost savings, or inclusion in base operating expenditure, these areas of expenditure relate to:

- Marginal cost reductions from reduced water production;
- Additional wastewater treatment operations costs not market tested;
- Electrical and mechanical maintenance costs;
- Excavated spoil disposal;
- The cost of compliance with drinking water guidelines for turbidity; and
- Elements of Strategies and Studies.

We consider that Hunter Water should not constrain capital expenditure for projects to deliver operating expenditure savings where there are total cost reduction benefits. Examples of such initiatives include energy optimisation and on-site generation, water treatment residual s thickening and disposal and biosolids disposal. We have identified outputs from these initiatives in Section 9 Outputs.

We recommend an efficient operating expenditure for the period 2014 to 2018 as shown in Table 2.

($m 2012/13)	2013	2014	2015	2016	2017	2018	Total 2014 to 2017
HWC Proposed Expenditure							
One-off expenditure	6.6	0.0	0.0	0.0	0.0	0.0	
Water	34.6	36.4	37.9	37.1	38.8	39.3	150.3
Wastewater	46.5	47.2	48.3	48.8	48.8	49.6	193.0
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	32.7	33.7	34.3	129.7
Total opex in Regulated Business	**122.0**	**115.8**	**119.1**	**119.5**	**122.1**	**124.1**	476.4
Atkins Cardno Specific Adjustments to Hunter Water additional costs above the 2013 base							
HWA additional wastewater costs (+4.5m)	0.00	-0.40	-0.40	-0.40	-0.40	-0.40	-1.6
Elec/ mech maintenance (+2.1m)	0.00	-0.25	-0.25	-0.25	-0.25	-0.25	-1.0
Spoil disposal (+$1m one-off in 2013)	0.00	-0.75	-0.75	-0.75	-0.75	-0.75	-3.0
ADWR turbidity (+$2.1)	0.00	-0.25	-0.25	-0.25	-0.25	-0.25	-1.0
Strategies and Studies (+$3.2m)	0.00	-0.15	-0.15	-0.15	-0.15	-0.15	-0.6
Corporate reverse recycle overheads	0.00	0.00	0.00	0.30	0.30	0.30	0.6
Pre-feasibility studies to lever efficiencies	0.00	0.20	0.20	0.20	0.20	0.20	0.8
Total opex adjustments	**0.00**	**-1.60**	**-1.60**	**-1.30**	**-1.30**	**-1.30**	-5.8
Atkins Cardno adjustment for marginal cost of reduction in demand							
Marginal water costs	**0.00**	**-0.15**	**-0.15**	**-0.15**	**-0.15**	**-0.15**	-0.6
Application of Atkins Cardno operating efficiency targets to base expenditure							
Continuing Efficiency adjustment	**0.00**	**-0.14**	**-0.30**	**-0.45**	**-0.61**	**-0.78**	-1.5
Atkins Cardno Recommended Efficient Operating Expenditure							
Water	34.6	35.7	37.1	36.3	37.8	38.3	146.9
Wastewater	46.5	46.0	47.0	47.4	47.4	48.1	187.9
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	33.0	34.0	34.6	130.3
Recommended Efficient Operating expenditure	**115.4**	**113.9**	**117.1**	**117.6**	**120.0**	**121.9**	468.5

Source: Atkins Cardno Analysis

Table 2 Atkins Cardno recommended level of operating expenditure

Capital Expenditure Long Term Trends

Figure 4 illustrates Hunter Water's proposed capital expenditure since 2000 and its projected expenditure to 2022. The Figure shows that expenditure in the current price path was significantly greater than previous years. Hunter Water's proposed capital expenditure (12-13 SCI) shows a return to pre-2009 levels of investment.

We concluded that this analysis provides comfort that proposed expenditure in the future price path will be at a similar level as the period 2005 to 2009.

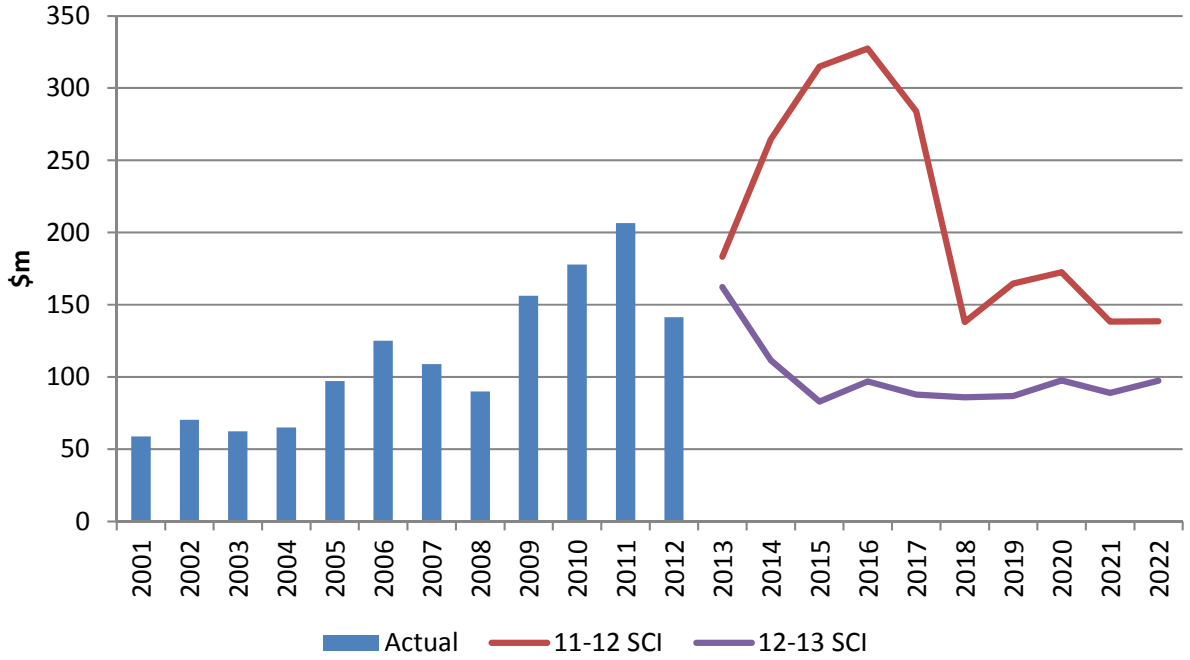


Figure 4: Total Capital Expenditure 2001 to 2022 ($2012/13) (Source: HWC modified to $12/13)

Capital Expenditure 2010-18

Hunter Water's actual and planned capital expenditure over the period 2010 to 2018 is shown in Figure 5. For the current period 2010 to 2013, actual and forecast expenditure is compared with the IPART 2009 Determination. Actual expenditure is to 2012; year 2013 is forecast. The forecast expenditure for the period 2014 to 2018 is also shown.

Actual expenditure peaked in 2012 but then fell below the Determination. Actual expenditure for the current price path is $13m above the Determination, after Tillegra expenditure and write-offs are excluded. Future expenditure from 2013 shows a reducing trend consistent with the Hunter Water proposal to maintain an average $75m/a expenditure over the future price path.

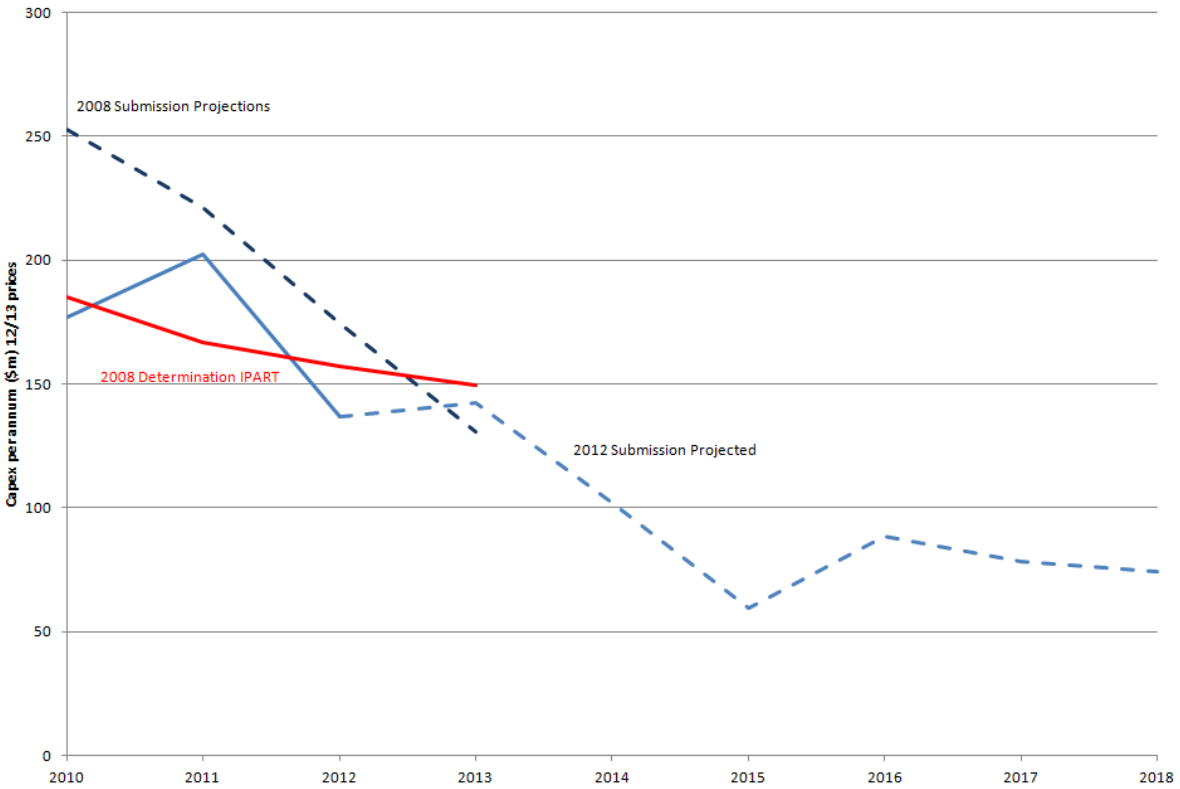


Figure 5: Total Capital Expenditure 2010 to 2018 (excluding Tillegra dam and recycled water)

(Source: SWC SIR and Atkins/Cardno Analysis)

Capital Expenditure in the Previous Price Path

We have compared actual expenditure in 2009, the last year of the previous price path, as reported in the SIR with the allowed expenditure as set out in Table 7.4 of the 2009 Determination[1]. In the Determination we reduced forecast capital expenditure in 2009 because we questioned the achievability of a significant increase in capex for the year. Capital expenditure on the wastewater service was under-achieved against the Determination. Water service expenditure was above Hunter Water's own estimate.

We recommend that the RAB for this price path period should be increased from $131.4m to $133.3m.

Capital Expenditure in the Current Price Path

Hunter Water's total expenditure was marginally above the Determination when expressed in real terms, with all expenditure to a 2013 base. Figure 6 shows expenditure by service over the period 2008 to 2012 and compared actual expenditure against Determination.

[1] Review of prices for water, sewerage, stormwater and other services for Hunter Water Corporation, IPART 2009

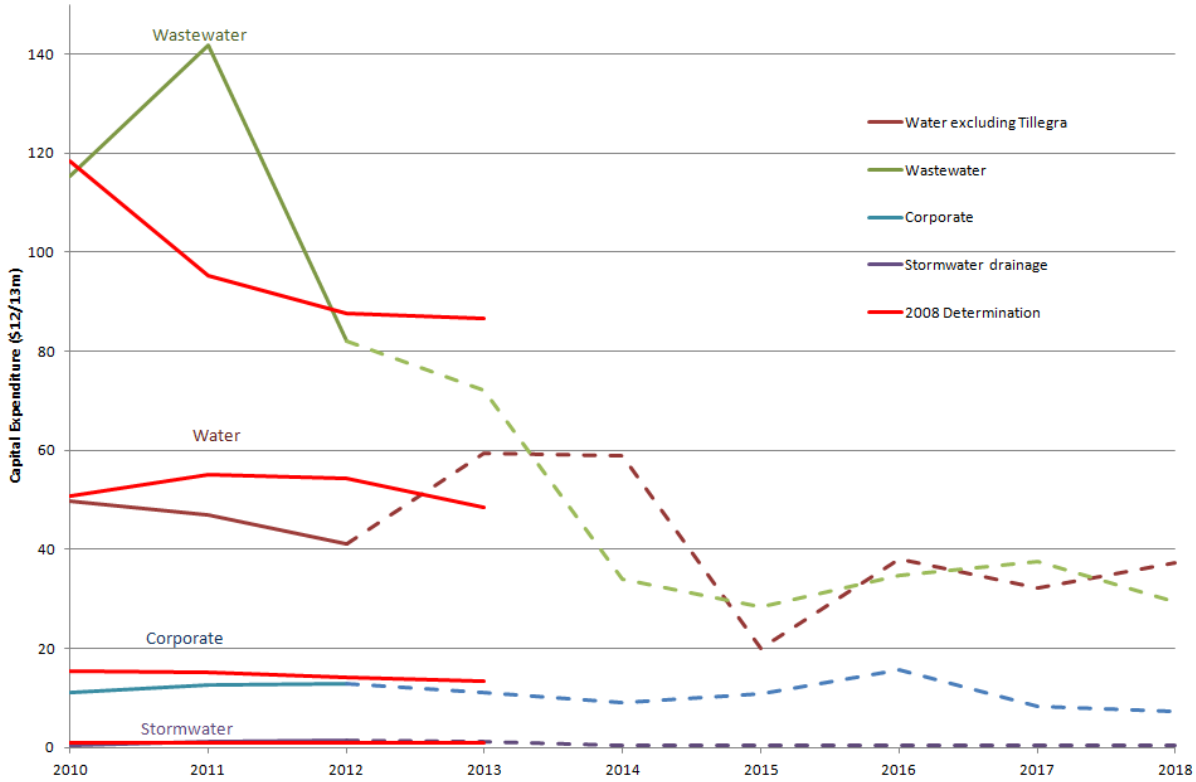


Figure 6: Expenditure in the Current Price Path by Service

Solid lines are actual figures, while dashed lines are forecast figures for the Submissions in 2008 and 2012. The chart shows forecasts made for the 2013 and also for the 2014-18 price path. Year 2013 is an estimate and shows a significant increase in the water service and reducing expenditure in the wastewater service. The reasons for these variances have been explained; however, it would be appropriate to revisit the actual expenditure in 2013 as part of the next efficiency review.

The most significant variation in expenditure by service is the material reduction of investment in the wastewater service. This is understood to be largely as a result of the major improvements made to the treatment works over the last ten years or so to address environmental and growth drivers.

The IPART brief requires us to comment on the efficiency and prudence of capital expenditure in the current price path. The prudence test relates to how decisions are made on the basis of information available at that time and how the investment was executed.

We formed the view that, on the basis of our review of sample projects and with one exception, expenditure in the current price was prudent. The one exception is the MARS project where there has been significant investment on a new IT system which subsequently was not progressed. The benefits of some of this investment have been used in a number of projects including AHANA, field computing and GIS implementation. Other activities included in the MARS project are being used as a basis for implementation of the ERP Upgrade. Hunter Water has written off $0.58m but has not accounted for a further $0.29m. Consequently we consider that $0.87m expenditure is not prudent.

There was evidence of cost overruns at several of the wastewater treatment plants which we attribute to shortcomings in cost estimating. Delivery of this wastewater treatment upgrade program as carried out

through the Hunter Water Alliance was appropriate and a number of benefits had been realised from this approach. Our review found that the processes supporting capital investment generally followed those outlined in Section 5. Supporting documentation was readily available which suggests that mature processes are in place and are followed corporately. We observed that a range of options were considered in the planning process and lifecycle costs and risks used to determine the optimal solution. Procurement processes appear to be appropriate for the type of program or project being implemented. Hunter Water adopts a range of project delivery approaches in delivering its capital investment program.

Expenditure by purpose showed that maintaining existing standards and new standards expenditure and business efficiency were above the Determination while there was a significant reduction in planned growth expenditure where the anticipated new developments have slipped because of lower demand. The reallocation of expenditure to existing standards is appropriate although we would caution that customers should not be asked to fund growth twice. This means that underspend on growth should not be considered as available for other drivers without sufficient tests and controls. With a constrained capex program, growth capex not expended should be banked for a future price period.

The 2009 Determination set an efficient level of expenditure for delivery of performance and outputs over the price path. Comparison against actual expenditure indicates that Hunter Water has spent $0.5m above the Determination. Given that there has been under-delivery of outputs, particularly to meet growth which has been deferred to future price paths, we consider an element of the over-expenditure is not efficient. We found that $0.3m, half of the net overrun of expenditure above the Determination, is not efficient.

We recommend an efficient and prudent value of capital expenditure for the current price path as shown in Table 3. This shows the adjustments applied to actual expenditure to derive the recommended efficient level of expenditure.

HUNTER WATER CORPORATION - EFFICIENT EXPENDITURE IN CURRENT PRICE PATH					
($m 2012/13) year actual expenditure	2010	2011	2012	2013	2010-13 Total
Water (excl Tillegra)	49.8	46.9	41.0	59.4	197.1
Wastewater	115.3	141.9	82.1	72.2	411.6
Stormwater	0.4	1.0	1.4	1.1	4.0
Corporate	11.4	12.6	12.5	9.7	46.1
Total actual expenditure	176.9	202.4	137.0	142.5	658.9
Atkins/Cardno Recommended Adjustments					
Atkins/Cardno Recommendation: MARS project non-prudent expenditure (corporate)		-0.4	-0.4		-0.9
Atkins/Cardno Recommendation: ERP adjustment (corporate)			-0.7	3.1	2.4
Atkins/Cardno Recommendation: inefficient expenditure	-0.1	-0.1	-0.1	-0.1	-0.3
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE					
Water (excl Tillegra)	49.8	46.9	41.0	59.4	197.1
Wastewater	115.3	141.8	82.1	72.2	411.4
Stormwater	0.4	1.0	1.4	1.1	4.0
Corporate	11.4	12.1	11.4	12.8	47.7
Total efficient expenditure	176.9	201.9	135.8	145.5	660.1

Source: HWC Submission and Atkins Cardno analysis

Table 3 Atkins/Cardno Recommended Efficient and Prudent Expenditure in the Current Price Path

Capital Expenditure in the Future Price Path

We have reviewed Hunter Water's processes for preparing and delivering capital projects and have examined specific projects to confirm how these processes are applied.

We have carried out an assessment of potential continuing and catch-up efficiencies to reflect investment planning, the cost estimating process and procurement. The efficiencies imposed on the capital expenditure by Hunter Water, at an average of 10.8%, are greater than those suggested by the frontier company method. As such we have adopted Hunter Water's suggested capital program, subject to a number of adjustments set out beloww to reflect known errors, cost classification and phasing of outputs in specific programs or projects.

In discussions with Hunter Water, we formed the view that the decision by the Hunter Water Board in July 2012 to constrain capital expenditure required a more detailed assessment of the scope and timing of these projects. We suggest that the there is scope for further risk assessment work to examine the scope and phasing of these critical projects. Hunter Water has stated that if unforeseen problems arise then they will need to re-prioritise the capital expenditure program. We formed the view that Hunter Water has processes in place to allow it re-prioritise capital expenditure in response to unforeseen events. Hunter Water is also upgrading its Enterprise Resource Planning (ERP) system to allow it to more readily identify asset performance issues and better target its maintenance expenditure.

We consider that Hunter Water has set itself a challenging target but that it should be achievable. Figure 4 shows that Hunter Water's forecast capital expenditure (in real terms) is returning to pre-2009 levels. Figure 7-15 shows that renewals expenditure as a percentage of current replacement costs has been relatively stable since 2005. These factors provide us with some added reassurance that Hunter Water's proposed expenditure forecasts while challenging are not unrealistic.

We recommend that the business continues to strengthen its understanding of the associated risks and further expand and develop risk mitigation plans and investment prioritisation where appropriate. This is In order to ensure that the risks of non-compliance Licence requirements and discharge consents are minimised. The response to risk management could be through operational modifications or capital investment. We consider that Hunter Water has the capability and flexibility to research and develop leading practice in the area of risk management and in investment prioritisation in response to the constrained capital expenditure.

In addition, Hunter Water should not constrain capital expenditure for projects to deliver operating expenditure savings where there are benefits total cost reductions. We recommend that Hunter Water uses $1m of the capital efficiency savings towards studies to identify operating expenditure reduction in the subsequent price path. Progress should be reported at appropriate intervals to IPART. We question the ability to deliver the level of efficiencies proposed in 2014 and 2015 because of the extent of committed expenditure under construction or tendered. With a greater part of expenditure for 2016 and 2017 these efficiencies should be achieved. Given that there is a prudence test for expenditure at the next price review, Hunter Water should look to fund any shortfalls in planned efficiency gains. In order to ensure that compliance is not unduly affected we consider that it will be essential for the business to continue to strengthen its understanding of the associated risks and further expand and develop risk mitigation plans where appropriate.

We show in Table 4 below the capital expenditure proposed by Hunter Water, the adjustment we have made and our findings on the level of efficient capital expenditure for the future price path.

We recommend the following adjustments made to Hunter Water's post-efficiency capital expenditure:

- Rephasing of $1.8m of backlog sewer schemes costs in 2016-17 and $1.0m in 2017-18 within the wastewater service into the post 2018 price path as we consider it unlikely that that many of the infill projects will be implemented in the four year period;

- Removal of the Kooragang Island expenditure from the water service capital expenditure as it is dealt with separately as a RAB adjustment (see Chapter 8 below);
- Reduction of $7.4m to the allowance for water service "growth" expenditure in 2018 as we understand that Hunter Water has assigned the expenditure for a number of schemes to this year which it considers, in reality, may happen at some point over a four year period starting from 2018;
- Rephasing the Hunter River Tunnel Replacement forward for completion in June 2015 rather than the proposed June 2017. We agree with Hunter Water that this is a critical investment for the next price path. Given the high risk associated with this asset and the long-term duration of customer impacts while a replacement asset is constructed, it would be preferable that this investment is undertaken as originally programmed;
- Hunter Water has advised that the most recent estimate for the HV upgrade shows an increased expenditure in the next price path of $2.4m. We have included this adjustment;
- Rephasing of the Muninbung Creek rehabilitation forward to 2016/17 and 2017/18 with$0.9m allocated in each year. Customer complaints are likely to continue. Deferring two major stormwater projects for 10 years to 2026 could be considered as transferring today's costs to future generations. The cost is not significant and will continue to allow Hunter Water to continue its stormwater capital expenditure at similar levels to previous years; and
- Rephasing forward of the expenditure on the ERP and reducing forecast expenditure from $8.7m to $8.1m.

In the case of non-critical mains replacement we consider that the rate adopted was too high in comparison to that achieved in the current price path. We have adjusted the output measure for this program from 18km to 21 km.

We recommend an efficient value of capital expenditure for the future price path as shown in Table 4. This includes the adjustments and efficiencies that we explain above and in Section 7.

HUNTER WATER CORPORATION PROPOSAL - CAPEX - COMPANY LEVEL							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Water	58.8	20.0	38.0	32.2	37.3	148.9	186.2
Wastewater	34.1	28.4	34.7	37.5	29.3	134.7	164.0
Stormwater	0.4	0.4	0.4	0.4	0.4	1.4	1.8
Corporate	8.7	7.8	15.5	8.2	7.3	40.3	47.6
Total	101.9	56.6	88.5	78.3	74.3	325.4	399.7
Atkins/Cardno recommended adjustments for specific programs or projects							
Reallocation: remove Kooragang RWS (Water)	-26.1					-26.1	-26.1
Rephase Hunter River Tunnel Replacement (Water)	2.8	6.5	-2.8	-6.5		0.0	0.0
Additional HV expenditure (Water)	2.2					2.2	2.2
Deferaal of 2018 "growth" expenditure (Water)					-7.4	0.0	-7.4
Rephase backlog sewers (Wastewater)				-1.8	-1.0	-1.8	-2.8
Additional HV expenditure (Wastewater)	0.2					0.2	0.2
Bring forward Muningberg Scheme (Stormwater)				0.9	0.9	0.9	1.8
Rephase ERP expenditure (Corporate)	6.0	0.4	-7.0	0.0	0.0	-0.6	-0.6
Total	-14.9	6.9	-9.8	-7.4	-7.5	-25.2	-32.7
ADJUSTED EXPENDITURE BEFORE APPLICATION OF EFFICIENCY TARGETS							
Water	37.6	26.5	35.2	25.7	29.9	125.0	154.9
Wastewater	34.3	28.4	34.7	35.7	28.3	133.1	161.4
Stormwater	0.4	0.4	0.4	1.3	1.3	2.3	3.6
Corporate	14.7	8.2	8.5	8.2	7.3	39.7	47.0
Total	87.0	63.5	78.7	70.9	66.8	300.2	367.0
Atkins/Cardno recommended additional capital efficiency targets (beyond those applied by the company)							
Continuing Efficicency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
Catch-up efficiency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Water	37.6	26.5	35.2	25.7	29.9	125.0	154.9
Wastewater	34.3	28.4	34.7	35.7	28.3	133.1	161.4
Stormwater	0.4	0.4	0.4	1.3	1.3	2.3	3.6
Corporate	14.7	8.2	8.5	8.2	7.3	39.7	47.0
Total (excluding Kooragang RWS)	87.0	63.5	78.7	70.9	66.8	300.2	367.0

Source: Atkins/Cardno analysis

Table 4 Atkins Cardno Recommended Efficient level of capital expenditure

Recycled Water

The actual/forecast capital expenditure in the current price path is significantly lower than was projected by Hunter Water at the 2008 submission and the subsequent revised Appendix D submission. This appears to have been mainly due to slower development than originally envisaged and, in the case of Kooragang Industrial Water Scheme, the time it has taken to establish commercial agreements. We have not seen any evidence to suggest that the investments undertaken are imprudent.

Hunter Water has not proposed any regulated recycled water investment in the next price path period.

We have undertaken a high level review of water recycling at existing wastewater treatment plants. We have not been able to identify any cases where the assets should be classified as "recycled water" where they are not already classified as such, suggesting that Hunter Water has appropriately ring fenced recycled water assets.

We have evaluated Hunter Water's proposed RAB adjustment related to the Section 16A directive and avoided and deferred costs associated with the Kooragang Industrial Water Scheme.

We consider that, on the balance of probability, it would be reasonable to assume an avoided and deferred cost of approximately $7.5m, representing the likelihood that recycled water use will be between the contractual minimum and the potable demand profile assumed by Hunter Water. This is lower than indicated in Hunter Water's submission because of the amendments to the analysis to bring it in line with the relevant guidance and to reflect the possibility that sales volumes are less than the case presented.

However, we note that if significant investments are proposed by the Lower Hunter Water Plan, or if contractual sales volumes are varied significantly, consideration should be given to amending the avoided and deferred cost calculations accordingly.

We recommend an avoided and deferred capital cost of $7.5m arising from the Kooragang Industrial Water Scheme. Any allowance made in the 2009 Determination and included in the RAB at that time should be deducted from this value.

Output Measures

Hunter Water has met most of the targets with valid reasons provided for any under or over target achievement. Particularly noteworthy is the delivery of the wastewater treatment plant upgrades which was a significant project involving the upgrades at nine plants. All upgrades except one are complete or scheduled for completion within the current price path. The remaining plant is slightly delayed by six months.

We recommend a range of Output Measures for the future price path. A small number of measures have been included which focus on asset replacement. We have included some measures to track the delivery of cost effective projects to drive operating efficiencies.

We record our thanks to Hunter Water and its managers for their helpful assistance and close cooperation in this efficiency review. The Corporation provided information, arranged interviews, prepared presentations and responded to subsequent questions in a timely, diligent and professional manner indicative of a proactive and well-performing Agency.

1. Introduction

1.1 Terms of Reference

In July 2012 the Independent Pricing Tribunal of New South Wales (IPART) appointed the Atkins/Cardno consortium to carry out a detailed review of the Hunter Water Corporation's operating expenditure and capital expenditure. The purpose of this review is to inform the Tribunal's Determination on prices for the upcoming price control period which applies from 1st July 2013.

This report has been prepared in accordance with the Terms of Reference set out in the contract between Atkins/Cardno and IPART dated 23rd July 2012.

The findings of this report form an important component of the overall price review process as set out in the IPART Issues Paper. The conclusions relating to prudence of expenditure in the current price path inform what IPART includes in Hunter Water Corporation's opening Regulated Asset Base (RAB) value. The conclusions relating to efficient operating and capital expenditure in the future price path assist the Tribunal's assessment of what are justified requirements to be included in the 'building block' model for determining future prices.

1.2 Hunter Water Corporation submission to IPART

IPART required Hunter Water Corporation to provide a submission outlining and substantiating its proposed prices for the period 2014 to 2018 and historic costs for the current price path from 2010 to 2013. The following versions of this information have been used in the preparation of this final report:

- Submission to IPART dated September 2012;
- Special Information Return (SIR) dated September 2012; and
- Annual Information Return dated September 2012.

Whilst we have endeavoured to satisfy ourselves as to the provenance and robustness of the data provided, a detailed audit of the completeness and accuracy of the information lies outside the scope of this project.

1.3 Review Process

We, the Atkins/Cardno team, undertook a two-stage approach the review. In Stage 1 we reviewed the strategic asset management processes including the long term capital investment strategy. This commenced in August 2012. The Stage 2 review started in September long following receipt of the Hunter Water Submission, AIR and SIR. Following initial review and planning the team arrived in Newcastle for structured interviews staring on 8th October

We held interviews between 8th and 12th October 2012 with key Hunter Water staff. A scope for each of these interviews was prepared and provided to the organisation in advance.

Over the week long interview period we requested additional supporting documentation relating to a range of issues. We believe that the Corporation provided us with this information promptly and to the best of its ability. We then requested further information over the subsequent week which Hunter Water was able to respond to in a timely manner.

We presented our draft findings to the IPART Secretariat and Hunter Water on 19th October 2011 and discussed the key issues with both parties at the same meeting. We also agreed the next steps with both parties.

Atkins/Cardno would like to take the opportunity to thank Hunter Water Corporation for their assistance in preparing for both the Stage 1 and Stage 2 reviews, providing documents in a timely manner and making

its staff available for the interview days. We recognise the professional manner in which the organisation responded to our challenges and requests for further detail.

This draft report is the outcome of our review of the strategic management processes and other processes of the Hunter Water. It is based on the background information provided to us by IPART, the submissions made and supplementary information provided by the Corporation, the findings of our interviews and the outcome of the presentations and associated dialogue.

1.4 Methodology

Continuing and Catch-up Efficiency

Our review and assessment of capital and operating efficiency is based the approach applied by Ofwat, the Water Regulator in England and Wales which has been applied in deriving efficiency targets for Determinations in 2004 and 2009. The methodology is based on the hypothesis of a Frontier Company competing in an open market to deliver services to customers.

A Frontier Company would continue to drive efficiencies over time to maintain its competitive advantage in the market. This is achieved through, for example, innovation, new technologies and improved management processes, This Continuing Efficiency reflects how the whole sector would improve its performance and efficiency over time.

Other companies or agencies would be seeking to improve their efficiency to be more competitive in the market. This requires improving processes, systems or work practices to a level of efficiency comparable with the Frontier Company. We define this efficiency as 'Catch-up'. This approach can be applied equally to operating and capital efficiency.

We use this approach to compare the business processes and systems with current best practice and to identify the extent of catch-up that may be required over time to reach an efficient level of operation. We review the decision making processes for both operating and capital expenditure to test whether there is sufficient challenge and rigour to deliver total least cost solutions. We comment in Section 2 and 3 on Hunter Water's management systems and processes and identify areas with the potential to drive further efficiencies over the price path period.

We discuss our findings and assessment of continuing and catch-up efficiency in Section 6 for operating expenditure and Section 7 for capital expenditure. A cumulative calculation of efficiency is applied and $ values shown in the summary tables.

Operating efficiencies are calculated on the base expenditure. This is separate from the recent additional or forecast increases in expenditure which are reviewed, tested and here appropriate adjustments are proposed.

Stage 1: Strategic Asset Management Review

Within this overview we have reviewed the long term capital investment strategy and tested how this links with expenditure proposals for the future five-year capital program. We reviewed asset management practices, capital investment appraisal and procurement processes insofar as they are used to identify investment needs and timing, appraise solutions, prioritise projects within defined budgets and procure and manage timely delivery. We identified the key drivers of capital expenditure and the underlying reasons for the level of expenditure proposed.

A key area of focus was the robustness of systems to link the asset management decisions with current and future levels of service and environmental performance. We also examined how Hunter Water assesses risks, mitigation measures and overall risk management across the business. This is important in trade-offs between lower expenditure and impact on performance. We looked at the method for prioritising expenditure which is of increasing importance as Hunter Water manages a lower capital program compared with previous price paths.

Stage 2: Detailed Review of Operating and Capital Efficiency

Operating Expenditure

IPART requires us to assess:

- the efficiency of operating expenditure for the period from 1 July 2009 to 30 June 2013, to the extent necessary to assess the efficiency of the proposed operating expenditure; and
- the efficiency of proposed operating expenditure for the period from 1 July 2013 to 30 June 2018.

Our assessment is based on the actual operating expenditure in the Submission, the robustness and confidence of these estimates taking into account the basis of the estimates and confidence in the need, timing and scope of the requirements. We also take into account whether additional expenditure proposals have been through the internal approval and challenge processes.

We have interviewed the functional managers, reviewed supporting reports and documents and assessed the current status of business systems in place, under implementation of planned for the future price path. The extent to which these process meet current best practice links back to the ability of Hunter Water drive further efficiencies through the business.

We present our analysis of the future expenditure proposals contained and comment on each product and function in terms of the potential for efficiencies to be achieved through the robustness of estimates, the need and timing of expenditure and absorbing of some activities within base opex as a surrogate for the application of internal challenge and budget control.

Our views on future operating expenditure efficiencies are based on the hypothesis of a Frontier Company, the continuing efficiencies that a Frontier Company makes through innovation and technological development, and the catch up efficiency required of Hunter Water to achieve the performance of a Frontier Company over time. We then take into account the future efficiencies proposed by the Corporation across the business.

We present our review of operating expenditure and our present proposals for an efficient level of future expenditure in Section 6.

Capital Expenditure

IPART requires us to assess:

- the efficiency and prudence of capital expenditure for the period from 1 July 2010 to 30 June 2013; and
- the efficiency and prudence of proposed capital expenditure for the period from 1 July 2013 to 30 June 2018 – in order to ensure that planned capital expenditure is directed to the most appropriate projects at an efficient cost.

Our assessment of the prudence of schemes in the current price path is based on a review of a representative sample of projects. We reviewed the need for each project, its timing and the difference between actual costs and outputs against planned. We considered the basis of costs and the procurement route for implementation of sample projects. For the year 2013 we took a view of the most likely outturn expenditure based on the current status of schemes in the program.

Our approach to the assessment of allowable future expenditure is based on a review of the asset management and capital expenditure processes, project appraisal and decision processes and a review of a representative sample of schemes in the program. Our methodology involves the following steps which we apply to all expenditure at a real 2012/13 price base:

- Any inconsistencies in inclusions and allocation of capital expenditure by driver recorded in the SIR;

- Adjustments to the timing of projects due to uncertainties in the implementation programs;
- Adjustments for specific scheme cost estimates;
- The scope to gain efficiencies through the implementation of the business planning process, cost estimating process, and the approach to procurement discussed in Section 4; and
- Netting off any efficiency savings proposed by Hunter Water.

Our views on future capital expenditure efficiencies are based on the hypothesis of a Frontier Company, the continuing capital efficiencies that a Frontier Company makes through innovation and technological development and the catch up efficiency required of Hunter Water to achieve the performance of a Frontier Company over time.

We present our review of capital expenditure and present proposals for an efficient level of future expenditure in Section 7.

Recycled Water

We have reviewed recycled water activities to confirm that the operating and capital expenditures are rink fenced from the regulated business. In particular we comment on the avoided and deferred costs in relation to the Kooragang Island recycled water scheme.

Output Measures

IPART requires us to assess Hunter Water's past performance against its current output measures and review and recommend output measures for the next determination period, taking into account:

- Output measures delivered against the 2008 Determination;
- Any proposals made by Hunter Water in its submission to IPART.

We present our findings in Section 9.

Inflation factors

In our report, we have presented all monetary values in real terms to a 2012/13 price base unless otherwise stated. For expenditure in the current price path, we have arrived at prices to the 2012/13 base by inflating nominal costs using Consumer Price Index (CPI) values provided to us by IPART. There is one difference between the IPART factors used in our analysis and the factors used in the SIR. For 2010/11 Hunter Water used an estimated CPI factor of 2.9 compared with the confirmed value of 1.2%. This leads to small differences between the analysis in the Report and Hunter Water's submission.

Data sources

The data sources we have used for the operating expenditure assessment comprise the Hunter Water Submission dated September 2012, the AIR and SIR opex tables which detail costs by product, activity and expense code, and specific information provided during the interview process and subsequently from responses to questions. Examples of additional information provided include activity based costing data, expenditure related to electricity use, maintenance activities and costs and other supporting information. Where there are differences in cost information provided e have used the Submission as the default values.

We have based our assessment of Hunter Water's capital expenditure on Tables 6.2 and 6.4 in Hunter Water's submission. Breakdowns by project and driver have been taken from the Microsoft Excel Information Return "HWC 2012 AIR Return FINAL for IPART original" dated 14 September 2012. The breakdowns by driver have been based on the "SIR Capex 2 (revised by IPART)" sheet and project specific expenditure taken from the "Capex by project" sheet.

We noted differences between the total capital expenditure figures for wastewater and corporate capital expenditure quoted in Tables 6.2 and 6.4 of the submission and those in the Excel sheet used for the breakdown by driver. We have made adjustments to the breakdowns by driver using reconciliations provided by Hunter Water for the wastewater service and by allocating the discrepancy to drivers pro-rata for corporate capital expenditure, as summarised in Table 1-1 below. In this way the totals reconcile to Tables 6.2 and 6.4 of Hunter Water's submission.

($M 2012/13) year ending June	2010	2011	2012	2013	2014	2015	2016	2017	2018	Source
Wastewater-discretionary expenditure	-5.1	0.3	-0.3	0.7	0.3	-0.5	2.0	1.9	-4.1	Based on spreadsheet received from HWC "HW Submission vs. AIR vs. SIR capex and opex - to HWC_Main (v2_151012).xls"
Wastewater-existing mandatory standards								-0.9	0.9	
Corporate (allocated pro-rata across the drivers)	0.3		-0.5	-1.3	-0.4	-3.0				Atkins/Cardno comparison of submission Tables 6.2 and 6.3 and SIR Capex 2 (revised by IPART)

Table 1-1: Summary of adjustments made to capital expenditure by driver to reconcile with submission ($12-13m)

We have set up a formal Q and A process where questions raised by the Atkins Cardno team and answers from Hunter Water are recorded in one document.

2. Business Environment

2.1 Legislation

Hunter Water is a state-owned corporation, wholly owned by the New South Wales Government, under the *State Owned Corporation Act 1989.* Hunter Water's area of operations including Cessnock, Dungog, Lake Macquarie, Maitland, Newcastle and Port Stephens as shown in Figure 2-1.

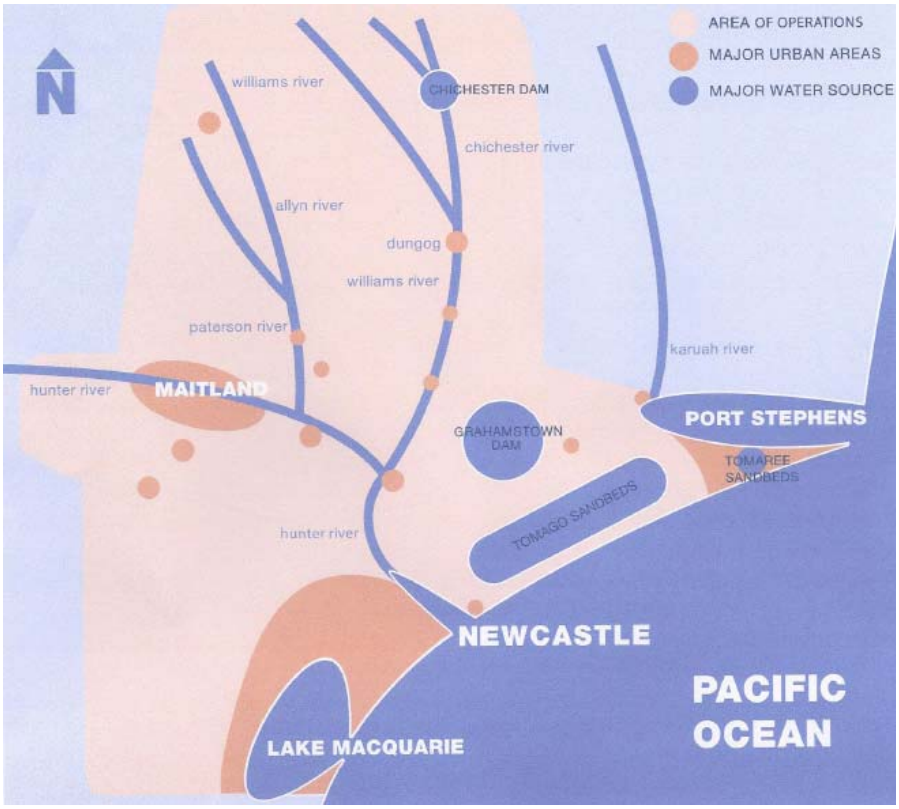


Figure 2-1 Map of the Hunter Water Corporation Area

The Corporation sets out several Corporate Visions as per its Statement of Corporate Intent (SCI). These are:

- Working safe;
- Right solutions;
- Financially Responsible;
- People Matter;
- Commitment to our Community;
- Respect for the Environment;
- Keeping Promises;
- Continuous Improvement;
- Efficient Recovery.

Hunter Water Corporation was established as a state owned statutory authority under the State Owned Corporations Act 1989. The regulatory framework within which Hunter Water operates is dictated by various pieces of legislation and by a number of regulatory authorities. Hunter Water's access to water sources is regulated by two licences:

(i) Water Management licence – issued under the Water Act of 1912; and

(ii) Water Access licence issued under the Water Management Act 2000

The licences are granted by the NSW Office of Water (NOW) and control Hunter Water's access to water resources within its area of operation.

Hunter Water's operations are regulated by a number of different authorities. They are:

- The State Government of NSW – responsible for issuing Hunter Water with its operating licence, the conditions of which are recommended to the Government by IPART;
- IPART – responsible for regulating prices;
- The Environmental Protection Authority (EPA) - responsible for issuing Hunter Water's wastewater system licences;
- The NSW Office of Water (NOW) – responsible for administering Hunter Water's Water Management Licence; and
- The Department of Health – via a memorandum of understanding, it establishes procedures for communicating results of water quality monitoring programs.

Under the *IPART Act 1992,* IPART is responsible for setting prices for Hunter Water. The last price path review covers the period to June 2013. The future price path period will cover a period of four years until 2017. IPART is responsible for administering the Operating Licence. The form of the Licence was reviewed in 2010 and updated with new requirements for performance measures.

2.2 Operating Environment

Hunter Water supplies at average 184 Ml/d of water to a population of 550,000 in 232,000 properties[2]. This covers the areas of Cessnock, Dungog, Lake Macquarie, Maitland, Newcastle and Port Stephens. There are four water sources comprising an impounding dam at Chichester, a pump storage dam and impounding dam at Grahamstown Dam and groundwater sources at Tomago Sandbeds and Anna Bay. With 20km of water main per property this is indicative of a semi rural network. Inland from the coastal areas of Newcastle and Lake Macquarie, the network is dendritic in nature. The area relatively flat with 120 pumping stations mainly in distribution. There is capacity to provide a bulk supply to Central Coast Water although this has not been used lately.

The wastewater network comprises 4800km of sewers and about 400 wastewater pumping stations. Some of the larger wastewater treatment plants have been upgraded recently to meet increasing environmental discharge standards. Some effluent is supplied as recycled water to industry and domestic customers.

2.3 Regulatory Requirements

Hunter Water's operating licence is granted by the State Government of NSW. The operating licence details the standards of service that Hunter Water is obliged to meet in relation to the supply and treatment of water, and the treatment and disposal of wastewater. The key contents of the Licence insofar as it impacts on the efficiency review are:

[2] Section 2, Hunter Water Submission, September 2012

(i) Growth - drinking water and wastewater services must be available on request for connection to any property in the area of operations, subject to any conditions to ensure safe, reliable and financially viable supply to properties.

(ii) Customer rights and complaint/dispute handling - customer contract, hardship procedures, rules on disconnection for non-payment.

(iii) Asset Management and infrastructure performance: asset management requirements, system performance standards, service quality indicators, response times for water main breaks, towns to be serviced under the Priority Sewerage Program;

(iv) Water Delivery Operations: water quality requirements for drinking water, recycled water, stormwater and water conservation requirements to reduce the quantity of drinking water used and the level of leaks, water efficiency programs, recycling;

(v) The Environment: requirements to maintain an environmental management system certified to AS/NZS ISO 14001:2004 and report on environmental performance indicators;

(vi) Performance Indicators: these define service delivery performance for customers; and

(vii) Reporting on drinking water quality.

Performance against the Operational Licence is audited annually and reported by IPART.

2.4 The Regulated Business

The regulated business of Hunter Water is responsible within its area of operation for:

- The Water Service including catchment management, dams and groundwater source. water treatment to meet ADW guidelines and distribution;
- The Wastewater Service including collection and sewage treatment to meet EPA requirements;
- Elements of Stormwater Drainage.

2.5 The Non-Regulated Business

Hunter Water is establishing a recycled water business. Currently this includes minor sales of treated effluent to farmers, golf courses and a power station. This business is currently small when compared with the regulated business. Plans at the 2008 Determination to expand recycling to new housing areas and an industrial supply to Kooragang Island have yet to be implemented. For the future price path the largest recycling project is an industrial area at Kooragang Island and small supplies to industry.

2.6 Governance Arrangements

Hunter Water has a Board of seven Directors including the Chairman and Managing Director. Reporting to the Board is an Executive Team comprising the Managing Director and five Executives of the functions defined in Section 2.7.

2.7 Organisation, Structure & Functions

Hunter Water re-structured its organisation from July 2012 from seven into five functions. These are shown in Figure 2.2. We have grouped these functions into Operations, Maintenance and Administration as required in the RFP. The number of full time employees (FTEs) in each function is shown in the Figure 2-2. The restructuring is described as a change in focus by the business rather than any material change in total FTEs although this results in a reduction of two executives.

The **Planning and Operations** function comprises System Operations (55FTEs), Maintenance Services (123) and Planning (34). System Operations includes networks, assets and treatment. Hunter Water Australia (HWA) has a contract to operate water and wastewater treatment plants; the FTE count excludes

this contract. Maintenance includes civil repairs to water mains and sewers and mech/elec repairs to treatment works and pumping station assets. Planning comprises water resources, system planning and environmental and sustainability. Support services include infrastructure delivery (32), Program Management Office (8) and Lower Hunter Water Plan (LHP) (5).

The **Customer Services** function covers Customer Contact (28), Billing and Collections (17), Commercial Services (6), Developer Services (9) and Technical Services (10). The Customer Contact section comprises the call centre, customer centres and customer complaints; the FTEs include contracted out services. Billing and Collections includes retail operations, business compliance and contract management; the FTEs include contracted out services. Commercial Services include account management and product development.

Information Services include operations (20), business improvements (8), technical information (7), program delivery (6) and strategy (10).

Finance includes Finance (19) comprising corporate reporting, management services and financial analysis and procurement (10).

The **Strategy, Governance and Corporate** function combines a range of administrative activities including People and Safety (27), Corporate Strategy and Regulation (4), Marketing and Stakeholders (8), Corporate Services (11), Internal Audit (5) and General Counsel (2).

The total FTE count is 442 at June 2012. This is shown to increase by 40 FTEs in 2013 although Hunter Water explains that this is because there were 33 vacant positions in 2012 and they will be filled by 2013. In our 2008 Report we reported an FTE count of 453 compared with 482 planned for 2013. Hunter Water plans to manage with a 5% vacancy rate which is 22 positions on the 2012 base. In effect the Company is currently working with a 33 vacancy rate or 7.5%.

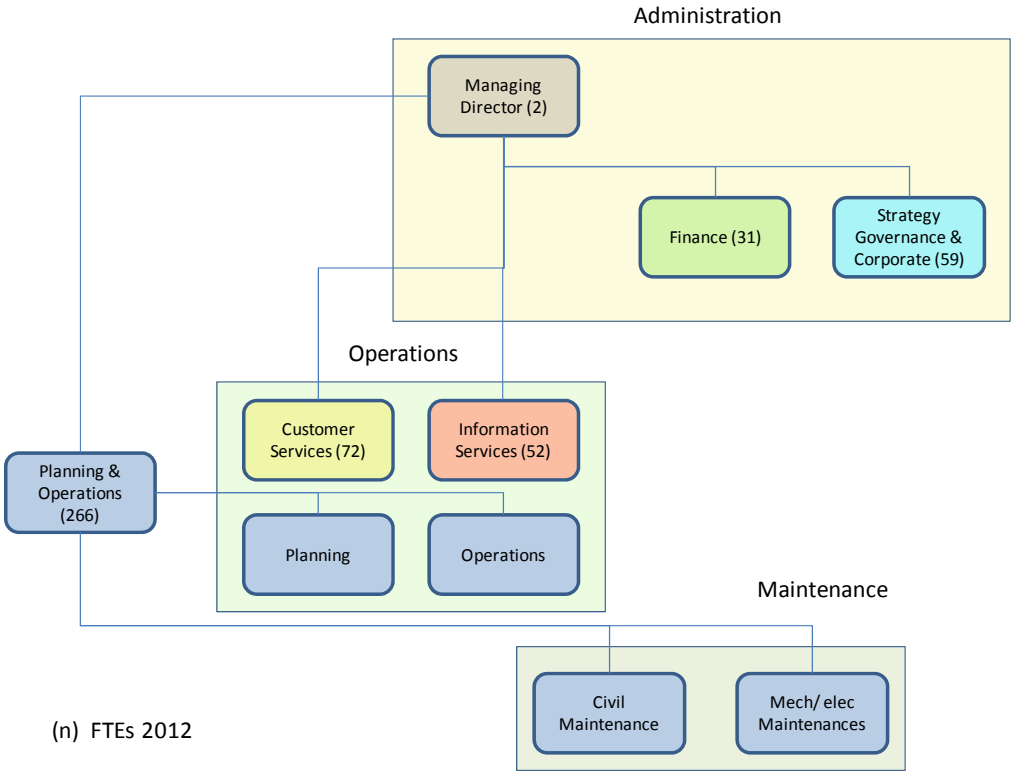


Figure 2-2 Hunter Water Organisational Structure (Source: Hunter Water)

2.8 Business Systems & Processes

The quality, extent and application of the Hunter Water business systems provide an important measure of the effectiveness of the business and the potential for leverage of further efficiencies over time. We list the key business systems and their current status in Table 2-1.

Functional Area	System	Last updated	Comments
Finance	*Ellipse* used for General Ledger, fixed assets, accounts payable and receivable and labour costing. Many other functions including budgeting, capital budget planning and activity based costing (ABC) monitoring are carried out on Excel spreadsheets. *Business Objects* is used for reporting from *Ellipse*.	2005	Plans in the current price path to replace *Ellipse* and spreadsheets with new ERP system were not progressed. The option to update to Ellipse system as selected for implementation in December 2013 with full implementation for the year ending 2015.
Customer and Community Relations	*Enterprise* based customer management and billing system (CIS) implemented in 2006. This is a property-based system.	Major upgrade in 2011	Custom application managed 'in house'. Minor enhancements planned in 2014.
Water mains and sewers asset management	AOMS	Developed in-house over ten years ago	Planned for replacement with the updated *Ellipse* system by December 2013.
Above ground asset management	The Enterprise Asset Management System is implemented using Ellipse	2005	The update to *Ellipse* will be used to manage above ground assets and to address current shortcomings in the quality of asset information.
Operations	SCADA (Serck SCX6)		This system is meeting business needs and will require technical upgrades to sustain its value and maintain vendor support.
Operations	The existing FRAMME GIS is currently being replaced with ESRI Arc GIS	2012	The existing FRAMME product is no longer supported.
Operations Planning	InfoWorks is used for water distribution network modelling and Mouse for sewer modelling		Mouse is no longer supported and there are plans to replace.
Operations	Engineering Data Reporting System		
Operations	Labware and Lab Data used for managing laboratory sampling and testing		
All	TRIM used for records management		Support ended 2007 and managed in house. To upgrade 2013 to 2014.
All	*Business Intelligence* used for internal data collection, collation and reporting		

Functional Area	System	Last updated	Comments
All	Plan room system used for managing Hunter Water plans on-line		

Table 2-1 Hunter Water Business Processes (Source: Atkins/Cardno analysis)

Financial Management System

The financial management system uses Ellipse for the General Ledger and Fixed Asset Register but relies on a series of spreadsheets in many areas including financial planning, budgeting, capital budgeting and activity based costing. These current financial management processes fall short of industry best practice. A plan is being implemented in the future price path to update the Ellipse system to provide greater capability and enhance reliability of financial processes.

IT Development

To address the risk of maintaining unsupported software systems, an ICT transformation program – known as MARS (Management of Assets, Resources & Systems) – was established in July 2009. The MARS Discovery project analysed business requirements and recommended a case for transformational change across the business by investing in:

- the upgrade or replacement of the ERP and AOMS systems, in conjunction with
- a focus on improving data quality, and business-wide process reengineering and change management program.

The scope of the program covered 5 key functional areas:

- Asset management (including works management)
- Finance
- Procurement
- Contracts Management
- Human Resources & Safety.

A comprehensive Request for Tender process was implemented and a shortlist of suitable tenderers developed. As a result of the increasing pressures on Hunter Water's budget for the next price path, it was not feasible to proceed with the MARS Project. An ICT review also found that the organisation did not have the required level of IT capability. Consequently vendors were advised of the project's termination on June 2012. Much of Hunter Water's investment in the MARS project will provide inputs into the ERP upgrade.

Hunter Water has decided that given the constrained capital program the optimal investment will be the upgrade of Ellipse and the incorporation of AOMS data into the upgraded Ellipse. The driver for replacing or upgrading the corporate ERP and AOMS is to eliminate the risk associated with continuing to run critical corporate systems beyond their intended end of life:

Activity Based Costing

Activity based costing (ABC) has been in place over the current price path. The business has been able to allocate direct costs by activity and indirect costs to functional areas. The most recent analysis has been able to apportion direct costs to each product (water, wastewater, drainage and recycled water) and to sub-process (bulk water, water treatment, water transport, and wastewater transport and wastewater treatment). Direct costs account for 37% of total costs, functional costs comprising 33% of costs have been allocated to sub-products based on the prime activities of staff. The remaining 30% of costs have been allocated across each sub-process in proportion to direct costs.

There are limitations to the current ABC methodology in that for example only some staff use timesheets, the costs for civil repair and maintenance works are allocated to generic job codes rather than identified work orders and treatment works costs are allocated to works rather than processes within works. Hunter Water has recognized these shortcomings in the ABC analysis and the new Ellipse system will have a more comprehensive set of works orders and coding to be able to allocate costs with greater confidence. With the current system, shortcomings include cost allocation to identify recycled water indirect costs which have been based on discussions with managers and estimated time, the true additional staff time on specific projects such as the LHWP are not clearly identified where staff are not backfilled, and the monitoring of treatment process costs is limited. For civil works, allocation of costs to specific works orders will provide greater clarity of costs.

Our view is that a more rigorous approach to activity based costing should be able to identify further efficiencies as detailed activity costs are exposed and compared. With the Ellipse update fully in place for 2014/15, further efficiencies should become evident as activity based costing is implemented in greater detail.

Capital Planning Systems

We comment in Section 4.6 on capital planning systems.

3. Strategic Review

Stage 1 of this study involved a strategic asset management review. As part of this review we were required to review Hunter Water's long term investment plan so that the medium term (i.e. proposals for the 5 years of the pricing submission) can be considered in the context of its longer term plans. The Terms of Reference ask us to provide advice on a range of issues related to the Strategic Review. For ease of reference we identify each area of review and the relevant subsection where we comment.

	Area of Review	**Section(s) in Report**
(a)	Whether the longer term capital investment strategy is the most efficient, and whether processes support this including procurement processes, whole of life cycle planning and assessment of capital and operating expenditure tradeoffs.	3.2 Long Term Investment Program
(b)	The key assumptions that are driving expenditure (e.g. asset replacements, demand forecasts, growth assessments, environmental requirements, licensing standards). Comment on how these key assumptions have been considered and tested	3.1 Investment Drivers and Assumptions
(c)	The consistency of Hunter Water's proposed 5 year capital expenditure program with its longer term program of capital expenditure, and implications or risks of the 5 year program for the longer term program.	3.2 Long Term Investment Program and 7 Capital Expenditure
(d)	The robustness of systems for linking asset management decisions with current and future levels of service and performance requirements, including customer service and environmental outcomes.	3.4 Levels of Service and Performance and 7.1 Renewals Expenditure and Service Levels
(e)	The way in which Hunter Water manages the risks associated with asset failure or underperformance.	3.6 Impact of Investment and 3.7 Risk and Mitigation
(f)	Any particular concerns or issues relating to the process for determining and prioritising future infrastructure expenditures for Hunter Water.	3.5 Prioritising Future Investment Expenditure
(i)	At a strategic level relevant to the price review, how Hunter Water's asset management framework, systems and practices align with the asset management obligation in its new 2012-17 operating licence	4.1 Strategic Asset Management Framework
(ii)	The appropriateness of Hunter Water's systems for classification of capital expenditure to various corporate drivers and their implementation	3.1 Investment Drivers and Assumptions
(iii)	The robustness of Hunter Water's systems for generating and assessing options for service quality outcomes that exceed minimum standards or where there are no prescribed standards, the costs of delivering these outcomes, and risks.	

3.1 Investment Drivers and Assumptions

Hunter Water's definitions for investment drivers are summarised in Table 3-1.

Driver	**Definition**
Growth	Capital expenditure to meet the requirements of new customers or increased requirements of existing customers in accordance with mandatory standards. Expenditure is funded through cash income from charges other than developer charges.
Existing mandatory standards	Capital expenditure as a result of an existing mandatory standard. A mandatory standard is an obligation imposed by statute or the imposition of a requirement by a regulator that is

Driver	Definition
	mandatory on the agency and is enforceable. Examples include expenditure to improve the reliability of assets to ensure compliance with existing or newly-imposed mandatory standards.
New mandatory standards	Capital expenditure as a result of a new mandatory standard
Business efficiency	Capital expenditure that is wholly justified on the grounds of expected reductions in operating expenditure. The resulting savings should be reflected in the operating budget.
Asset and service reliability	Capital expenditure intended to enhance asset and service reliability.
Discretionary standards	Capital expenditure as a result of a discretionary standard. A discretionary standard is a decision taken by the agency itself that is not imposed or enforceable by any regulatory instrument. These standards include but are not limited to a level of service higher than the level enforceable under a mandatory standard. Agencies may need to supply additional justification for this type of expenditure such as "community willingness to pay" analysis.
Government programs	Capital expenditure to meet specific Government programs or directives. The expenditure is driven by the Government program which may override other objectives such as commercial return.

Table 3-1 Capital expenditure drivers (Source: AIR)

We found that the categorisation to capital drivers may not always be consistent. For example:

- The distinction between which projects were classified as asset and service reliability and existing mandatory standards was not always consistent. For example, very little expenditure on the wastewater service for the upcoming regulatory period is included in the *asset service and reliability* category but there is significant expenditure in this category for the water service; and
- We noted that expenditure under business efficiency that may more appropriately be categorised under asset and service reliability.

Assumptions underpinning the long term capital expenditure profile are:

- The expenditure profile does not include any expenditure o*n water source augmentation.* This can only be considered following the outcomes of the Lower Hunter Water Plan;
- Growth assumptions have been revised downward and limited to hotspots. This is due to lower demand projections and a better understanding of the areas where growth is to occur; and a greater willingness to utilise assets beyond their theoretical capacity through increased monitoring and annual risk reviews;
- Hunter Water believes it has sufficient 'headroom' between its current performance and its Operating Licence obligations to enable it to defer some renewals expenditure;
- There is a drop off of projects assigned to new regulatory standards. Hunter Water is undertaking a number of investigations to confirm the environmental impact on a number of wastewater systems. Hunter Water is taking the risk position that the investigations will demonstrate that significant upgrades to improve performance in the next price path will not be required; and
- Investment in a new Enterprise Resource Planning system has been re-evaluated and a refresh of a number of existing systems, at a lower cost, is proposed; and
- Portfolio cost estimates have been reduced for most project estimates to reflect outcomes of value management studies.

Hunter Water had previously classified a component of project expenditure as discretionary. However following a review of future capital expenditure in July 2012 all discretionary expenditure had been

removed apart from the Sewer Backlog Program. However, there had been insufficient time to re-allocate the driver percentages in any documentation provided to us. Thus expenditure shown in the SIR as discretionary has been incorrectly apportioned.

3.2 Long term Investment Planning

Hunter Water's approach to infrastructure planning is outlined in the following documents:

- *Planning for a Sustainable Future – Our Integrated Planning Strategy*
- *System Planning Overview*
- *Water Resources Strategic Plan 2012-17*

Hunter Water advised that they were now placing a greater emphasis on longer term planning. Techniques such as scenario planning are now being used to gain an understanding of the full range of possibilities when developing and assessing planning options. Hunter Water is aiming to take a more flexible and adaptive approach to its planning processes

The *Planning for a Sustainable Future* document outlines Hunter Water's 'Three Horizon' approach to infrastructure planning with the horizons being:

Horizon 1 - Current price path 2010-13

Horizon 2 - Next price path

Horizon 3 - Hunter Water's vision and plan for the future, 2017 and beyond. This horizon directs actions within Horizons 1 and 2.

Hunter Water has developed an Integrated Planning Framework which includes:

- Major strategies and policy development which set the long term vision in Horizon 3. These include, for example, the Lower Hunter Water Plan, Regional Effluent Management Plans, Regional Sewer Master Plans and Bulk Water Strategy;
- Studies, designs and programs which are aligned to horizon 3 strategies and generally involve the implementation of works. Examples include the Catchment Improvement Program, Water Network Upgrade Program and Wastewater Treatment Upgrade Program;
- Site master plans and lifecycle plans which provide a framework for the delivery of works lifecycle plans. The lifecycle plans broadly follow the Gateway process of approvals to progress from the planning phase through to design, delivery and ultimately operation. The overall lifecycle then begins again as operational data from the new assets are used in the planning phase; and
- Support tools, these include, for example the Sustainable Decision Making Framework, Scenario Planning, Growth Mapping Tool, Asset Management Plans and Capital Portfolio Management.

We found that Hunter Water's planning framework is integrated and has a longer term focus into which the shorter term planning is aligned. Further discussion on infrastructure planning is included in Section 5.1.

Historical and Forecast Ten Year Capital Investment

The capital investment over the current and future price path is illustrated in Figure 3-1 and Figure 3-2. These figures show that capital investment will reduce from an average of just under $160M per annum to just under $90M per annum a reduction of around 44%. We were advised that as at April 2012 the forecast capex for the next price path was projected to continue at an average of $160M per annum and estimated to increase to an average of $180M per annum in the following price path. Hunter Water advised that a re-evaluation of the capital investment program was necessary to:

- Minimise the impact of price increases on customers; and
- Maintaining an investment grade (BBB) credit rating.

The resulting program has a strong focus on regulatory compliance and has been developed using the recently developed Capital Portfolio Management process described in Section 5.3. The long term investment strategies have been developed based on:

- Growth projections;
- Negotiations with stakeholders including regulators regarding standards and compliance;
- Renewal, maintenance and critical asset strategies; and
- Customer impacts.

Assumptions underpinning the long term capital expenditure discussed in Section 7.

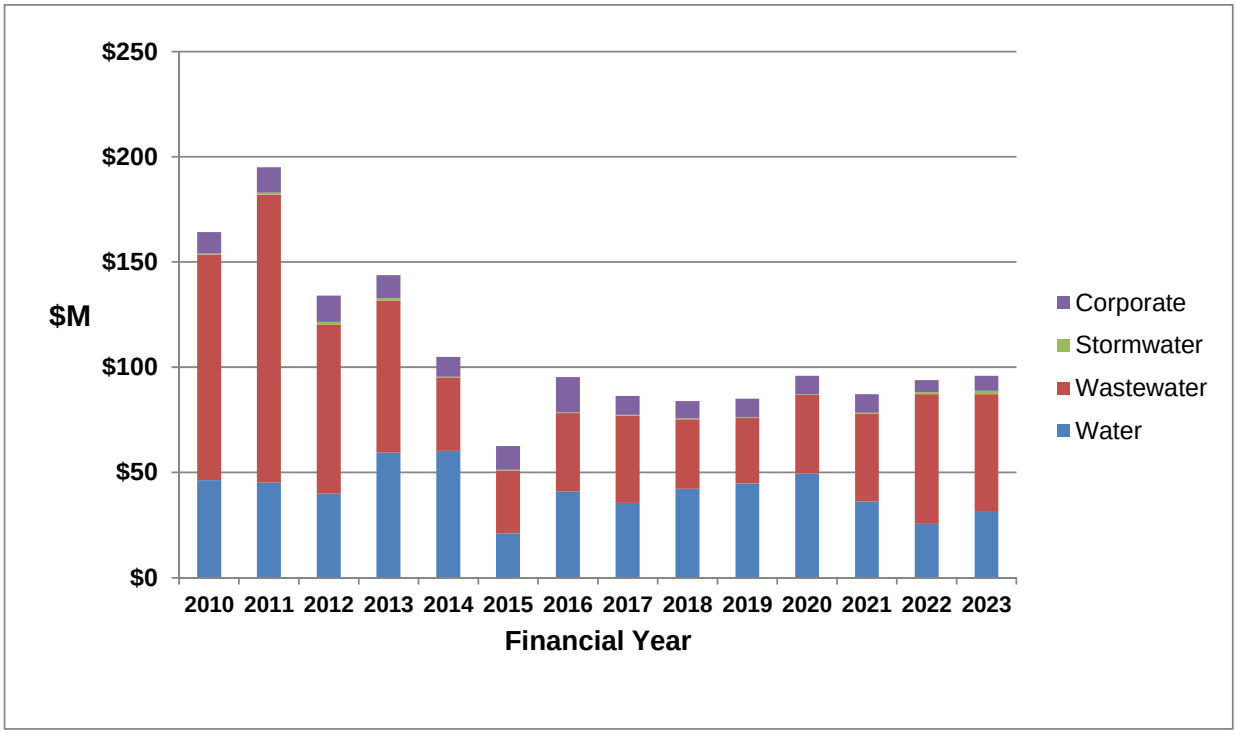


Figure 3-1 Capital expenditure by service ($nominal) (Source: HWC)

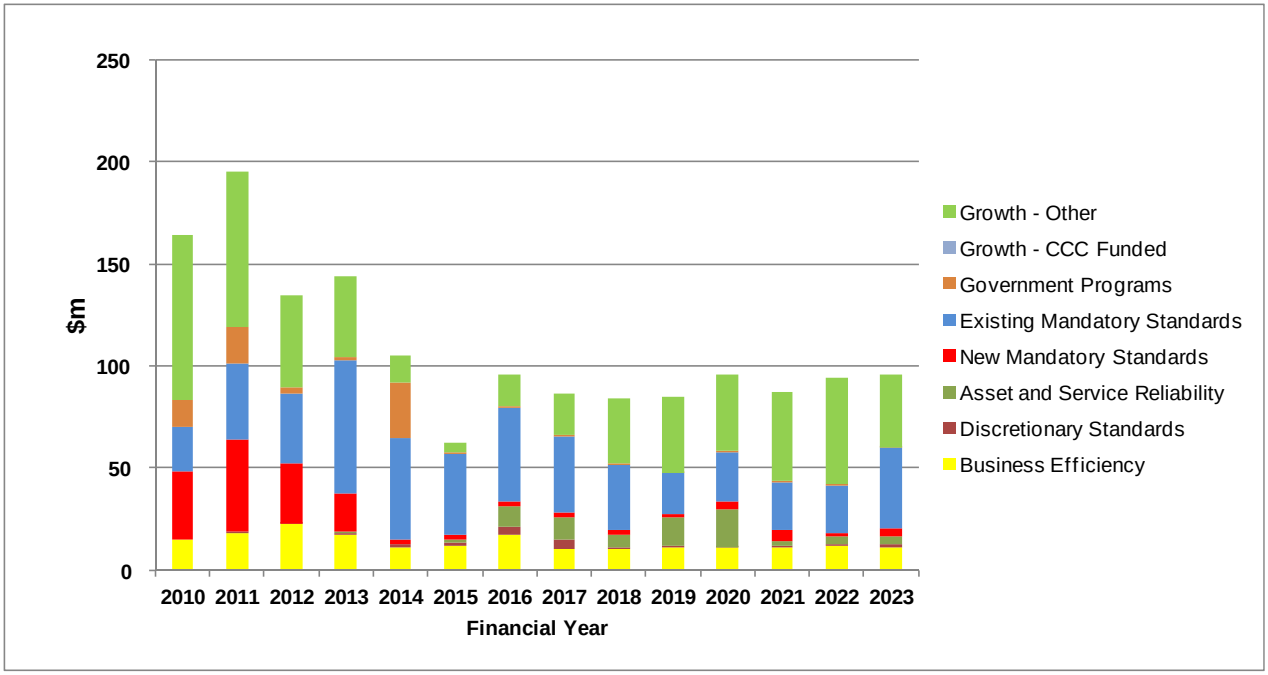


Figure 3-2 Capital expenditure by driver ($nominal) (Source: HWC)

The status of projects, by value, planned for the next price path is summarised in Table 3-2. The projects in the last two years of the next price path are at the Gateway 1 (need identified) stage. This would also be the case for the remaining projects identified to 2023.

Gateway		2014	2015	2016	2017
1	Initiation (need identified)	30%	45%	81%	93%
2	Request project funding (business case developed)	9%	10%	17%	7%
3	Request delivery funding (pre-tender)	52%	43%	2%	0%
4	Request award of delivery project (pre-contract award)	9%	2%	0%	0%

Table 3-2 Project Gateway Review Status

For the future price paths Hunter Water has reduced expenditure by 10% for most projects to reflect additional value management to be undertaken through the project phases and reduction in contingency approximating a P_{50} equivalent.

Figure 3-3 illustrates Hunter Water's proposed capital expenditure since 2000 and its projected expenditure. The figure shows that expenditure in the current price path was significantly greater in previous years and Hunter Water's proposed capital expenditure (12-13 SCI) shows a return to previous levels of investment.

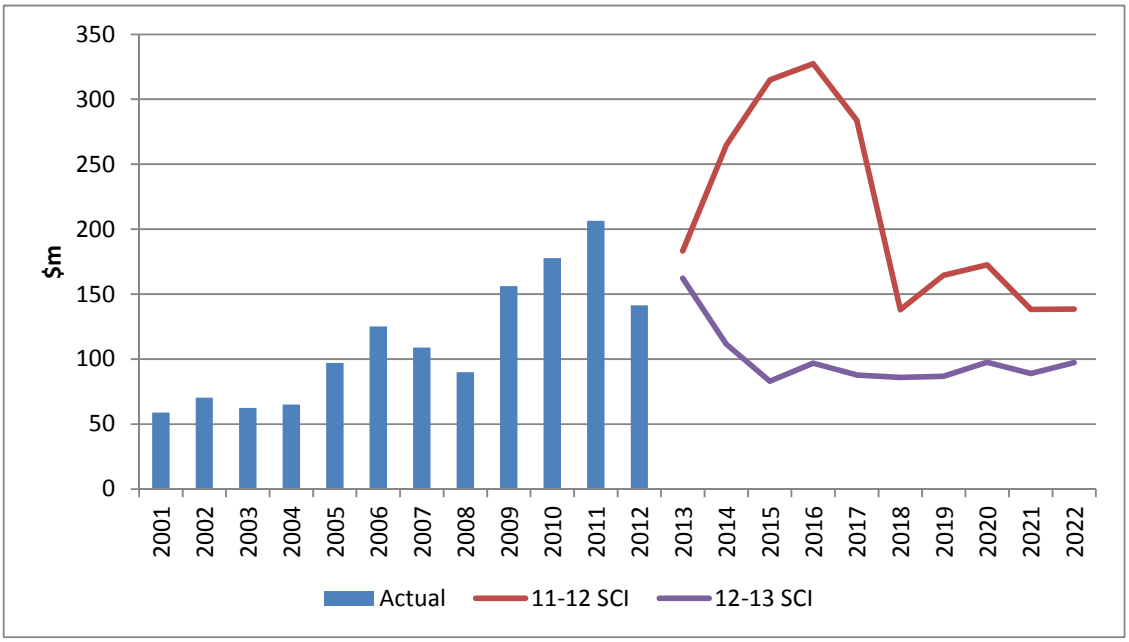


Figure 3-3 Total Capital Expenditure 2001 to 2022 ($2012/13) (Source: HWC modified to $12/13)

Assessment of Capital and Operating Expenditure Trade-offs

This is an area which warrants further development as part of medium and long term planning. Efficiency should consider the total least cost solution and any constraints on capital expenditure should not lose the opportunity to deliver savings in operating costs.

3.3 Medium Term Capital Program

Our discussion on the capital program for the next price path is included in Section 7. This section considers the prudence and efficiency of the proposed program based on our assessment of a sample of projects.

3.4 Levels of Service and Performance

Hunter Water's performance against its Operating Licence is summarised in Figure 3-3 and Figure 3-5. In 2010 some of the indicators applied in the Operating Licence were modified. This table indicates that Hunter Water performs well against the targets specified in its licence. Over the past 10 years performance against some indicators has been static or has improved.

The drinking water continuity target was exceeded in 2004 and 2007 and remained high up until 2007. The 2007 event was storm-related. which also impacted on the unplanned water interruption. The greatest impact on unplanned water interruptions is one or more major failures of critical water mains. While there are a number of trunk main failures most of these can be managed with limited customer service impacts.

The figures show reducing trends in the number of properties reported and the increasing headroom against Targets.

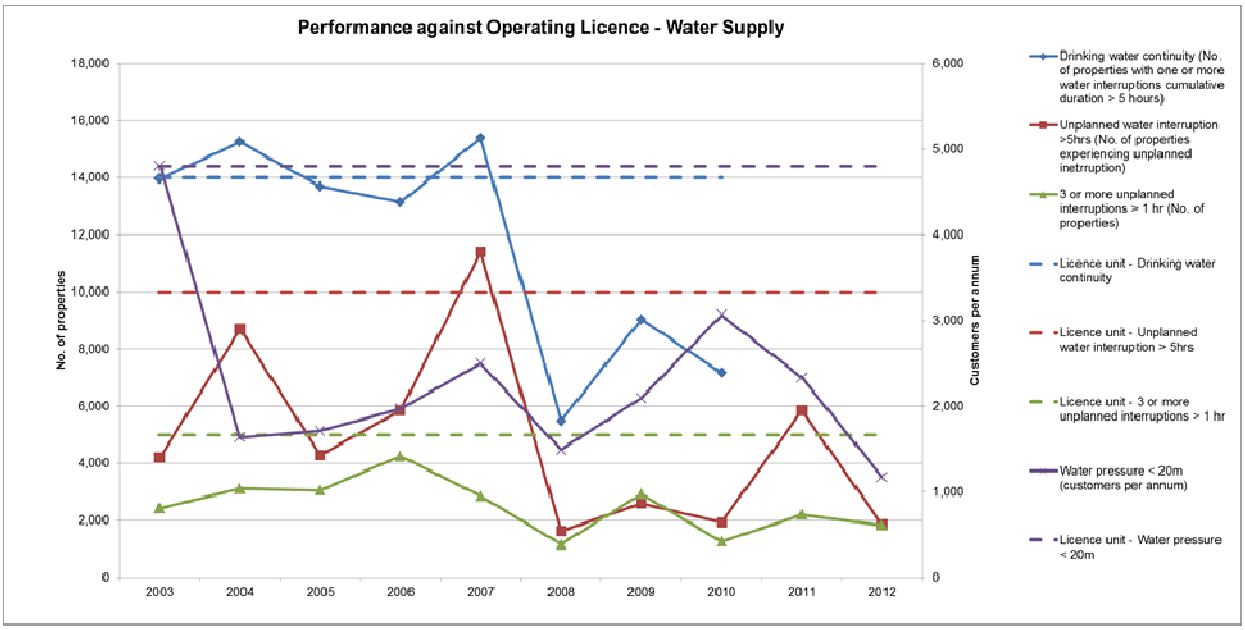


Figure 3-4 Performance against Operating Licence – Water Supply

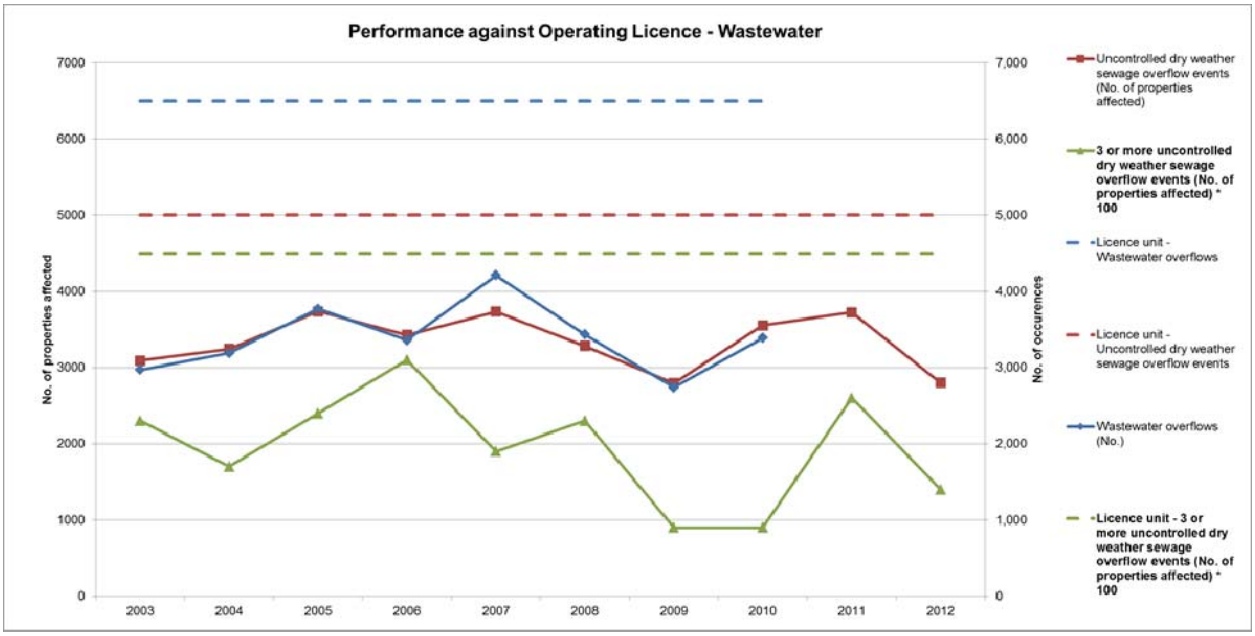


Figure 3-5 Performance against Operating Licence - Wastewater

Hunter Water also provided information on the load limit performance of its wastewater treatment works for the period to 30 Sept 2012. This information for BOD, TSS, nitrogen and phosphorus is illustrated in Figures 3-5 to 3-8. These show that the plants are meeting the limits except for Fairley WWTW where upgrading works are currently in progress.

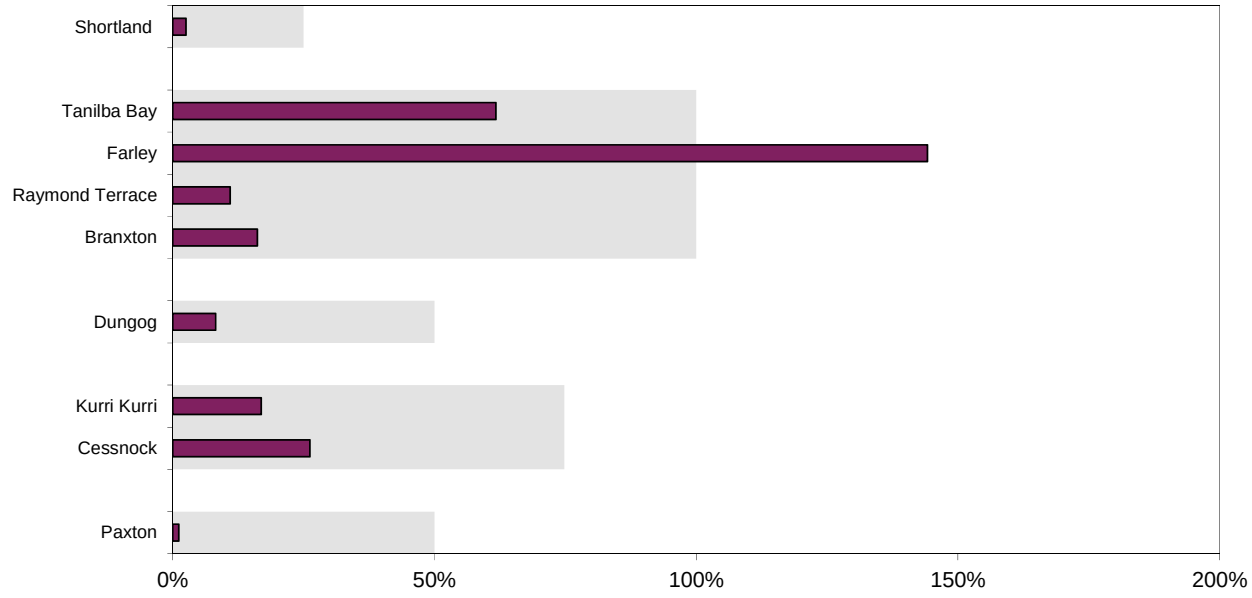


Figure 3-6 BOD Load Tracking to 30 Sept 2012 (Source: HWC)

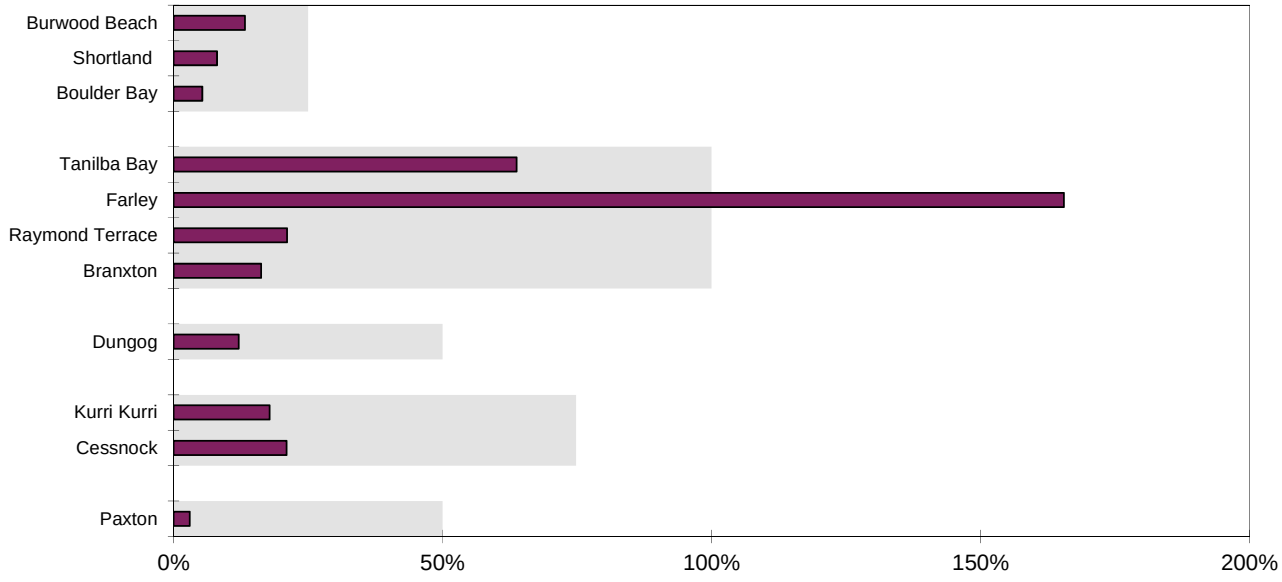


Figure 3-7 TSS Load Tracking to 30 Sept 2012 (Source: HWC)

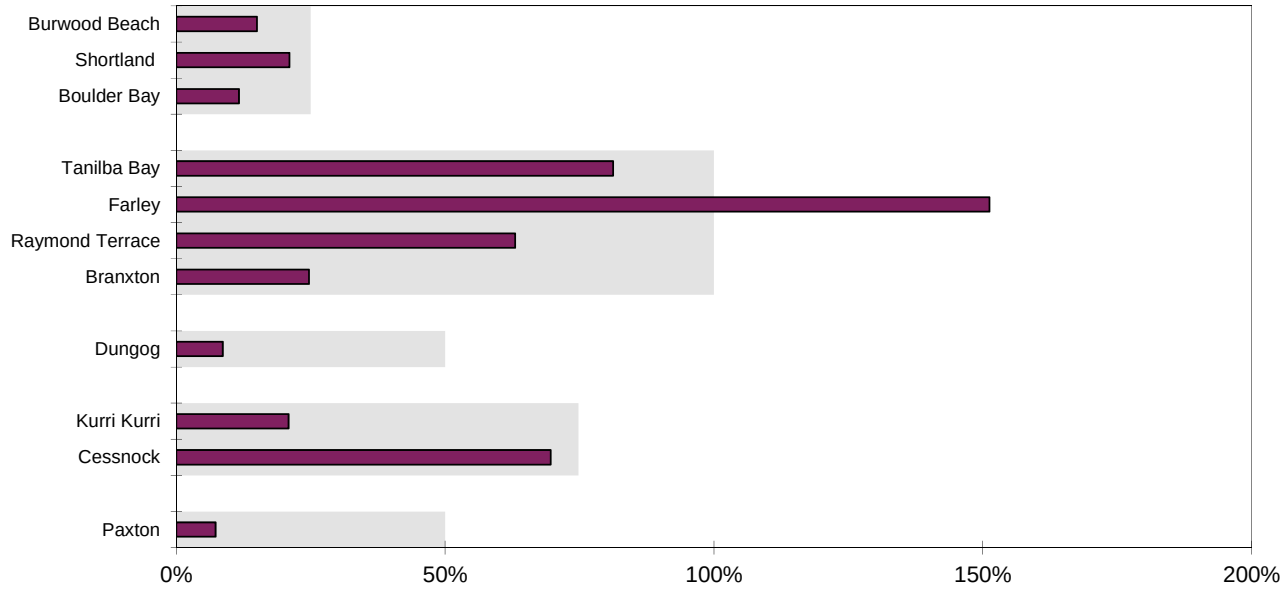


Figure 3-8 Total Nitrogen Load Tracking to 30 Sept 2012 (Source: HWC)

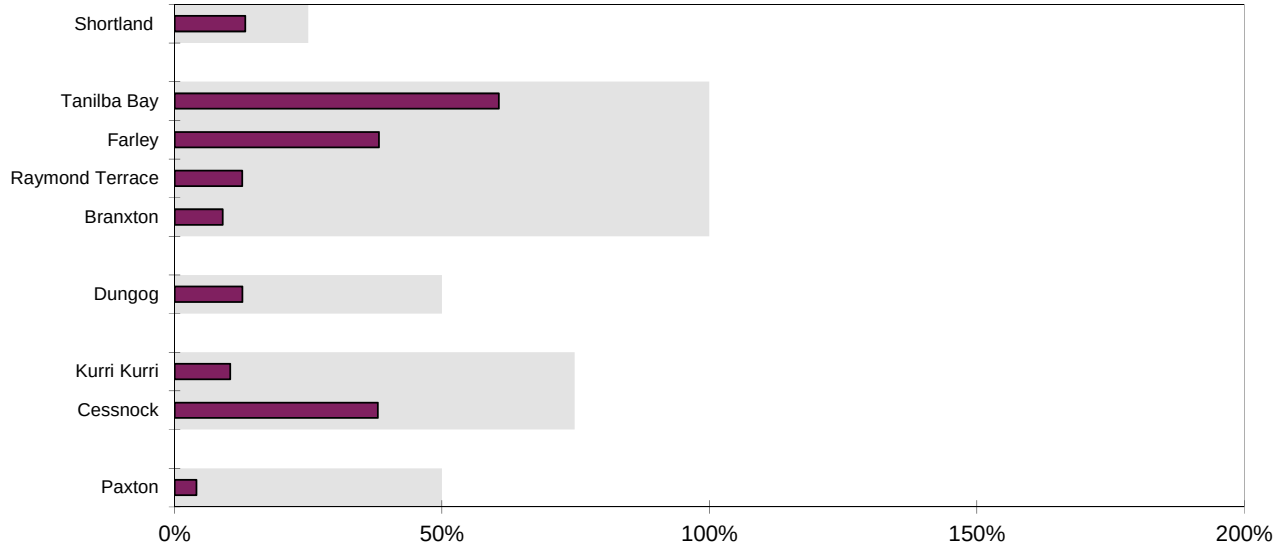


Figure 3-9 Total Phosphorus Load Tracking to 30 Sept 2012 (Source: HWC)

3.5 Prioritising Future Infrastructure Expenditures

The AIR/SIR submission in September 2012 reflected the new approach with a lower capital program than as envisaged earlier in the year. The revised capital program was prioritised using the following criteria:

- Safety (highest priority);
- Legislative compliance;
- Operating Licence compliance;
- Customer impacts; and
- Business improvement (lowest priority)

The prioritization was largely undertaken at a program level, for example wastewater treatment. This was based on existing information and the judgment of the Planning and Operations management team. The expenditure profile for each program was adjusted with the aim of ensuring that highest priority issues were addressed and, where necessary to meet the financial constraint, additional risk would be taken by the lower priority areas.

Capital expenditure within each program area was adjusted by deferring or eliminating projects within that program area and considering the risk presented by not proceeding with the proposed projects.

Hunter Water applied a further reduction was on nearly all capital projects. This was made up of:

- 5% saving that could be achieved through additional value engineering;
- 5% reduction in costs as many capital estimates are P_{90} estimates or equivalent, and it was thought unlikely that the full contingency allowance would be required for all the projects within the portfolio;

The result of the process is that projects, apart from the highest priority projects, have been deferred, delayed or de-scoped and had a budget reduction.

Further information on the project prioritization process may be found in Section 5.3.

3.6 Impact of Investment

As a result of the reduced investment, Hunter Water will be more susceptible to the impacts of the following triggers:

- Higher growth or growth in unanticipated areas. The Hunter Region does not have a planned land release strategy which makes Hunter water more susceptible to "out of sequence" development than some other utilities such as Sydney Water;
- Weather conditions which will impact on the wastewater system (wet weather overflows or, during drought periods higher tree root blockages. Impacts on the water distribution system could be increase main breaks in area of reactive clays;
- Major asset failures. Major failures of large critical trunk mains such as the Chichester Trunk Gravity Mains (CTGM) will have a significant impact on customers;
- Any tightening of the regulatory framework could have a major impact on the capital investment program given that it is assumed there will be no change; and
- Government directives could impact on capital or operational expenditure.

The reduced investment in renewals will also impact on operational expenditure as the rate of failures increases. In the case of non-critical water mains the increased operational costs as a result of the budget reduction are estimated to be $800,000 per annum by 2017/18. These cost increases will have to be

accommodated within the current operational budget. We have undertaken some analysis on the relationship between renewals investment and service levels and the results are outlined in Section 7.8.

3.7 Risk and Mitigation

Hunter Water provided us with a Board paper dated 13 July 2012 which outlined the implications and risk profile associated with adopting a revised capital program. Table 3-3 is taken from the Board Paper and lists the major risks associated with the proposed program.

Risk	Detail of Risk	Details of how this proposal contributes to the mitigation of the risk
Customer Service	The risk that customer service standards are not met.	The proposed program of work incorporates the minimum investment necessary to comply with Operating Licence requirements.
Public and Employee Safety	The risk that practices to manage the safety of staff and the public are ineffective.	The proposed program of work should allow delivery of those projects which are essential to meeting public health standards and satisfying WHS obligations.
Infrastructure Demand	The risk that the growing infrastructure requirements of the community are not met.	The proposed program of work incorporates the minimum investment necessary to service a moderate growth scenario of 1.4% pa whilst allowing for some deterioration of performance within the overall tolerance of the Operating Licence.
Regulatory	The risk that Hunter Water fails to comply with economic and legal regulatory obligations.	The proposed program of work incorporates the minimum investment necessary to comply with existing regulatory requirements.
Business Continuity	The risk that critical business functions are not available to customers and key stakeholders.	The proposed program of work incorporates the minimum investment necessary to maintain critical functions of the business.

Table 3-3 Major Risks Associated with Reduced Capital Program (Source: HWC)

Hunter Water management is aware of the increased risks associated with the reduced capital investment. The inherent risks associated with each project have been estimated and a qualitative assessment undertaken of the most likely risks that will need to be managed. Strategies to manage the residual risk are under development. We were advised that risks would be managed through a holistic asset management and catchment management approach.

Hunter Water is an experienced water utility with a good understanding of its infrastructure, service demands, potential risk impacts and areas for improvement in its systems and processes. One important improvement initiative will be upgrading the asset management information systems from the current dispersed systems. The higher risk profile will require Hunter Water to rely even further on reliable, timely information so that it can readily respond to any major changes in performance.

Hunter Water will need to further develop, trial and continually refine its contingency plans particularly for high consequence asset failures. It is anticipated that there will be an ongoing need to review and re-prioritise the capital expenditure program in response to changes in performance or improved knowledge of likelihood or consequence of failures.

Other areas where Hunter Water will seek continuing improvement will be increasing challenging of business cases and Gateway submissions and further refining the cost estimating process. Hunter Water have already identified the value management process as being a key tool in achieving efficient and effective capital investment to minimize risk. The improvement opportunities identified in the WSAA Asset Management Performance Improvement Project (refer Section 4.1) will also contribute to the risk mitigation process.

Water utilities tend to be conservative and risk averse due to the impacts of events on essential services, public health and environment and as a result customers may be required to pay higher prices for the assurance of high service levels. The approach taken by Hunter Water, in response to customer financial impacts and business viability, means that it has the challenge of continuing to meet service targets at a lower cost. In responding to this challenge Hunter Water needs to continue to develop the processes and systems to enable it to mitigate risks though contingency planning and be responsive and adaptable to service delivery.

3.8 Conclusions

Hunter Water's infrastructure planning framework is integrated and has a longer tern focus into which the shorter term planning is aligned. The capital investment program arising from the infrastructure planning process is linked into the organisation's longer term financial modelling. This linkage has allowed Hunter Water to assess the impacts of an unconstrained capital investment program on its financial viability and on customer charges. As a result it has made significant reductions in its capital expenditure.

Constrained funding is focusing the organisation on implementing an efficient capital investment strategy. We found that the supporting processes for this strategy including costs estimating, options analysis, gateway reviews, value management and risk management were well developed. Hunter Water was continuing to seek continuous improvement in these areas.

Hunter Water management is aware of the increased risks associated with the reduced capital investment. The inherent risks associated with each project has been estimated and a qualitative assessment undertaken of the most likely risk that will need to be managed. Strategies and contingency plans to manage the residual risk are under development. We were advised that risks would be managed through a holistic asset management and catchment management approach.

We found that there was consistency between the medium (0 to 5 years) and longer term (5 to 10 years) capital expenditure programs and there was no evidence of sharp changes in planned expenditures in those periods.

4. Asset Management

4.1 Strategic Asset Management Framework

Hunter Water defines Asset Management as to:

> *"Optimise physical assets life cycle management to provide sustainable water services to existing and future customers at acceptable levels of risk."*

Hunter Water's Operating Licence requirements for the Asset Management System (Clause 4.1) are:

> *4.1.1 Hunter Water must maintain a Management System that is consistent with:*
>
> *a) the BSI PAS 55:2008 (PAS 55) Asset Management standard; or*
>
> *b) the Water Services Association of Australia's Aquamark benchmarking tool; or*
>
> *c) another asset management standard agreed to by IPART,*
>
> *(Asset Management System).*
>
> *4.1.2 Hunter Water must ensure that the Asset Management System is fully implemented and that all relevant activities are carried out in accordance with the system.*
>
> *4.1.3 Hunter Water must notify IPART of any significant changes that it proposes to make to the Asset Management System in accordance with the Reporting Manual.*

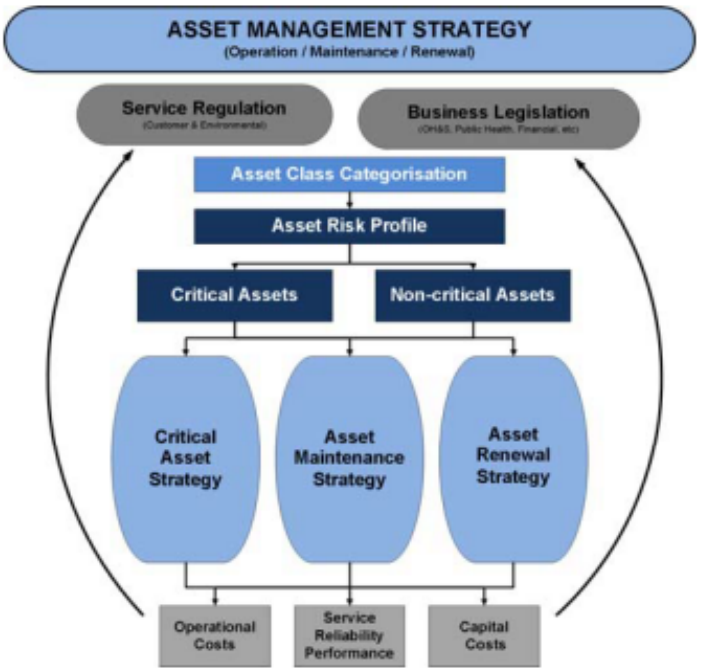
Currently, Hunter Water is adopting the *Aquamark* benchmarking tool, with the asset management framework, plans and strategies aligned. Over the next four years, Hunter Water proposes to review the new International Standard for Asset Management ISO 55000 and will consider adopting the standard with the next Operating Licence.

We note that a number of the Asset Management Plans (including the Asset Management Policy) were still in a final draft stage and require finalisation.

The *Aquamark* benchmarking tool is an existing framework which has been embedded within Hunter Water over many years. It has been externally audited to determine Hunter Water's compliance with the framework and to benchmark Hunter Water's performance nationally and internationally.

Hunter Water is currently developing and implementing an Integrated Quality Management System (IQMS) certified to ISO 9001, as required by the *2012-17 Operating Licence*. It is Hunter Water's intention to continue to use *Aquamark* to guide the continued development of the Asset Management Framework and this Framework would form part of the integrated system, certified to ISO 9001. This will ensure that there will be consistency in areas such as document control, records management, management review, incident reporting, training and auditing.

Hunter Water's asset management framework is illustrated in Figure 4-1.



Source: HWC

Figure 4-1Asset Management Framework

2012 WSAA Asset Management Performance Improvement Project (*Aquamark*)

Hunter Water participated in the WSAA benchmarking project. Hunter Water's asset management performance against other utilities is summarised in Figure 4-2.

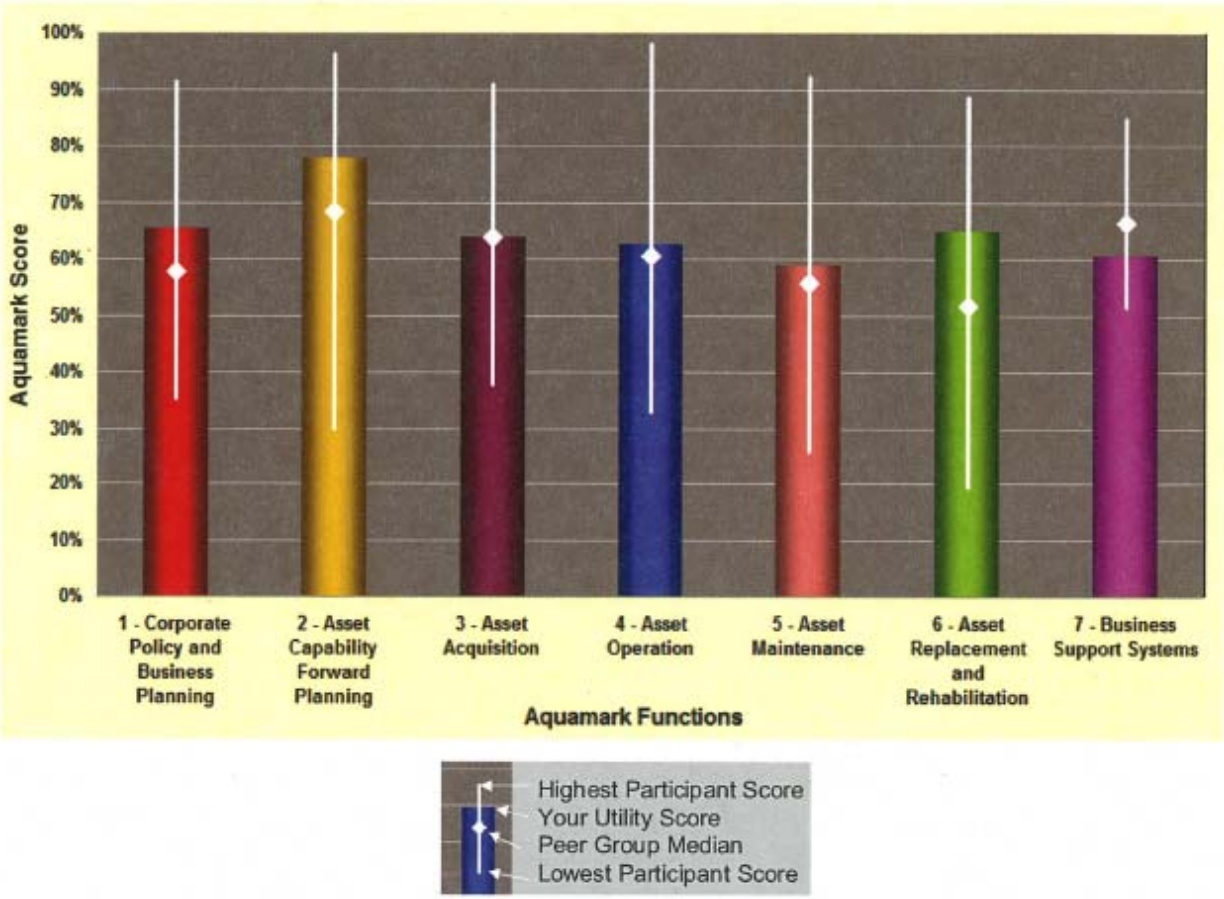


Figure 4-2 Hunter Water's Aquamark 2012 Ratings (Source: HWC)

The benchmarking process highlighted the following potential leading asset management practices within Hunter Water were:

- Growth mapping project;
- Capital prioritisation process;
- Asset creation knowledge flagship;
- Environmental science development
- Treatment plant Alliance;
- Water main and rising main risk models;
- Energy management program; and
- Asset management framework.

Some potential improvement initiatives identified from the benchmarking included:

- Quality management and procedures documentation in Operations & Maintenance;
- People and training development, training and succession planning;
- Maintenance management;
- Project business case challenge;
- Critical asset operation/resilience; and
- IT systems development.

We discussed the findings of the benchmarking project with Hunter Water. They explained that they had involved a wider range of staff than in previous exercises and had marked themselves quite hard as they saw the benchmarking process as great means of identifying improvement initiatives. Hunter Water's dispersed asset information systems and lack of a Quality Management System had lowered scores as well. Hunter Water will be implementing the improvement initiatives over the next few years.

4.2 Asset Base

The extent of Hunter Water's asset base is shown in Figure 4-3. This asset base has a gross replacement cost of nearly $7 billion. A breakdown of this cost is illustrated in Figure 4-4.

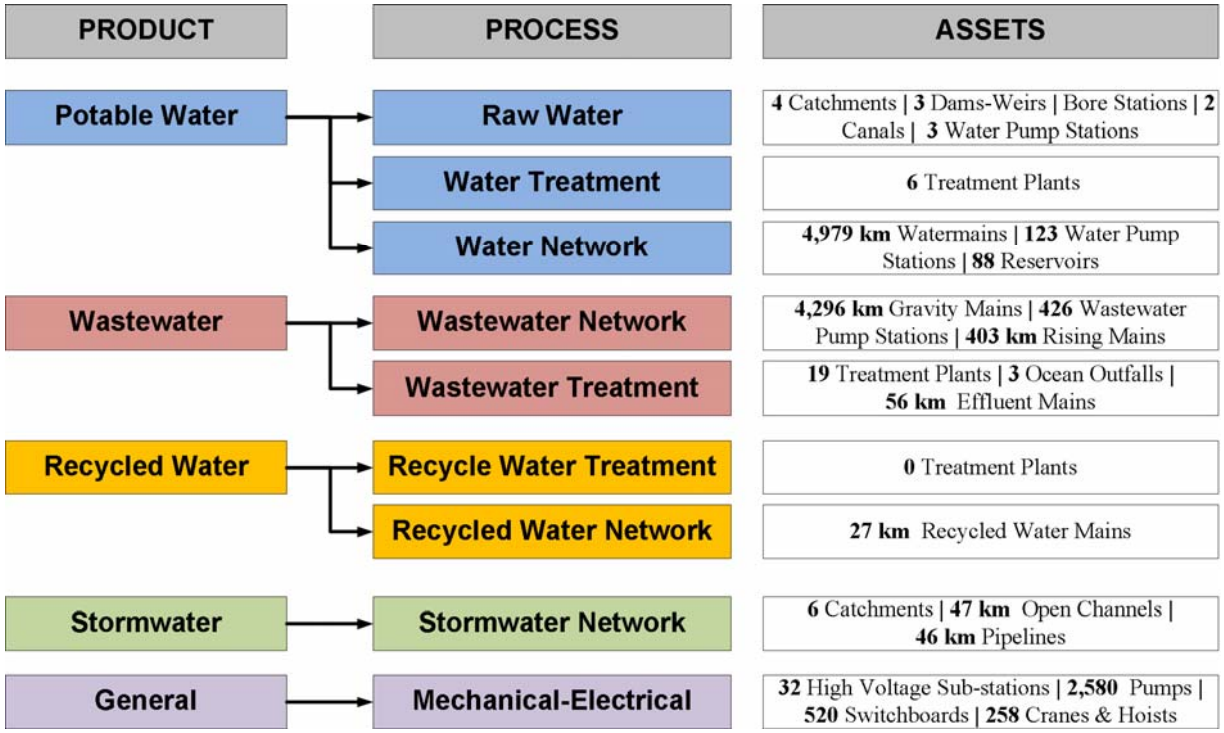


Figure 4-3 Extent of Hunter Water's Asset Base (Source: HWC)

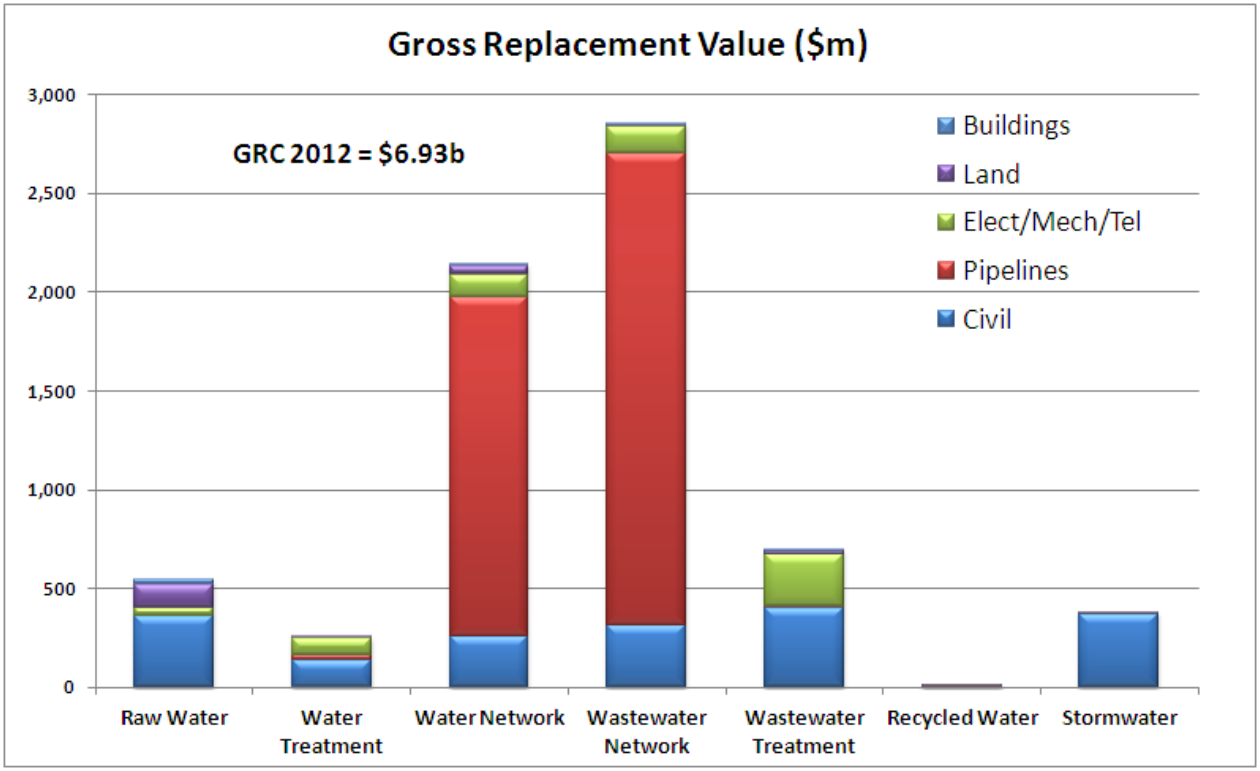


Figure 4-4 Infrastructure Gross Replacement Cost (Source: HWC)

Some of the infrastructure is quite old with 4.5% of the reticulation water mains exceeding 100 years of age. However, 65% of these mains are under 50 years old. The sewage collection system is slightly younger with less than 2% of the mains being over 100 years old and 68% of the mains being younger than 50 years old. The age profile for water reticulation mains and wastewater gravity mains are illustrated in Figure 4-5 and Figure 4-6 respectively.

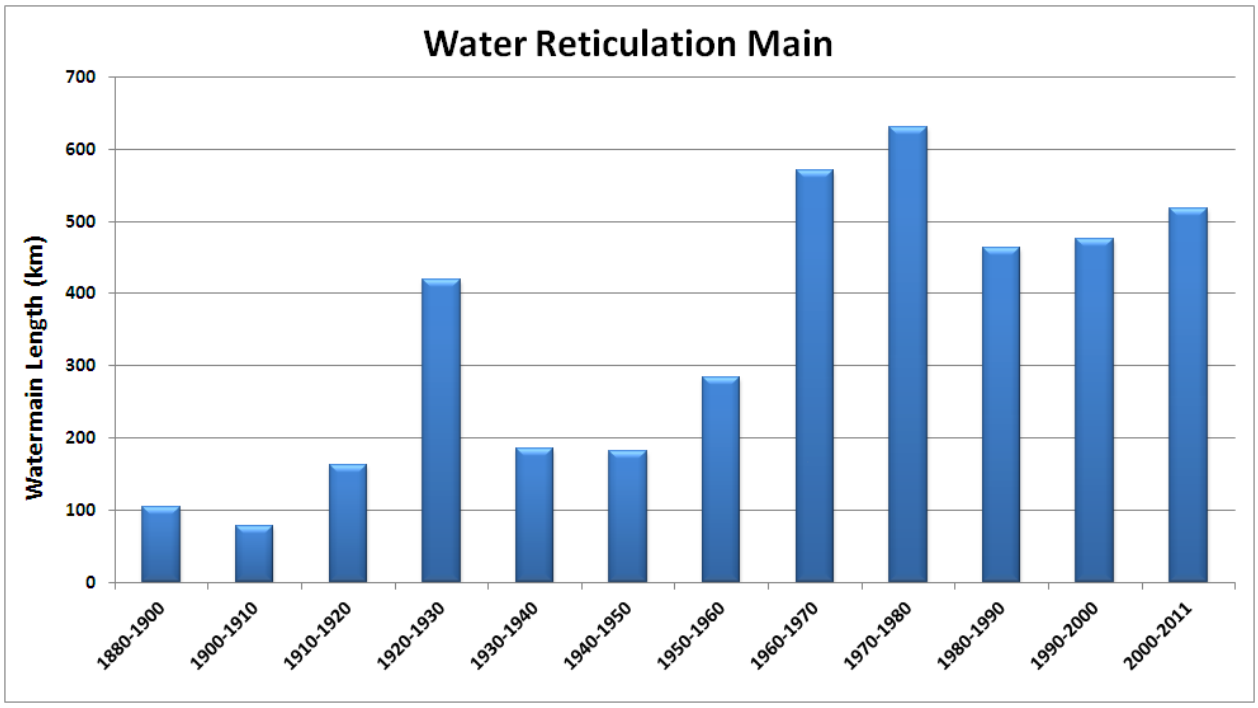


Figure 4-5 Water Mains Age Profile (Source: HWC)

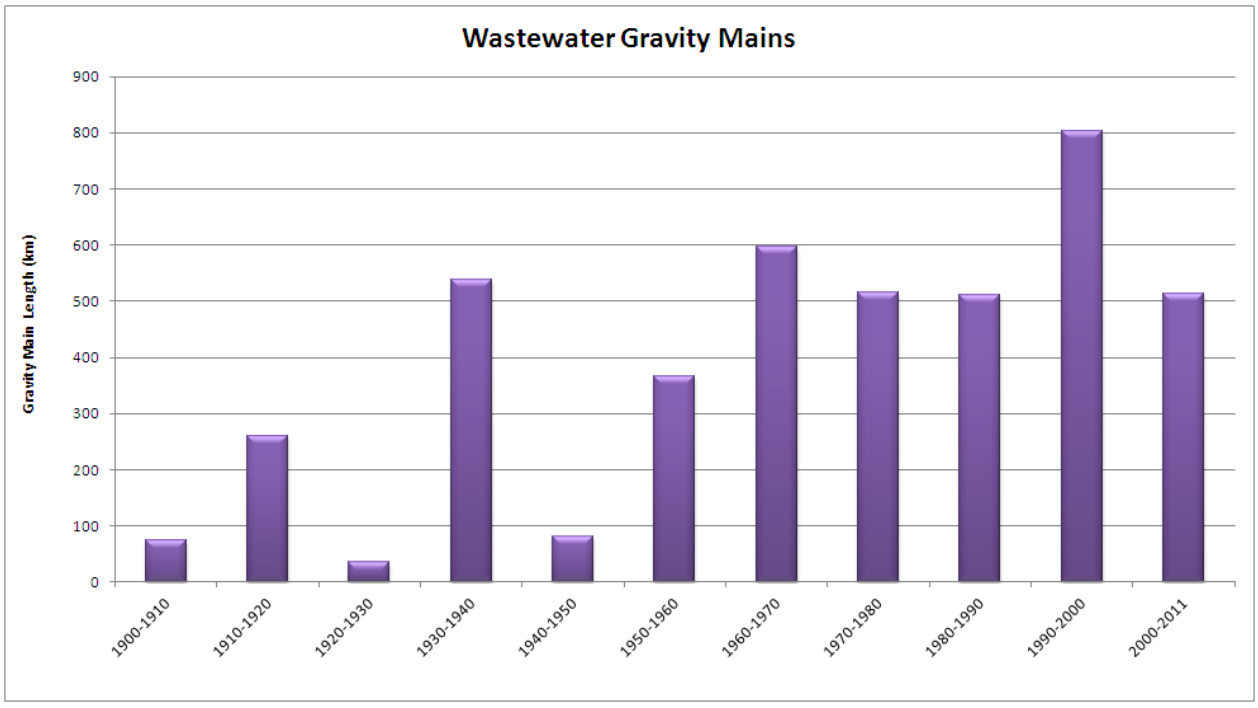


Figure 4-6 Wastewater Gravity Mains Age Profile (Source: HWC)

4.3 Asset Condition & Performance

As outlined in section 4.2 Hunter Water has a relatively old network by Australian standards. While it performs well against its Operating Licence (refer to Section 3.4), the performance of its infrastructure when compared against other larger Australian utilities (refer to Section 4.4) can only be considered as fair. For instance:

- Water main breaks have reduced from 45/100km in 2005/06 to 31/100km in 2010/11and is mid-range relative to other major utilities;
- The frequency of unplanned water interruptions has decreased but is still the highest amongst the major water utilities;
- The level of water loss is relatively high; and
- Sewer main breaks and chokes continue to be one of the highest relative to the other major utilities.

Hunter Water indicated the following as being major areas of concern in relation to asset condition:

- High voltage assets which is linked to the renewal program;
- Bulk supply pipelines which is linked to the CTGM management plan;
- Major water trunk mains, which has driven the trunk main management program;
- Wastewater treatment inlet works, which has resulted in a number of replacements;
- Belmont No 6 Rising Main; and
- A number of reservoirs including Cessnock No 1, Toronto No 3 and Stoney Pinch Reservoirs.

We note that the renewal of these assets has been included in the 2013/18 price submission although renewal of the bulk supply pipelines and major trunk mains will continue beyond the next price path. Renewal of the Cessnock No 1 and Stoney Pinch Reservoirs will not be required as alternative supply arrangements are available.

4.3.1 Asset Condition Assessment

Asset condition is determined through asset reliability performance monitoring and specific condition assessments.

Asset reliability performance is monitored through a system performance dashboard with reports prepared on a monthly and annual basis. Typical; parameters monitored include unplanned interruptions, sewer overflows, customer complaints main breaks, sewer blockages, sewer overflows and mechanical and electrical (M&E) asset failure.

Hunter Water takes a risk based approach to condition assessment. For low critical assets (low consequence of failure) condition is monitored based on asset performance including main breaks, sewer blockages Formal condition assessment of electrical and mechanical assets has been limited to date but Hunter Water are commenced addressing this issue.

Critical assets have a high consequence of failure. These are listed in Table 4-1. Hunter Water advised us of the status of their condition assessment process: While there has not been a formal condition assessment program for some assets (e.g. pump stations and treatment plants), day to day monitoring of condition and performance is undertaken by operational staff.

Critical Assets	Definition
Water Service	
Dams/Weirs	All dams and earth reservoirs
Treatment Facilities	All water treatment structures
Trunk mains	All water mains greater and equal to 250mm diameter
Critical Mains	Small diameter mains (less than 250mm diameter) which directly service remote townships
Critical Valve/Fittings	Valves and fittings on trunk mains
Critical Crossings	All water mains which located across major regional roads, railway lines and creek/river crossings
Reservoirs	All reservoir and tanks
Water Pump Stations	All water pump station buildings, All high voltage components, All major mechanical components, All boosted supply pump stations
Pressure Reducing Valves	All Pressure Reducing Valves
Automatic Inlet Valves	All Automatic Inlet Valves
Hydrants	All network hydrants
Wastewater Service	
Critical Carrier mains	Refer to the Critical Sewer main Strategy
Sewer Rising Mains	All sewer rising mains
Constructed Overflow Structures	All Constructed and designated overflow structures
Valves/Fittings	All wastewater pump station and rising main valves and fittings
Wastewater Pump Stations	All wastewater pump station buildings, All high voltage components, All major mechanical components
Wastewater Vacuum Stations	All Wastewater vacuum Stations
Ocean Outfalls	All wastewater treatment works ocean outfalls
Treatment Facilities	All wastewater treatment structures
Stormwater Network	
Gross Pollutant Trap	All gross Pollutant Traps
Channels	All open stormwater channels

Table 4-1 Critical Assets (Source: HWC)

Asset Class	Assets Condition Assessed (%)
High Voltage	100
Stormwater	60
Ocean Outfalls	80
Water Pump Stations	20
Wastewater Pump Stations	10
Reservoirs	100
Treatment Plants	30
Critical valves & Fittings	10
Critical Sewer Mains	100
Critical Water Mains	60
Dams & Weirs	100

Table 4-2 Condition Assessment Status (as at Sept 2012) (Source: HWC)

A key shortcoming is low asset condition coverage of both water and wastewater pumping stations and treatment works. In addition, the low coverage of critical valves should be addressed as part of the risk mitigation measures for interruptions to customers.

4.3.2 Renewals Planning

A range of approaches are used to forecast renewals expenditure. These are illustrated in Figure 4-7.

In the case of water mains four renewals models are utilised including:

- 'Nessie' curves which are projections of asset renewal expenditure based on theoretical asset life for different pipe materials;
- Water main replacement model which is a micro-model that determines whether renewals is the most cost-effective strategy for individual mains;
- PARMS (Pipeline Asset and Risk Management System) which forecasts the failure rates of pipe cohorts over time based on deterioration curves; and
- A globalised version of the micro-model.

Renewals investment decisions are based on a range of criteria including:

- Asset failures;
- Lifecycle costs;
- Risk-based; and
- Condition assessments.

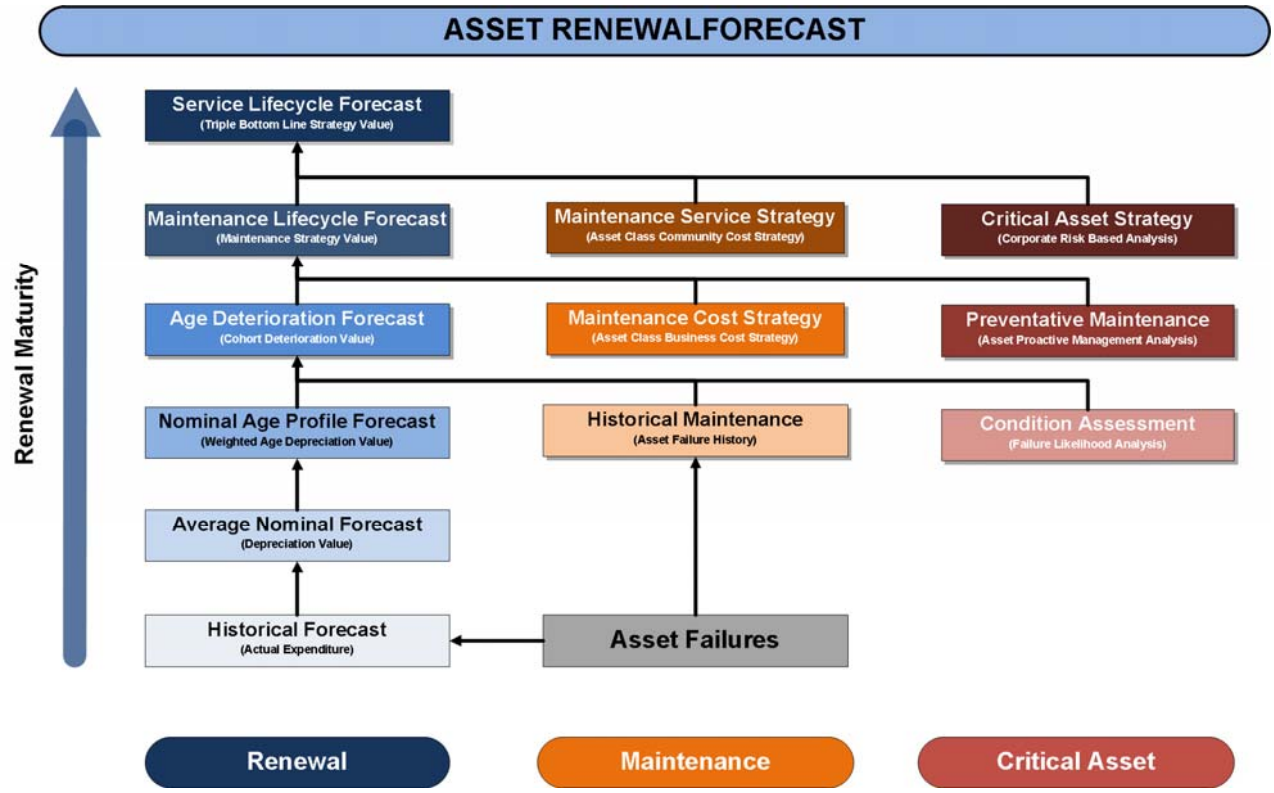


Figure 4-7 Renewals Forecasting Approach

Processes for linking asset management decisions with current and future levels of service and performance requirements are quite well developed and comparable to other major Australian water utilities. Further work will be done to model likely risk profiles of various asset classes over time based on level of investment.

4.4 Benchmarking

To benchmark Hunter Water against other utilities we have drawn on the comparative information provided by water utilities and collated and published by the National Water Commission in its National Performance Report 2010-11 for Urban Water Utilities.

For this report we present comparisons for the 100,000+ category comparing Hunter Water with other major urban utilities in Australia and have taken account of the comparisons during our review. Comparisons are shown in the following Figures 4-8 to 4-21. Care should be taken in the interpretation of these indicators as each of the utilities has different asset age profiles, system configuration, and ground conditions as well as other variations which could account for the relative performance. However, these indicators are useful in identifying relative trends.

There are a number of noteworthy trends which we discuss below.

Reducing Water Main Breaks

Main breaks have reduced from 45 breaks/100km in 2005/06 to 31 breaks/100km in 2010/11. Hunter Water's performance is mid-range for the major utilities. The reduction has occurred from the implementation of the water main renewal program (Figure 4-10). As discussed later in this report the

constrained capital expenditure in the next price path is estimated by Hunter Water to result in number of main breaks increasing by around 25% by the end of the next price path.

Reducing Frequency of Unplanned Interruptions – Water

The reduction is associated with both a reduction in water main breaks and a higher frequency of planned interruption projects, associated with a recent change in the Operating Licence. This has resulted in Hunter Water undertaking non-urgent jobs in a planned way, therefore giving customers adequate notice. However, Hunter Water continues to have the highest frequency of unplanned interruptions relative to other major water utilities (Figure 4-11). This is likely to increase over the next price path as a result of the constrained capital expenditure.

Reducing Water Quality Complaints

Hunter Water indicated that the following contributed to the reduction (Figure 4.17):

- There have not been any recent major water quality events in its surface water storages. Therefore, taste and odour complaints as a result of blue green algae by-products (ie MIB, geosmin) have not been an issue;
- The Tomago borefields have not been used since 2009 and so complaints due to high manganese levels have not been an issue; and
- Hunter Water has also been monitoring repeat water quality complaints and implemented a water quality improvement program (i.e. flushing program and communication program).

High Levels of Water Loss Through the Network

Hunter Water explained that because of the dispersed nature of the communities served, the length of main per customer was higher than the larger, more urban based water utilities. The Leakage Index (ILI) shows Hunter Water in the middle of the range of data (Figures 4.13 and 4.14).The average residential water supply per property is in the middle of the range of water agencies (Figure 4-8).

High Sewerage Main Breaks and Chokes

Hunter Water has a relatively high level of sewerage main beaks and chokes although performance has been relatively stable since 2005. It is likely that there will be a slight increase over the next price path in response to the constrained capital expenditure program. **High Sewage Flow Per Property**

The lower Hunter catchment has experienced higher than average rainfall over the past 12 months, which has resulted in increased inflow-infiltration to the sewage collection system and wastewater treatment plants (Figure 4-9).

Increased Sewerage Operating Costs

The increase in sewerage operating costs is primarily related to costs associated with wastewater treatment. More than half of Hunter Water's wastewater treatment plants have been upgraded in recent years to ensure compliance with regulatory standards and this has led to increases in electricity usage as well as increased maintenance costs associated with the more sophisticated and technically complex treatment plants. The significant electricity network price increases in recent years have also impacted the sewerage operating costs. Nevertheless, other water agencies have similar complex treatment processes and Hunter Water is showing as an outlier (Figure 4.19). Conversely water service operating costs are the lowest of the range of water agencies (Figure 4-18).

Water Service Complaints and Sewerage Service Complaints

The significant reduction in water and sewerage service complaints is associated with Hunter Water redefining the criteria for complaints classification. Originally, all complaints and enquiries were counted as well as any issue relating to those broad groups. After consultation with regulator, the definitions were

refined to the NWI criteria, which have resulted in a reduction back to core water and sewerage complaints (Figure 4.16).

Capital Expenditure

Hunter Water's capital expenditure per property (Figure 4.20) for water is relatively low as many of the other utilities undertook major source augmentation in response to the severe drought experienced from the early to late 2000's. Hunter Water has had one of the highest wastewater capital expenditures per property (Figure 4.21) in recent years which reflects its investment in the wastewater treatment plant upgrade program.

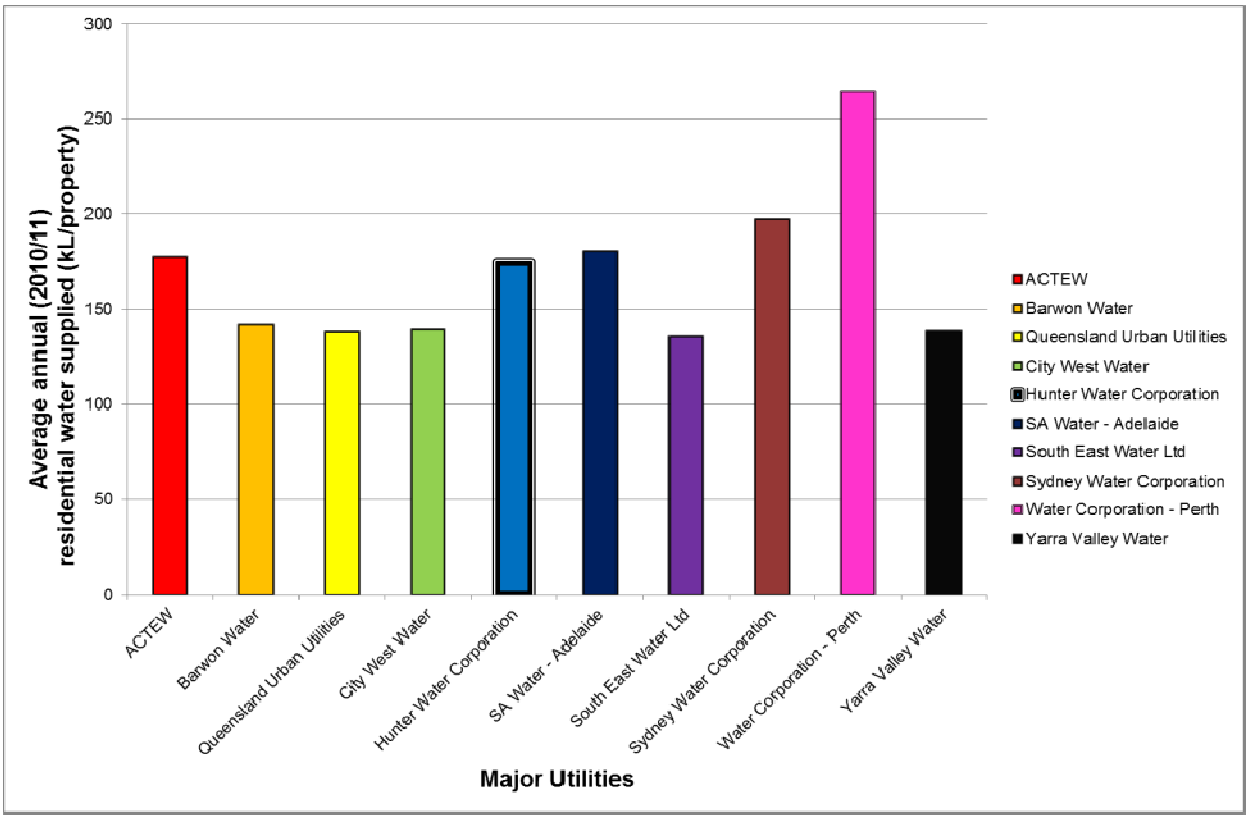


Figure 4-8 Average Annual Residential Water Supplied per Property in 2010/11

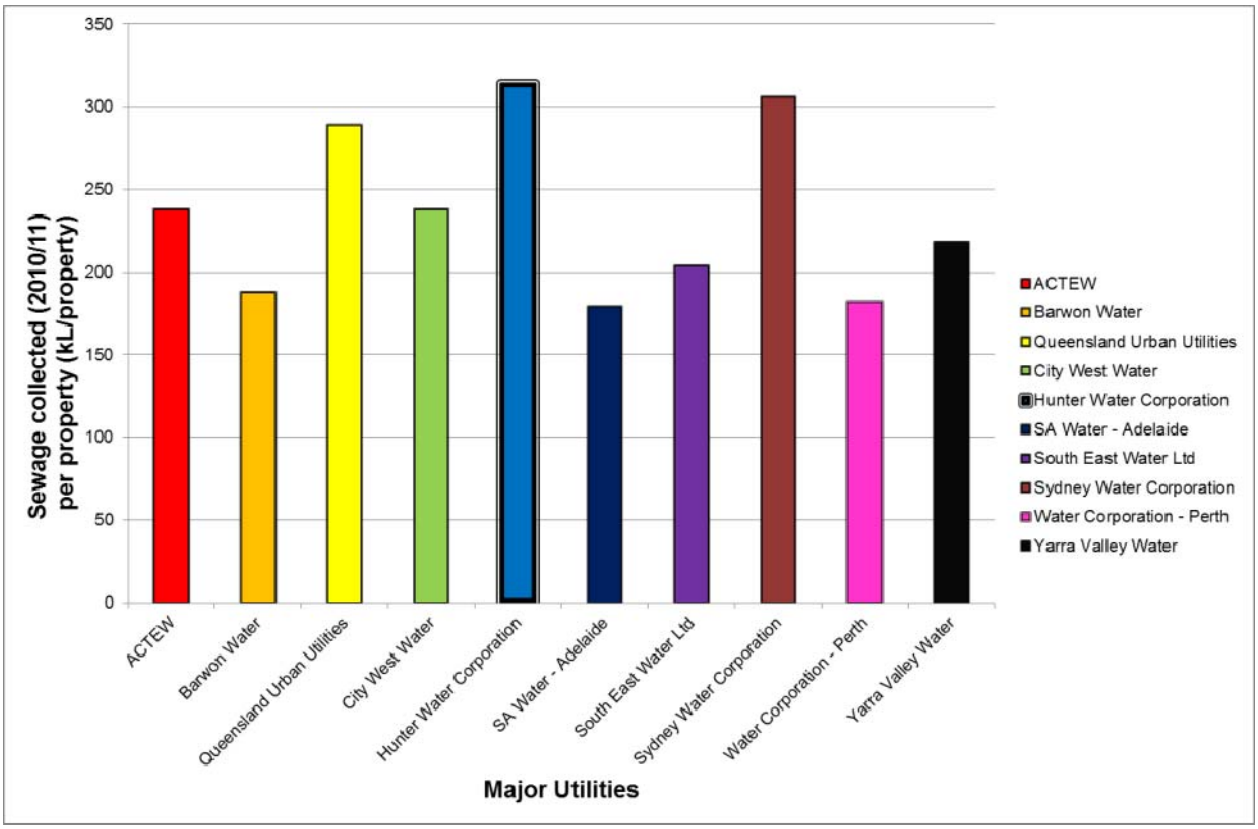


Figure 4-9 Sewage Collected per Property in 2010/11

Asset Performance Measures

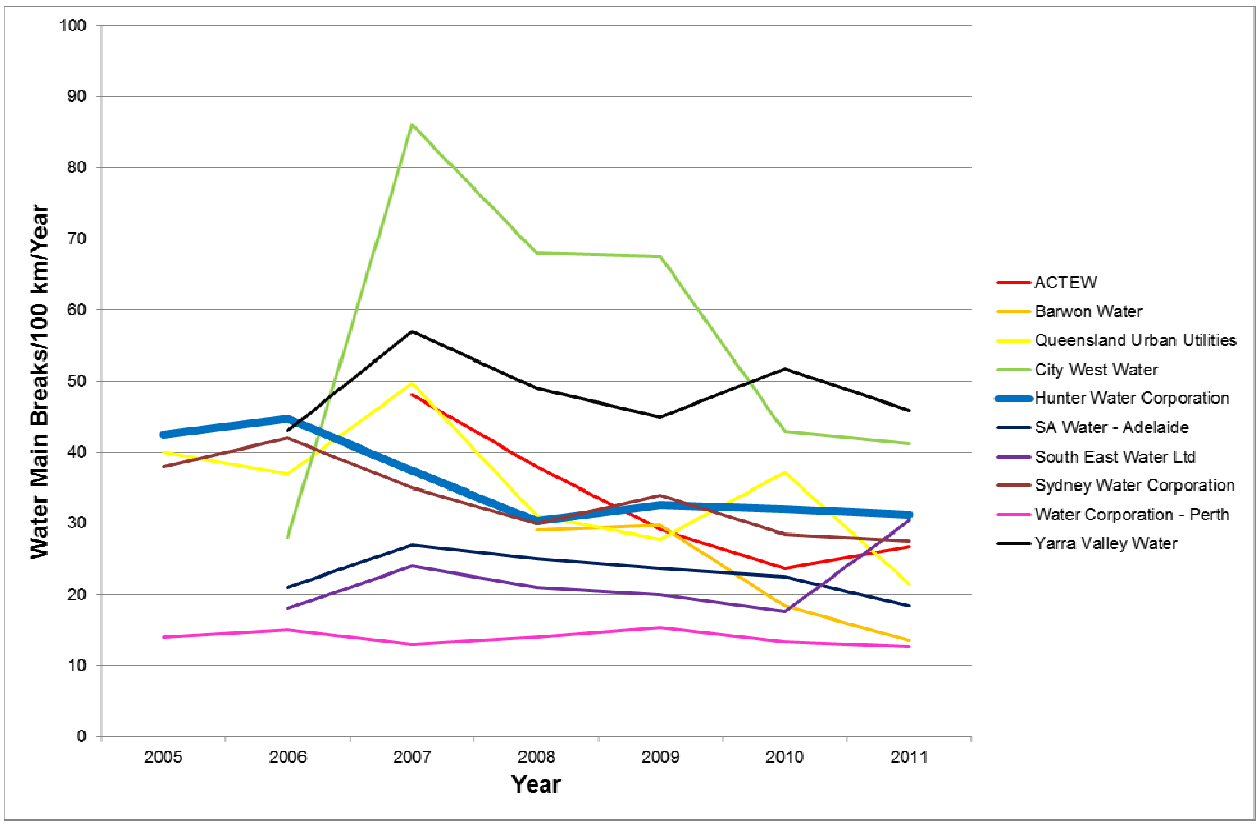


Figure 4-10 Benchmarking – Water Main Breaks

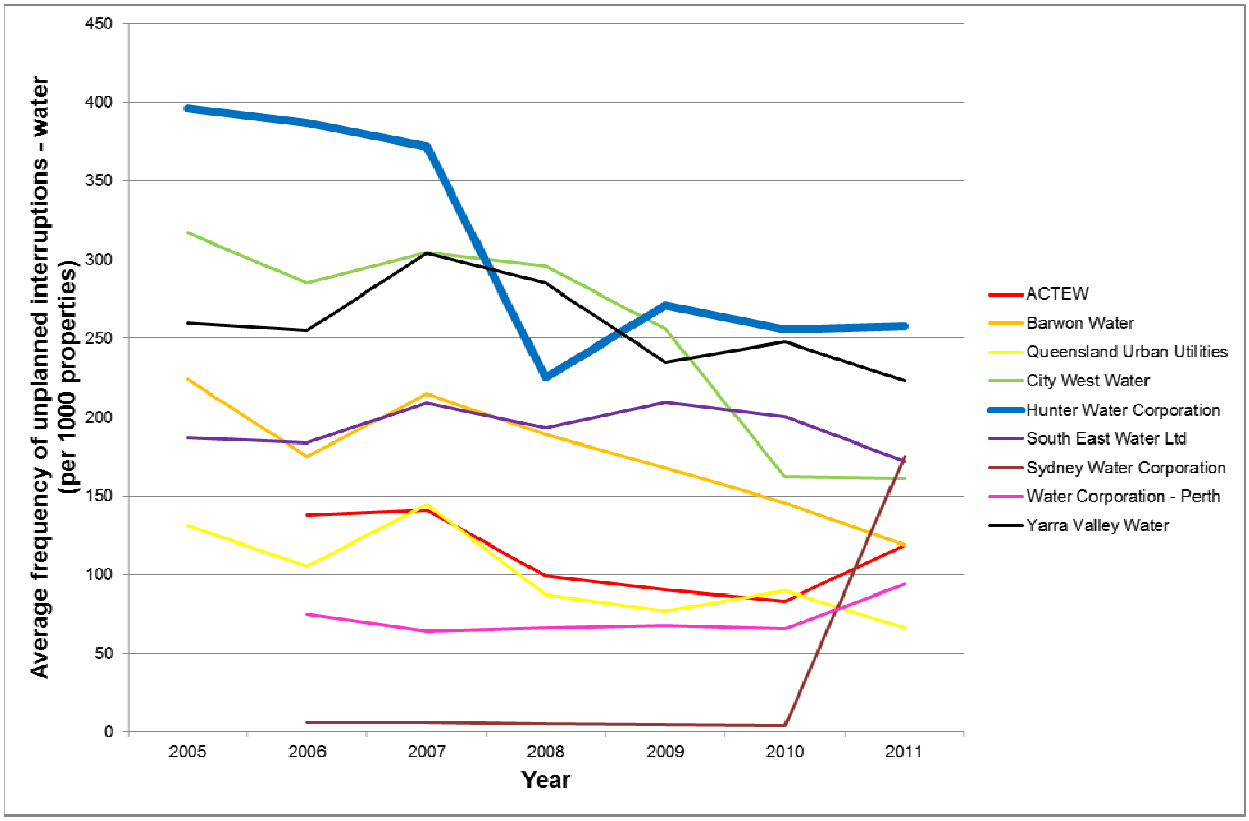


Figure 4-11 Benchmarking – Average Frequency of Unplanned Interruptions – Water

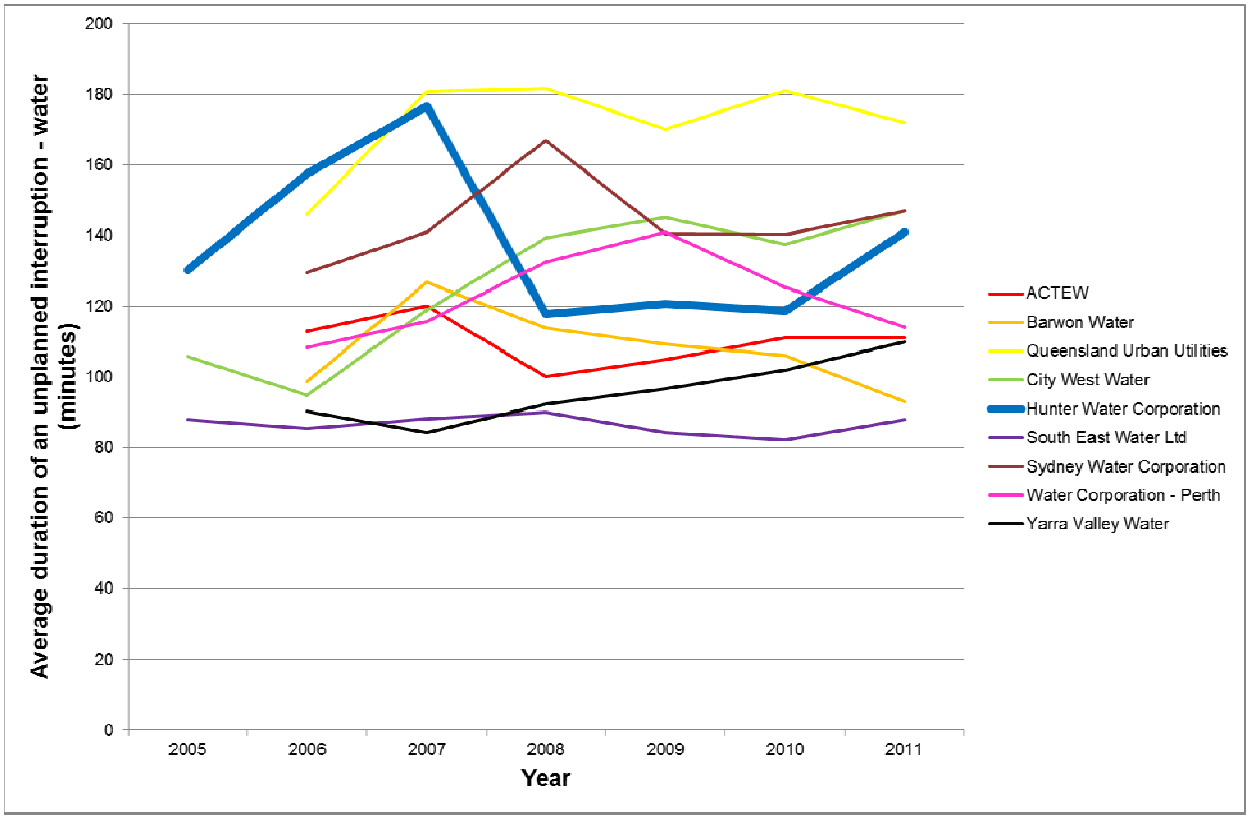


Figure 4-12 Benchmarking - Average Duration of Unplanned Interruptions – Water

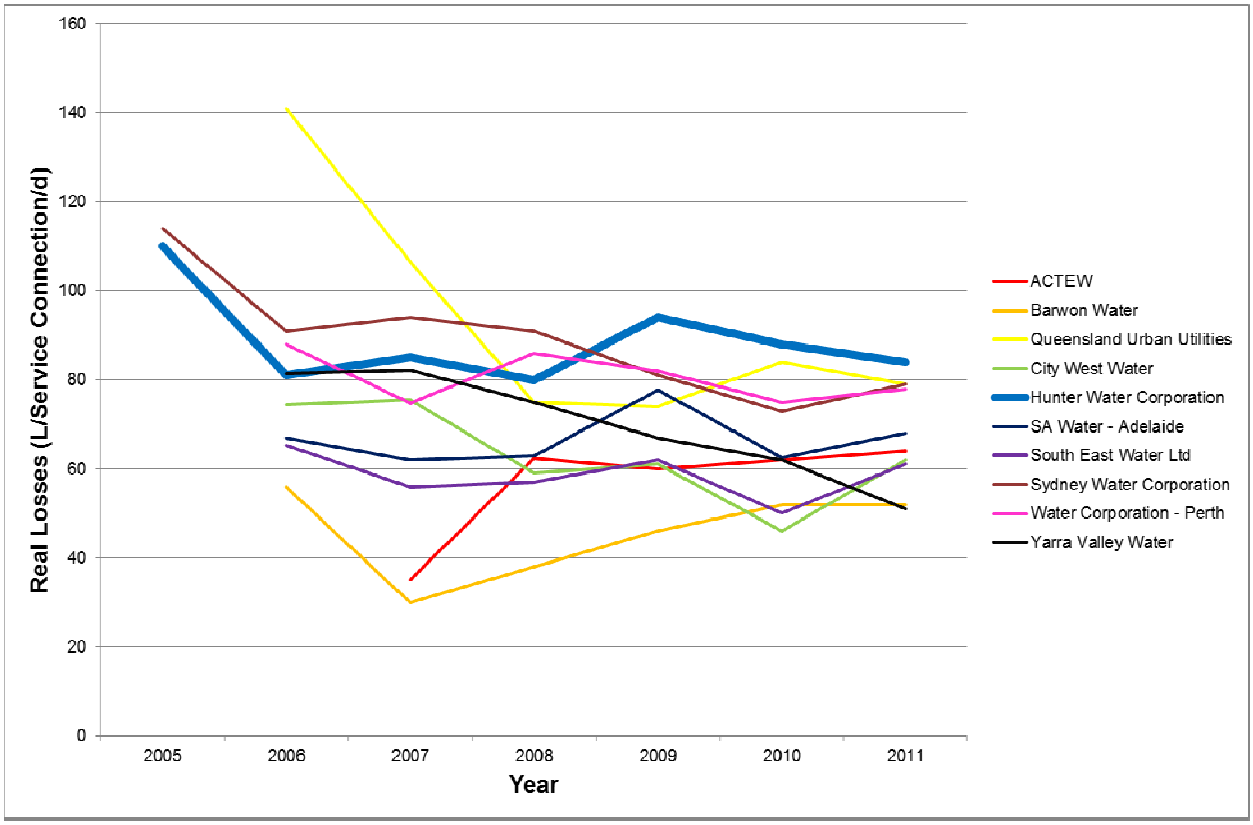


Figure 4-13 Benchmarking – Water Loss

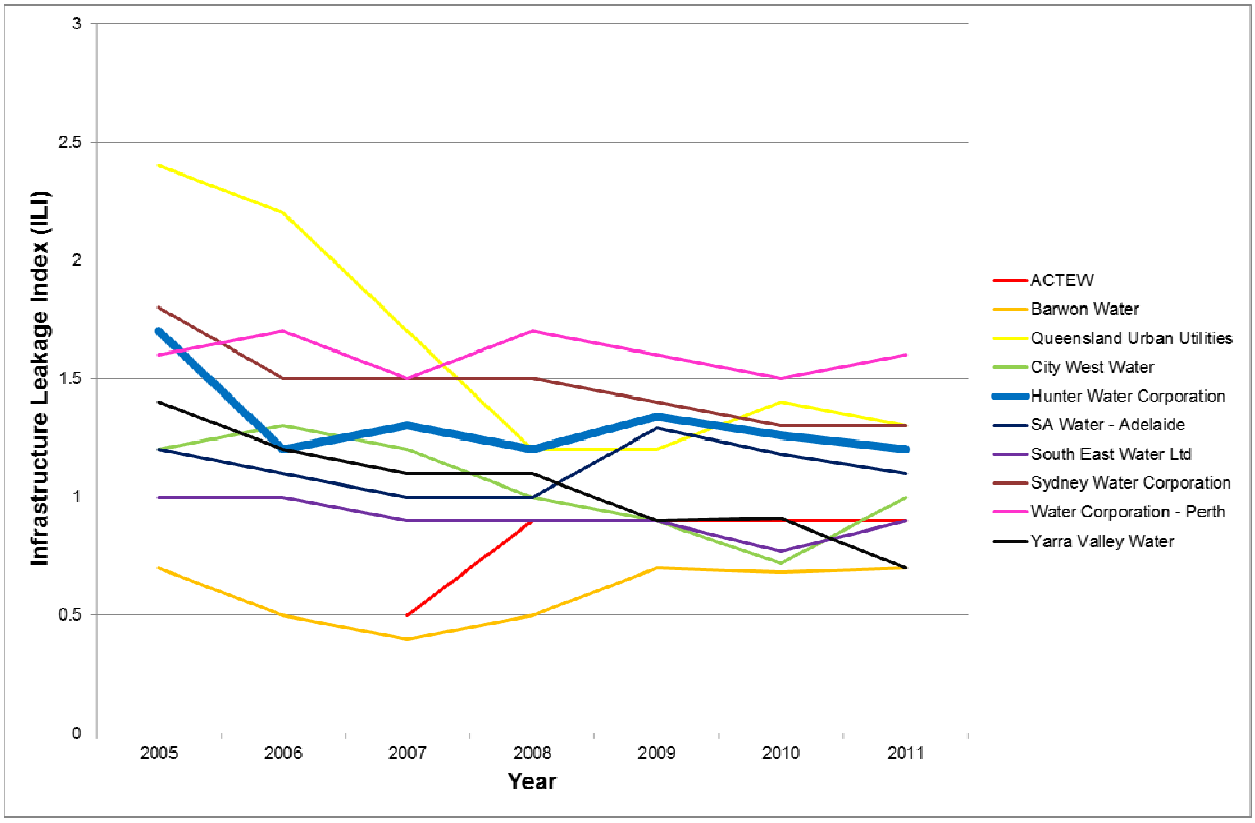


Figure 4-14 Benchmarking – Infrastructure Leakage Index (ILI)

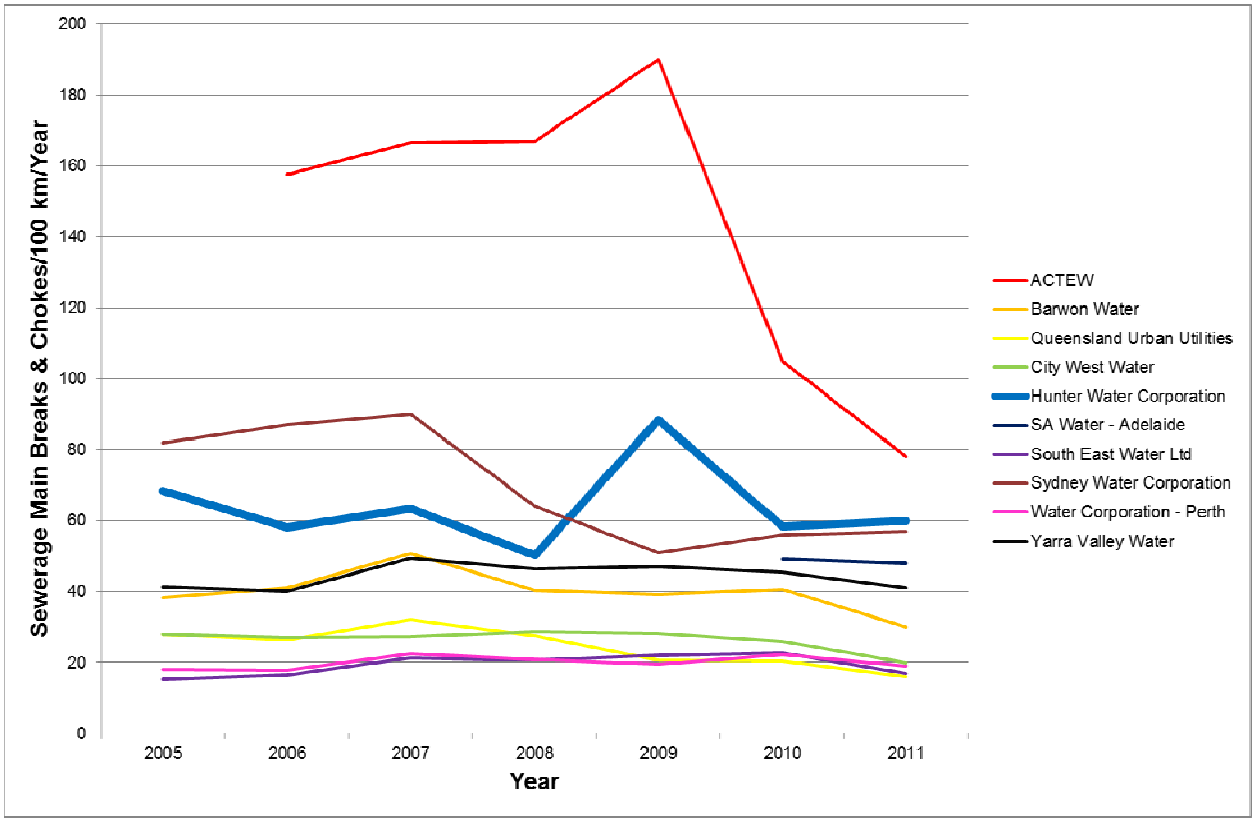


Figure 4-15 Benchmarking – sewerage main breaks and chokes

Complaints

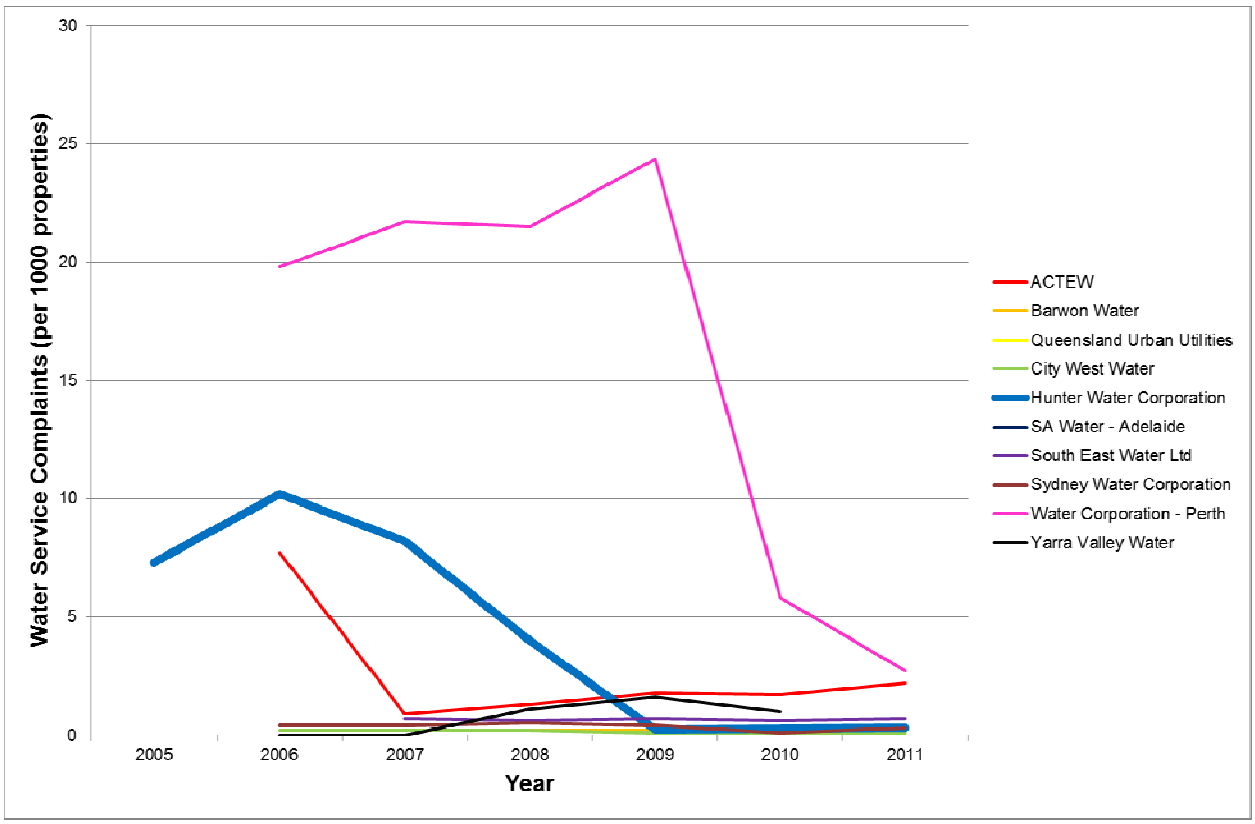


Figure 4-16 Benchmarking – Water Service Complaints

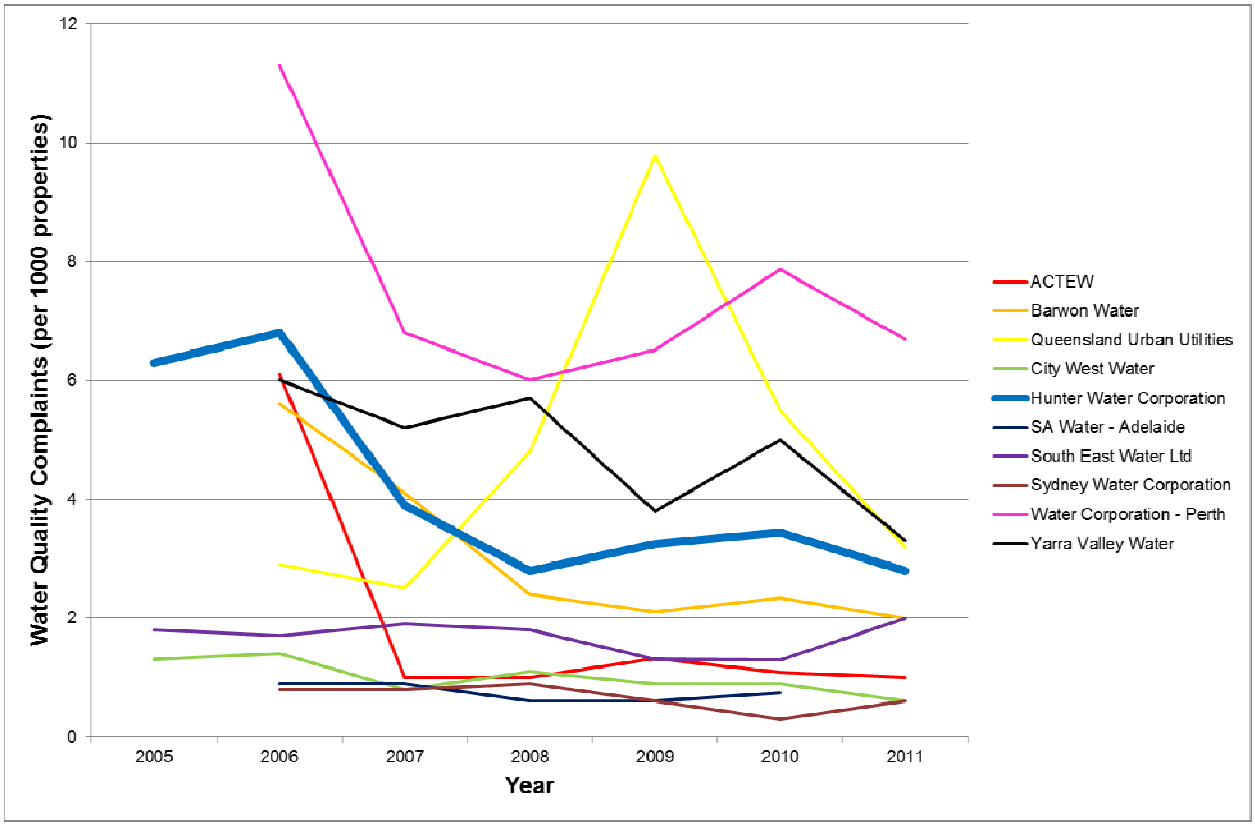


Figure 4-17 Benchmarking –Water Quality Complaints

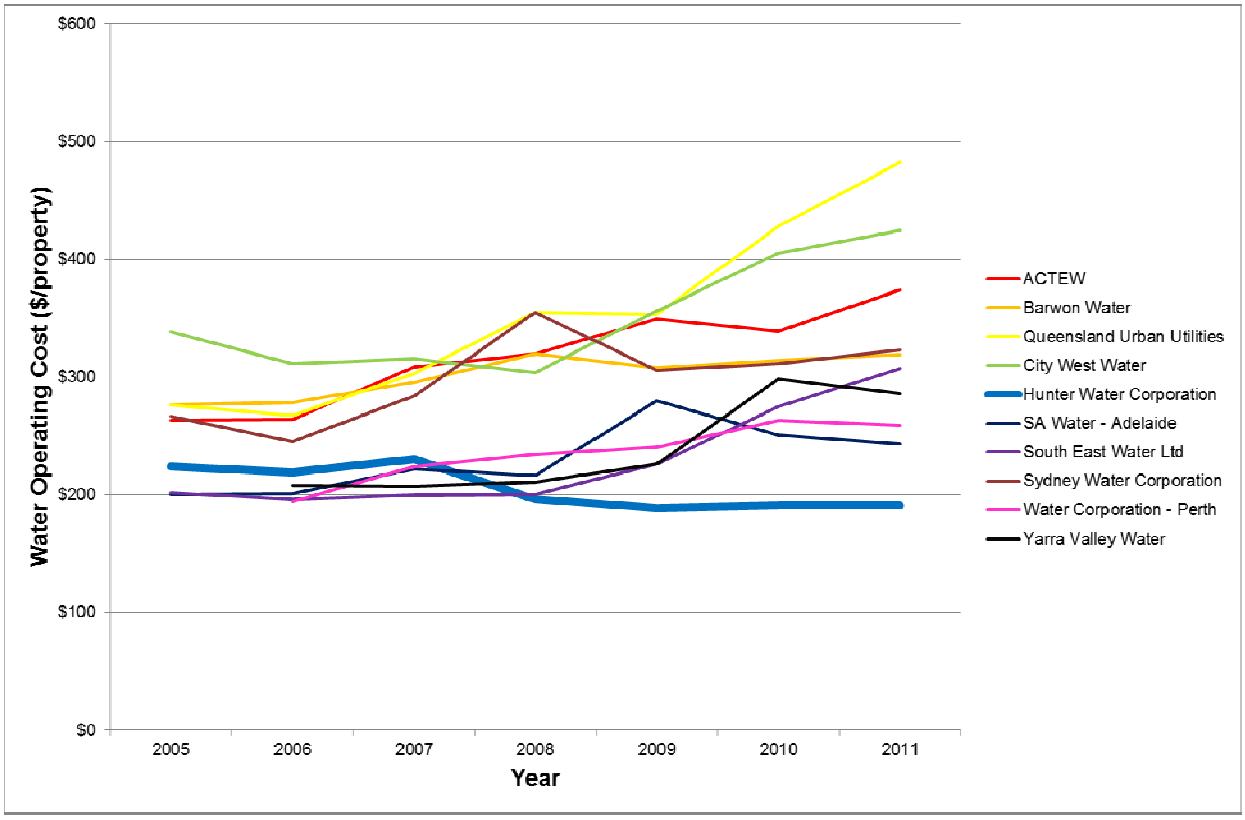


Figure 4-18 Benchmarking – Water Operating Cost per Property

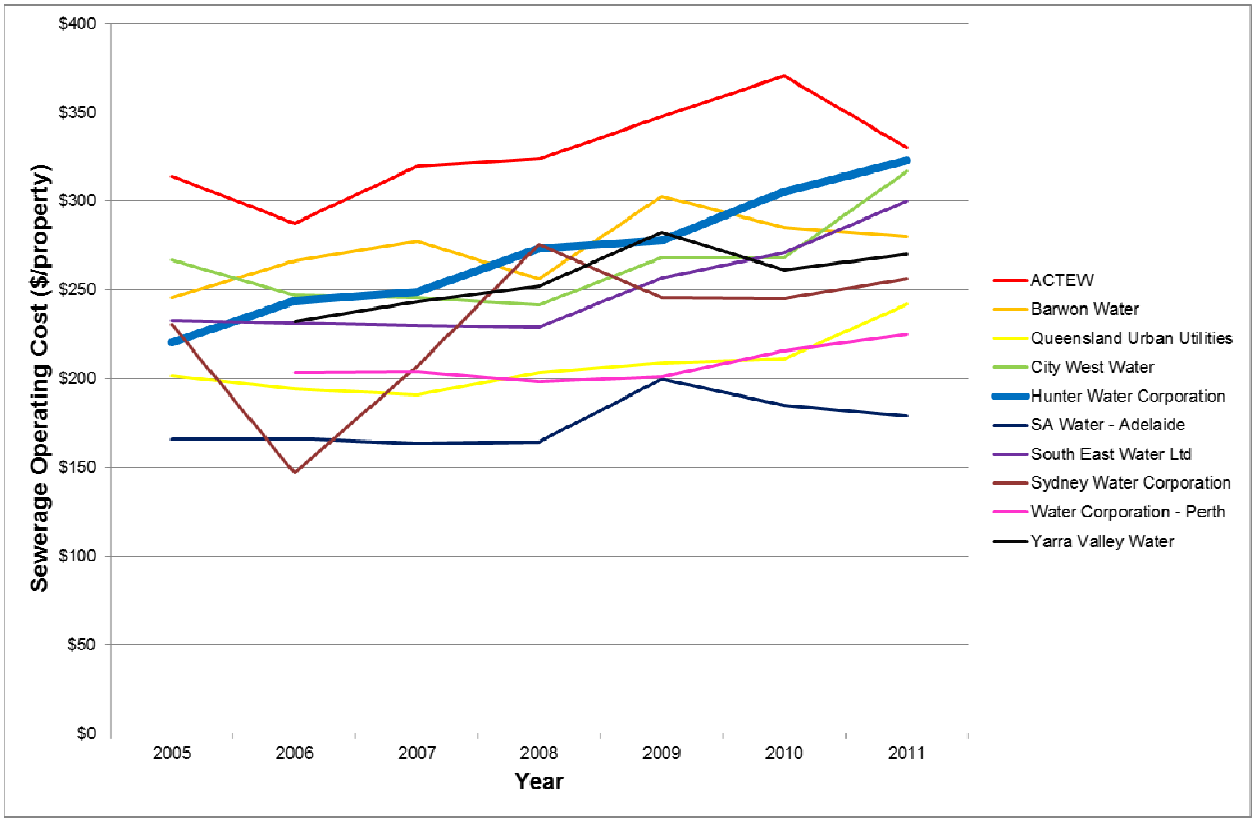


Figure 4-19 Benchmarking – Sewerage Operating Cost per Property

Capital Expenditure

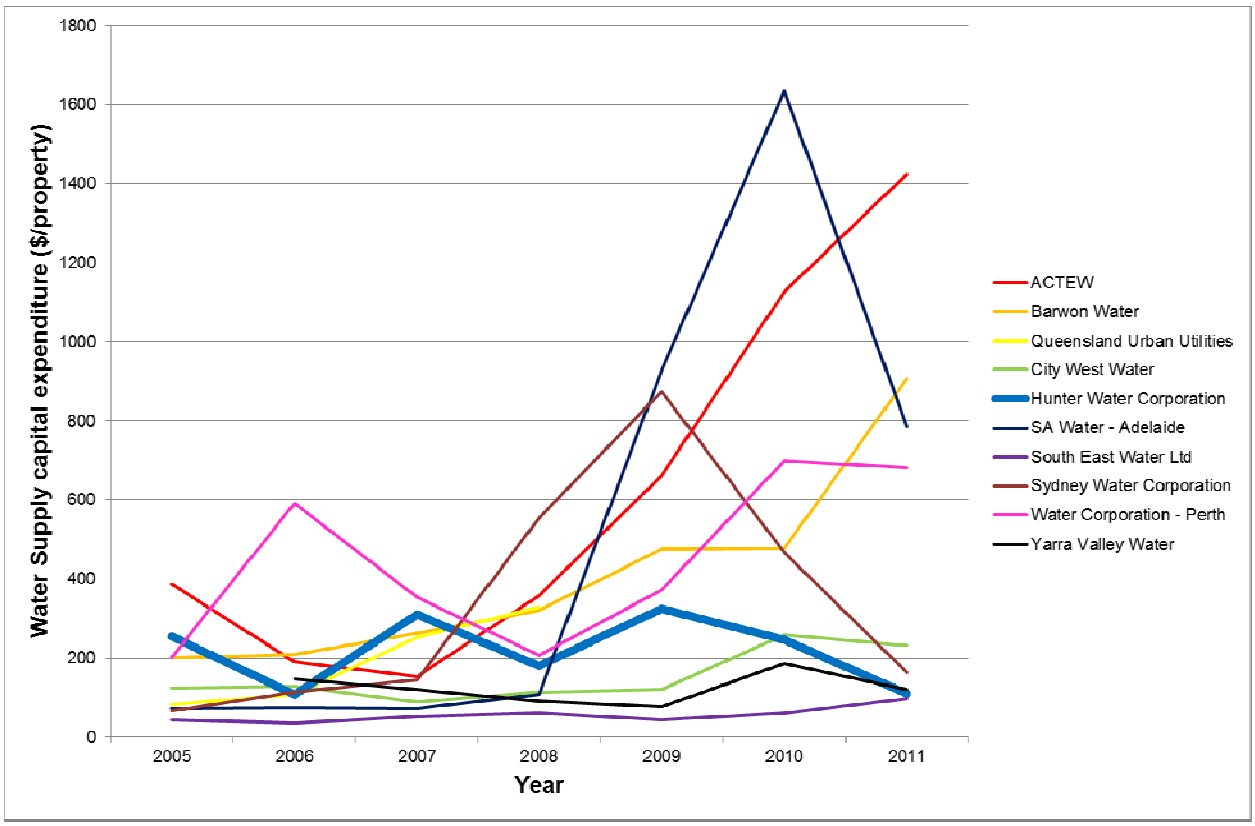


Figure 4-20 Benchmarking - Water Supply Capital Expenditure per Property

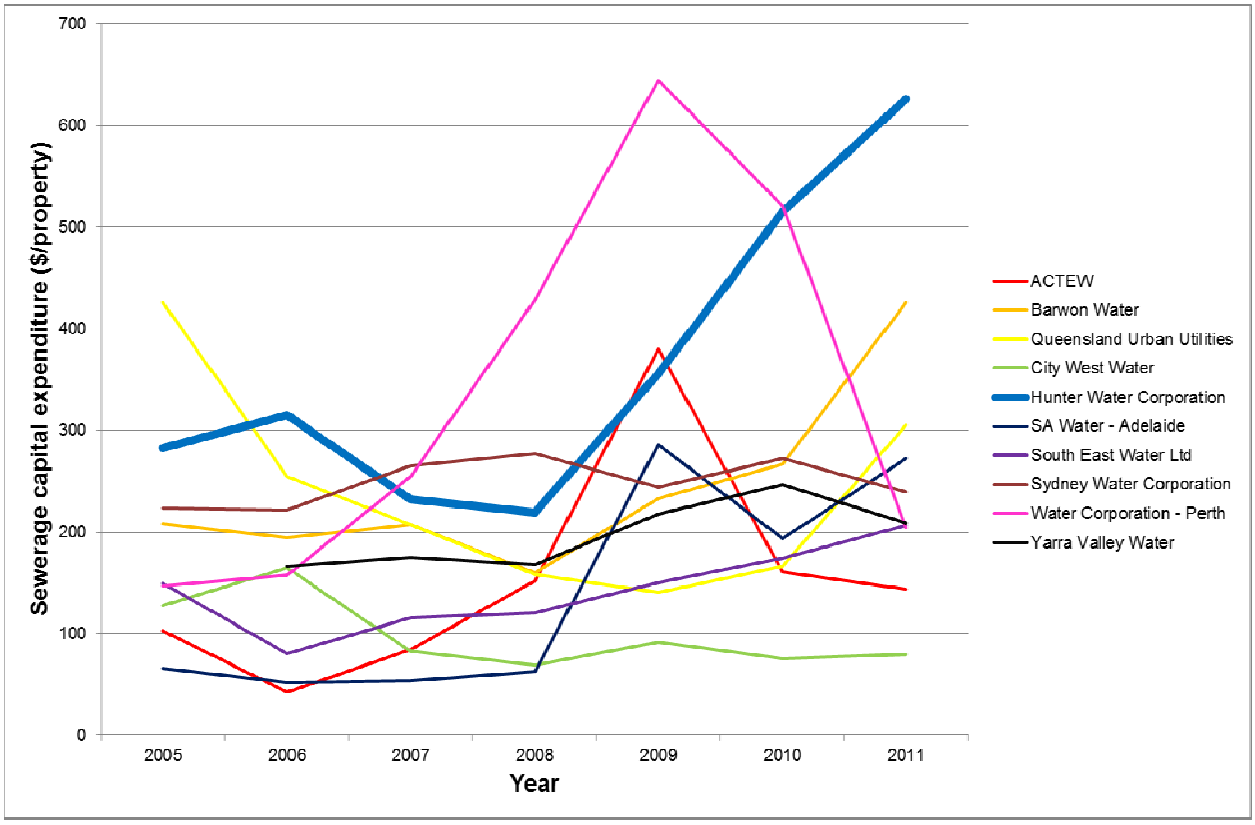


Figure 4-21 Benchmarking – Sewerage Capital Expenditure per Property

4.5 Asset Information Systems

We discuss and comment below on Hunter Water's primary asset management information systems.

- **GIS**. Intergraph FRAMME is currently being used but is being replaced by ESRI ArcGIS in late 2012 as the FRAMME product is no longer supported;
- **SCADA** is currently implemented using Serck SCX6. This product is meeting business needs and will require technical upgrades during the next price path to sustain its value and maintain vendor support;
- **Enterprise Asset Management System (EAMS)/Enterprise Resource Planning (ERP).** ERP is currently implemented using Ellipse V5.2. This product requires upgrade to maintain vendor support. The system is used to manage above ground assets. Ellipse data quality was reported to be poor and the system is not used efficiently or effectively. A program was established during the current price path called MARS to examine options for renewal / upgrade / replacement of Ellipse, AOMS and GIS. A transformation project option was originally put forward and as developed. However a more affordable Ellipse Upgrade is now being planned to commence in September 2012 and be complete in December 2013. Asset registers are stored in the Ellipse Equipment and Fixed Asset registers; and
- **AOMS** was developed in-house more than 10 years ago to manage jobs and operational license reporting for civil or linear (network) assets. The system was reported to have performed well but is

no longer supported as Hunter Water no longer develops in-house applications. The system is planned for replacement into the Ellipse Upgrade as part of the Ellipse Upgrade project.

Hunter Water's major weakness in asset management has been the dispersed nature of its information. There is a significant amount of information that is captured and because Hunter Water is not a very large utility this information can be accessed through informal means, but is not an efficient process. The upgrade of the Ellipse system and migration of AOMS into Ellipse should assists in having a more effective and efficient asset knowledge base.

Other key asset information systems include:

- Network modelling software. Infoworks is used for water modelling while Mouse is used for wastewater modelling. Mouse is no longer supported and is to be replaced with Mike Urban;
- Labware/LabData is used for managing laboratory sampling/testing;
- EDRS – Engineering Data Reporting System;
- Plan Room System is used for managing Hunter water's plans on-line;
- Oracle Utilities CC&B (Customer Care and Billing) was installed in 2006 and is scheduled for an upgrade in the next price path; and
- TRIM is used for records management.

Hunter Water has a number of initiatives to capture tacit knowledge within the organisation. Examples include:

- Communities of Practice for activities and processes;
- Knowledge Continuity exercises for key staff that are retiring and for key knowledge holders;
- Toolbox talks, team meetings;
- Post project lessons learnt meetings; and
- Rotations, secondments, etc.

Hunter Water believes that its introduction of a Quality Management System will greatly assist in capturing corporate knowledge.

4.6 Risk Management

Hunter Water has a well developed risk managed process consistent with *ISO 31000 Risk management - Principles and guidelines*. A Board approved Enterprise Risk Management Framework has been in operation since 2008. This framework is utilised to conduct an annual assessment of risks associated with the achievement of corporate objectives. The current risk profile includes 24 risks, with 11 of these tracked and reported to the Audit and risk Committee quarterly.

The concept of risk management permeates through the organisation with tools and methodologies developed appropriate to the required purpose.

Asset management strategies are risk based with assets categorised into critical and non-critical based on the consequence of failure. A proactive approach is taken to critical assets through undertaking condition assessments to determine the likely probability of failure, particularly for trunk infrastructure. Non-critical assets are operated to failure. Hunter Water has undertaken risk profiles of a number of assets. Progress in developing these risk profiles is illustrated in Figure 4-22. This indicates the scope for further development of risk profiles for water pipelines and both water and wastewater pumping stations.

A number of contingency plans have been developed for critical asset failure. Hunter Water outlined a number of actions in place to prepare for any emergency events including a Business Continuity

Framework, desktop and Major Emergency Management exercises. The reduced capital expenditure program including a smaller renewals program over the next price path will require further development of contingency plans to mitigate risk.

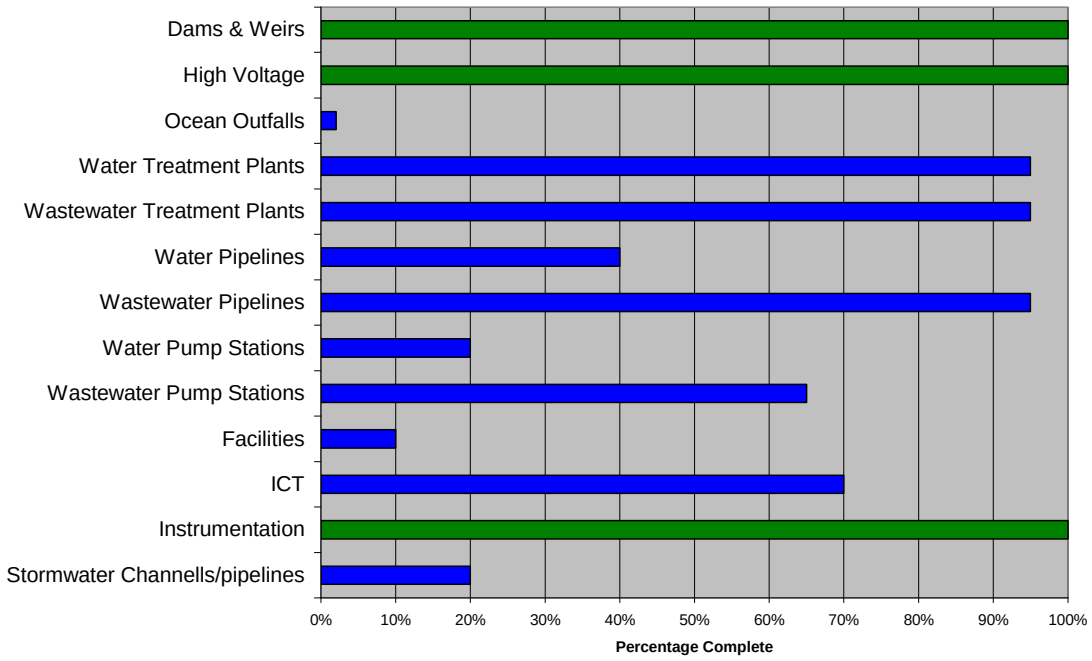


Figure 4-22 Asset Risk Profile Progress Status (Source: HWC)

4.7 Skills and Resources

Hunter Water has well developed capability planning and skill gap determination processes supplemented by training and skills development programs to ensure that staff have the necessary competencies. Performance reviews are undertaken annually and at mid-points. Critical positions have been identified and succession plans implemented for these positions. Development plans are in place for high potential staff. Resourcing requirements are addressed through critical position reviews and talent management processes.

Hunter Water faces strong competition for technical resources from other sector, particularly the mining sector. Specific skills shortages are a major challenge for resourcing particularly in the ICT, engineering and technical areas. Various initiatives have been instituted to address the issues wherever possible.

4.8 Continuous Improvement

Hunter Water has a centralised business improvement team. A Continuous Improvement team was formed in 2007 to execute improvement projects using the Lean Six Sigma methodology. This team was then formed into a Business Improvement team in 2010 to focus on high priority corporate initiatives.

Continuous improvement initiatives also occur within divisions and groups applying a bottom-up approach to generating initiatives. Directors Awards and Lightning Rewards acknowledge staff and team performance in improvement initiatives. Examples of identified improvements were provided.

Hunter Water is introducing an integrated quality management system which will provide a structured approach to continuous improvement.

4.9 Growth

For strategic level planning (e.g. the Lower Hunter Water Plan), growth projections are based on average increase residential connections since 1988 (3,000 residential connections per annum) and average population growth over the past 25 to 30 years of 1% to 1.12% per annum. The projections are reported to be broadly consistent with the NSW Department of Planning *New South Wales Household and Dwelling Projections: 2008 Release* but significantly less than the Department's *Lower Hunter Regional Strategy, 2006* (4,600 residential connections per annum).

For more detailed zonal/catchment planning Hunter Water has developed the Growth Mapping Project which is a Geographic Information System (GIS) framework that:

- Unifies historic census dwelling and population data, Hunter Water customer connection data and urban planning data and forecasts; and
- Produces a spatial dataset of growth areas with projected future growth.

From our viewing of the process, we have concluded that the Growth Mapping Project is a powerful planning tool that is close to leading edge.

Demand Projections

Up until 2011, Hunter Water used a spreadsheet model to project future water demand. It was based on a highly disaggregated analysis of consumption trends from individual customer categories. The total supply requirement was determined from factors such as the growth in customer connections, customer usage patterns, demand management programs and the impact of residential and industrial recycling schemes.

Recommendations for improvements to Hunter Water's demand forecast model and methodology have been made through consultant reviews over the last four years. The reviews were undertaken by SKM in 2008 as part of the IPART pricing submission and by the Institute for Sustainable Futures (ISF) in their review of Tillegra Dam. The key recommendation was that the methodology could be strengthened by greater use of statistical analysis and reduced reliance on quantitative estimates of future customer behaviour.

The National Water Commission recently funded an Integrated Resource Planning (IRP) for Urban Water project. The project was led by the Institute of Sustainable Futures and involved collaboration with WSAA, the CSIRO and several local governments. The project comprised a series of resource papers, case studies and an Integrated Supply–Demand Planning (iSDP) model.

The iSDP model is a type of end-use model which is based on a disaggregated analysis of consumption in individual customer categories comprising residential, industrial, commercial and unaccounted for water. Individual customer categories can be broken down further into individual end uses. These include toilets, showers, taps, washing machines and gardens, etc for residential. This is to better understand the distribution of end-uses and thereby better target potential areas for demand reduction in future options analysis. Hunter Water has used this model to determine water demand forecast for the next 50 years.

Hunter Water's demand model was recently reviewed by ISF. They confirmed that the model was being successfully applied by Hunter Water and made a number of recommendations for refining the model inputs.

Figure 4-23 provides a comparison between current and previous residential demand forecasts. The revised water demand forecast shows a significantly lower rate of growth which has a material impact on future capital expenditure.

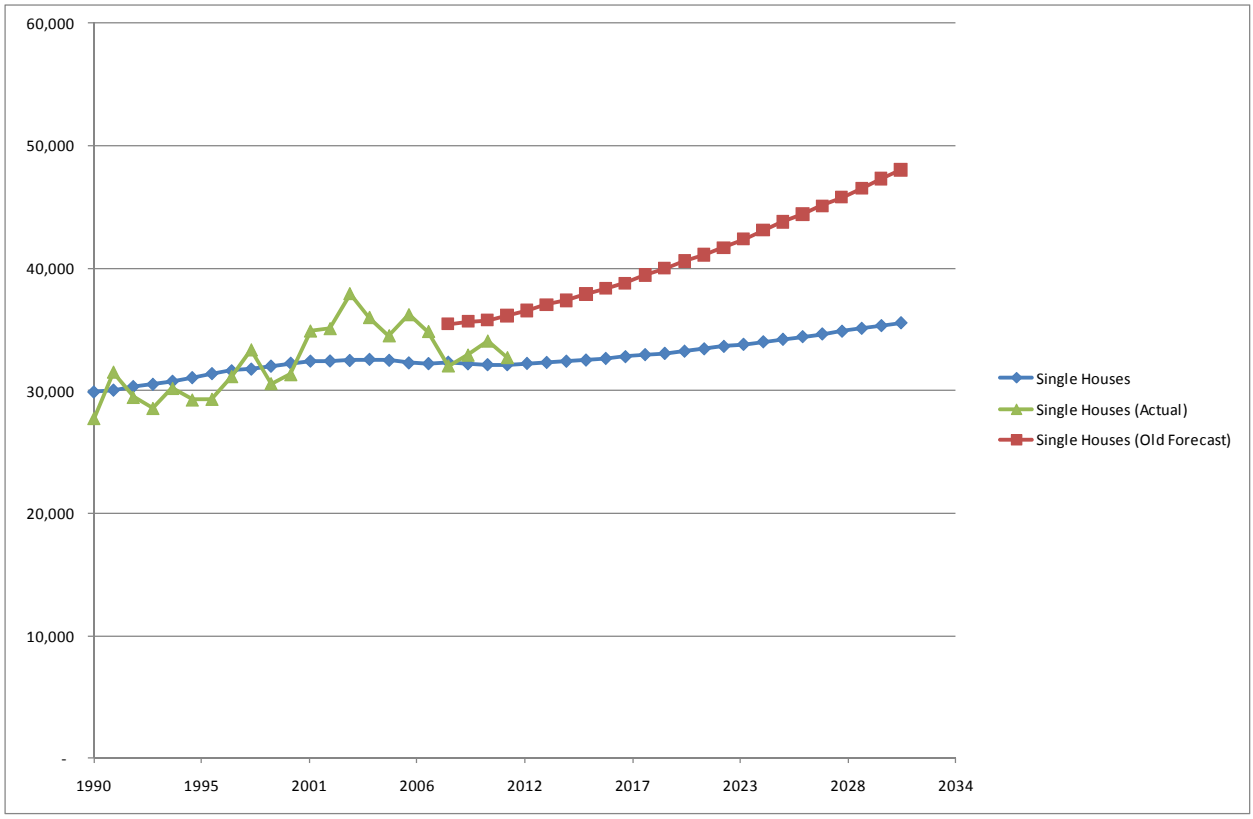


Figure 4-23 Residential Demand Forecast Comparison (Source: HWC)

4.10 Conclusions

The infrastructure base is relatively old by Australian standards with 4.5% of reticulated water mains and 2% of sewers being over 100 years old. However, around two-thirds of these mains are under 50 years old.

Hunter Water has a tradition of investing in asset management initiatives and continues to seek improvements in its asset management processes. Its asset management framework is comprehensive and supporting risk management processes are well developed. We note that a number of documents including the Asset Management Policy were still in a final draft stage and require finalization. A major weakness is the dispersed nature of the asset management information systems. The upgrade of Ellipse and migration of AOMS data into Ellipse should improve the efficiency and effectiveness of its information management.

Asset condition information has been assessed for a range of assets although the extent of information on water and wastewater pumping stations and treatment plants is limited.

Processes for linking asset management decisions with current and future levels of service and performance requirements are quite well developed and comparable to other major Australian water utilities. Further work is needed to model likely risk profiles of various asset classes, particularly water mains and pumping stations, over time based on level of investment.

While Hunter Water performs well against its Operating Licence the performance of its infrastructure when compared against other larger Australian utilities can only be considered as fair. As a result of the constrained capital expenditure program it is likely that Hunter Water's performance relative to other major

utilities will decline for indicators such as water main breaks, frequency of unplanned interruptions and sewerage main breaks and chokes, assuming that current trends continue in these utilities.

Processes for estimating service demand have been refined through the development of the Growth mapping tool and the iSDP end-use model. This indicates a significantly lower rate of growth than previous forecasts and has an impact of capital expenditure.

Currently, Hunter Water is adopting the *Aquamark* benchmarking tool, with the asset management framework, plans and strategies aligned. Over the next four years, Hunter Water proposes to review the new International Standard for Asset Management ISO 55000 and will consider adopting the standard with the next Operating Licence. We consider that Hunter Water's asset management framework already broadly aligns with the draft requirements of ISO 55000.

The WSAA Asset Management Performance Improvement Project has highlighted a number of potential leading asset management practices within Hunter Water and has also identified a number of potential improvement initiatives which Hunter Water will be pursuing.

5. Capital Delivery Processes

Capital delivery processes are governed by the ISO9001:2008 certified Asset Creation Framework (ACF). The system's scope covers the initiation, development, delivery and completion phases of the project life cycle and aligns with the corporate Gateway Approval Process. The ACF forms the quality management system that project managers follow during the abovementioned project phases to deliver capital infrastructure projects at Hunter Water.

5.1 Investment Appraisal

The Planning Group is comprised of three teams. The **System Planning** team provides planning support, water network upgrade planning, wastewater network upgrade planning, and wastewater treatment plant upgrade planning.

The **Water Resources** team is responsible for the strategic management of Hunter Water's drinking water catchments, water storages and water treatment plants.

The **Environment & Sustainability** team provides support to ensure Hunter Water meets environmental compliance, development of energy efficiency and water efficiency programs and other environmental initiatives

The planning process includes:

- Understanding key influencing factors (growth, asset performance, regulatory requirements etc.);
- Assessing capacity and risks;
- Adjustment of the timing and/or scope of existing proposed works in the Capital Portfolio;
- Preparing revised or new strategies where needed;
- Obtaining Gateway 1 approval to include asset upgrade proposals in the Capital Portfolio based on these strategies; and
- Detailed options analysis and preparation of business cases to obtain Gateway 2 approval to commence projects.

Planning is guided by a range of relevant Australian guidelines and the WSAA Code, Hunter Water Edition. Consideration of non-asset solutions is embedded in the planning and risk review process. A number of examples of using advanced planning techniques to determine the optimal solution, either capital, operating or a combination were provided. These examples included:

- Intensive marine environmental assessment studies being undertaken at the Burwood Beach and Boulder bay wastewater treatment outfall discharges to determine whether improvements to effluent quality proposed by EPA are warranted;
- The Bulk Water strategy which provides a holistic and integrated approach to water quality management resulting in the deferral of a major capital upgrade of the Grahamstown Water Treatment Plant; and
- Operational improvements can be recommended to better utilise parts of the water and wastewater network which have spare capacity, e.g. pressure rezoning, upstream shutdown controls for wastewater pump stations, and cross connections to transfer excessive wet weather flows from one part of the sewer network to another.

The first step in option analysis forms part of Hunter Water's servicing strategies, capacity reviews or upgrade strategies. These investigations set performance objectives, and identify scope and price of broad

scale options. A preferred solution that meets the objectives and has the lowest NPV is then recommended for adoption in the future capital works portfolio.

Hunter Water then typically undertakes a more detailed options study one to two years before commencement of design. This involves more in-depth constraints mapping, review of demand projections, review of relevant technologies and cost estimating to confirm the preferred option to meet the performance objectives.

For simple projects a life cycle cost analysis, typically in the form of a financial NPV, is used to determine the preferred option. For more complex planning projects the life cycle cost analysis may include system impacts and/or avoided or deferred costs. Options may also be distinguished on the basis of their direct (Scope 1) greenhouse gas emissions by adding a cost proportional to the emissions. Some projects have significant technical, environmental or social benefits. In this case an economic analysis may be undertaken, either as a cost/benefit analysis or multi-criteria analysis (MCA).

Projects over $5m are subject to subject to Technical Advisory Groups (TAG) and Sub-Portfolio Committee review prior to approval of the business case by the Expenditure Review Committee which consists of Executive managers including the Managing Director, Chief Operating Officer and Chief Financial Officer. The TAG is a group of subject matter experts created to assist the project managers and controllers in developing robust business cases, documented through the Gateway process. The use of the TAG prior to submission of the Gateway 2 recognises that early stakeholder involvement provides the greatest opportunities for shaping the project. Involvement at later stages focuses more on efficiency of delivery and other project refinements.

5.2 Cost Estimating Process

Cost estimating processes are guided by Hunter Water's *Capital Project Estimating Guidelines (V2.3)* which were initially developed in 2009 and have undergone regular review and update since that period. The performance goal of this estimating guideline is to:

- Achieve a variance of less than 25% between forward program budgets (preliminary estimates at Gateway 2) and final capital project costs; and
- Achieve an even distribution of estimates above and below the final capital project costs (50% above and 50% below preliminary estimate at Gateway 2).

Hunter Water has also produced a document *Operating and Maintenance Cost Estimating Guideline – Water and Sewer.* It uses a range of estimating techniques depending on the asset type, project value project and the location of the project within the project lifecycle/ Gateway review stage. These techniques include parametric estimates (based on previous Hunter Water projects), first principles and risk-based estimation using Monte-Carlo simulation. Estimates undergo peer review and approval process. Other methods used to develop appropriate estimates include:

- Development of standardised estimating tool for network and pump stations;
- Development of estimating schedule template;
- Independent external estimators engaged to prepare estimates using first principles approach including risk based methodology (Monte Carlo analysis);
- External estimating experts review cost tables for estimating tool that is used to prepare estimates for network and pump station assets;
- Cost escalation consideration including the review of industry construction cost reports to determine industry trends (BIS Shrapnel);
- Estimating performance and variation analysis is reviewed annually in Capital Works Committee;
- Data capture from tendering process is also used to analyse estimating performance.

We have compared the contingencies applied by Hunter Water and compared these to relevant guidelines as shown in Table 5-1. The contingencies applied appear reasonable at project level although there is scope to derive a separate lower program contingency using a statistical approach. Our experience is that leaving too much contingency at project level does not encourage project managers to drive efficiencies.

Gateway	Estimate type	Hunter Water	NSW Government[3]	Queensland Government[4]
1 Initiation (need identified)	Indicative (order of cost)	35% – 50%	25% - 50%	40% - 70%
2 Request project funding (business case development)	Preliminary	25% - 30%	15% - 25%	30% - 40%
3 Request delivery funding (pre-tender)	Detailed	10% - 15%	10% - 15%	20% - 30%
4 Request award of delivery project (pre-contract award)	Implementation	5 – 10%	5% - 10%	

Table 5-1 Application of Contingencies

Hunter Water provided a report which reviewed the accuracy of capital project estimating performance through analysis of project variations to the authorised budgets at Gateway 3 for capital infrastructure projects for 2012.

The report indicated that:

- The ratio of contract award sum to pre-tender estimate moved from 1.05 to 0.87 from 2010 to 2012. This suggests that the 5% potential savings from cost estimation proposed for the next price path is likely to be achievable; and
- Contract variations were 3.29% of the total authorised amounts in 2011/12 compared to 3.9% in 2010/11.

The report concluded that estimating performance had improved markedly since the introduction of the Capital Projects Estimating Guidelines in November 2009.

From the above information we conclude that program and project control during the construction phase is rigorous. There may be some opportunity to further refine estimates in the business case and pre-tender estimating stage. However, as noted in Section 3.5 Hunter Water has already reduced the cost estimate of most projects over the next 10 years by 10%, of which 5% relates to costs estimates, which suggests that there may be limited opportunity to further reduce the cost estimates.

A desktop internal audit report, dated December 2011, on the "top 25" projects in terms of capital expenditure was carried out to determine if the capital projects had been developed in compliance with the estimating guidelines. The overall conclusion was positive with improvements identified on the level of information contained in Gateway forms for some projects.

5.3 Project Prioritisation

Hunter Water has recently developed a portfolio management approach for determining capital investments. The approach is based on the UK OGC (office of Government Commerce) Management of Portfolios Guide. This approach provides better integration with other OGC approaches such as PRINCE2, Managing Successful Programs and the Guide to Portfolio, Program and Project Offices. The prioritisation process includes two stages, prioritisation followed by balancing.

[3] NSW Government Procurement Guidelines, Draft Capital Project estimating (for Construction), Dec 2006, NSW Dept of Commerce
[4] Project Cost Estimating Manual, Fourth Edition, July 2009, Queensland Government, Department of Main Roads

Prioritisation lists each program or project in ascending order of priority. The prioritisation scores are developed based on four key criteria:

- Contribution to meeting strategic objectives (value);
- Contribution to meeting regulatory requirements (compliance);
- Ability for timing and/or scope to be changed (forced – no opportunity to change and constrained – risk to change); and
- An assessment of the risk and complexity of delivering the project or program (achievability).

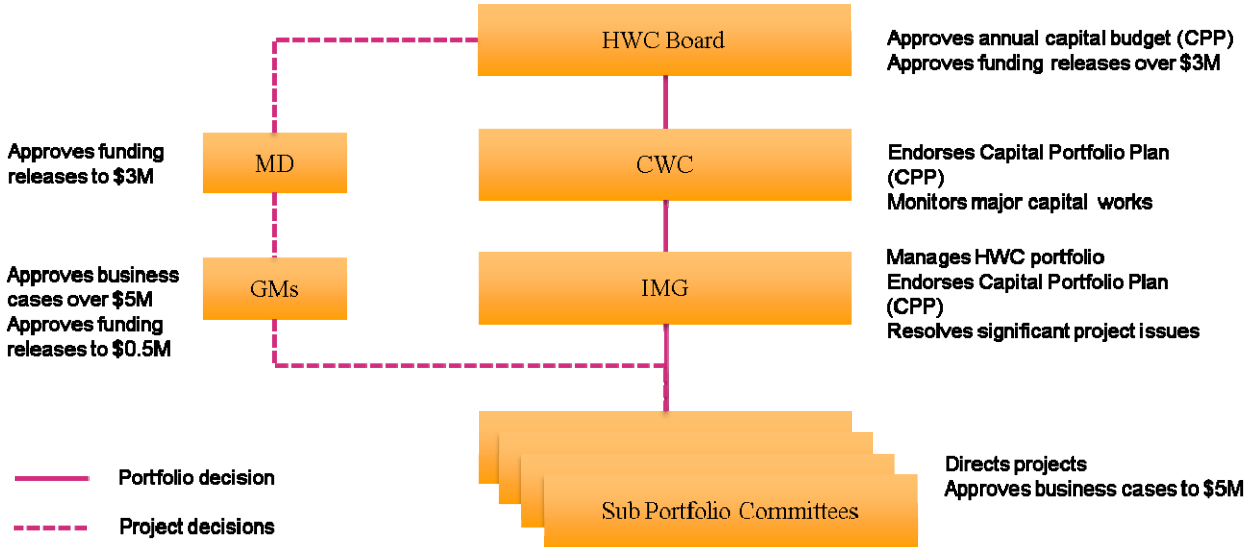
Balancing aims to find the ideal mix of programs and projects based on various criteria. It involves looking at the portfolio from a number of different perspectives to determine the best mix. The following criteria can be considered when balancing the portfolio:

- Budget categories/funding source;
- System type – transport, treatment, distribution, supply, ICT, etc.;
- Asset outcome – new verses replacement;
- Commitments to regulators, stakeholders, shareholders;
- Resource impacts – the balance between designs and construction;
- Percentage contribution to each strategic objective and balance between value and compliance; and
- Portfolio risk and achievability perspectives.

5.4 Control and Approvals Processes

Hunter Water has a mature project and portfolio governance approach. At the portfolio level, investment decisions are based around prioritisation and balancing of the portfolio as a whole. At the project level, investment decisions are based around the project business case. Those projects whose business cases continue to meet value for money requirements and contribute sufficiently to Hunter Water's strategic objectives join/ remain in the portfolio.

A summarised version of the framework is shown in Figure 5-1.



MD – Managing Director

GM – General Manager

CWC – Capital Works Committee

IMG – Investment Management Group

Figure 5-1 Capital Approvals Process

Hunter Water implemented a Gateway approval process in 2008 that provides formal points (gates) to document and review key information relative to a project, as well as provide the opportunity to develop and review the project business case using up to date information to ensure that a project is still worthy of continuation. The process was formally reviewed in 2011 to strengthen and streamline the process providing greater integration with other parts of the asset creation process. The process is illustrated on Figure 5-2.

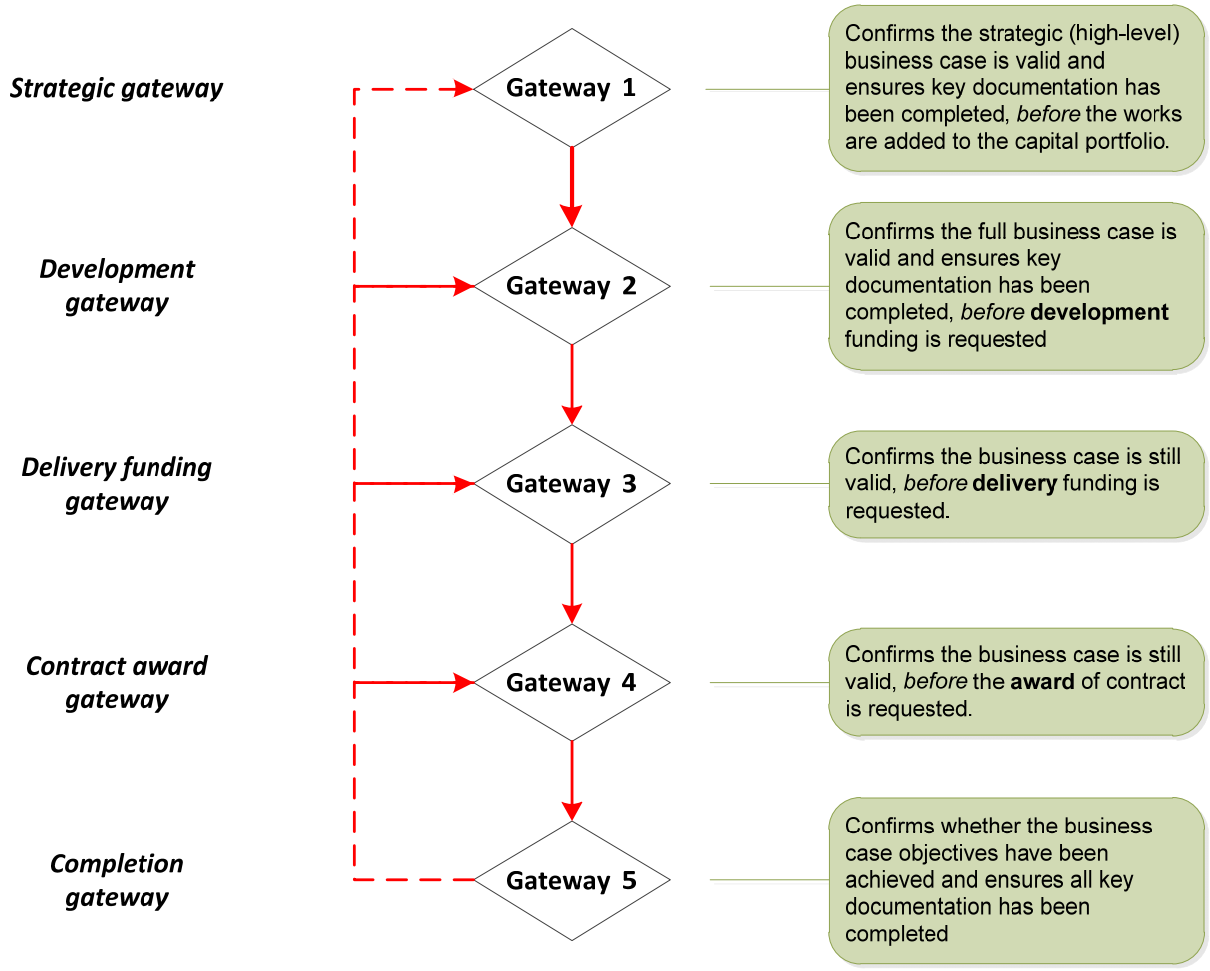


Figure 5-2 Gateway Approval Process

5.5 Procurement

A five year whole of portfolio procurement strategy is prepared at the commencement of each price path after completion of the IPART pricing review process. The strategy identifies any groups of projects or programs which could be bundled to achieve improved market competition, resource efficiency, consistent quality, knowledge transfer, and similar.

The strategy also identifies the preferred procurement option or range of potential procurement options for individual projects, to ensure that project initiation or development work does not unduly restrict options before the optimum procurement approach can be confirmed. Procurement options are reviewed and either confirmed or refined at each Gateway of the project approval process as the project scope and character becomes more clearly understood and defined.

In the current price path a major component, wastewater treatment plant upgrade (value $180m) was undertaken through an Alliance. We discuss the efficiency of this process in Section 7.5.

The five year whole of portfolio procurement strategy is subsequently updated each year, concentrating on projects which are yet to commence, to address any changes to financial, regulatory or market conditions.

We suggest that this procurement strategy becomes a rolling program so that there is a smooth and efficient transition between price paths.

Hunter Water anticipates that the procurement strategy for the portfolio proposed for 2014 to 2017 will be dominated by traditional design-bid-build contract systems. It considers the particular mix of medium to large projects proposed does not lend itself to significant bundling due to the mix of classes of work and project timing. However, the success of the Hunter Water Alliance may be one option to consider for bundling much of the mechanical/electrical replacement work in the future price path. Most programs of smaller projects, such as water main replacements, will be bundled.

In respect to operations and maintenance, the procurement strategy is generally to offer non-binding contracts for a particular need for a 3 year period with options to extend to 5 years, subject to business requirements. For larger contracts panel arrangements are considered which allow for ongoing competitive tendering within the panel. The main service outsourced is the operation of the water and wastewater treatment plants. Hunter Water Australia, a subsidiary of Hunter Water Corporation has operated the water treatment plants since 1998 and wastewater treatment plants since 2003. The approach to treatment works operation after the current contract expires is being reviewed

The extent of outsourcing through the asset lifecycle is summarised in Table 5-2.

	Service Provider	
	Internal	**External**
Planning	45%	55%
Design (refer to note 1)	<3%	>97%
Construction (refer to note 1)	<3%	>97%
Operations & Maintenance	45%	55%

Note 1: Eestimate, very minor work, usually arising from when maintenance of existing equipment is not appropriate and replacement is required.

Table 5-2 Extent of Outsourcing (Source: HWC)

5.6 Program and Project Management

A strategy is developed for the whole capital program once it has been finalised. This includes looking at opportunities for bundling projects and identifying other means of cost-effectively delivering the program.

We were provided with a decision model for infrastructure procurement which allows a range of options to be assessed based on scoring of a number of weighted criteria. Options range from construction only, design and construction through to Alliance and Early Contractor Involvement.

The wastewater treatment program was a significant component of the current price path and was delivered through an Alliance.

Hunter Water has a large group of contract managers who manage individual programs and projects.

On a financial basis, projects are monitored on a monthly basis to determine their progress and impact on the key financial portfolio targets of annual budget and price path. The portfolio is balanced to the Board approved four year target each year as part of the annual budget process, in between it is managed within a tolerance of 5% of the remaining expenditure in the price path. That is, if the forecast expenditure exceeds the remaining allowance by 5% the prioritisation and balancing process is triggered to bring the portfolio back within tolerance.

Monthly reports are provided to the Executive Team and the Board reporting on performance against time, budget, safety and environment.

As discussed in Section 5.2 the low expenditure on variations during the construction phase suggests that program and project management as well as good planning and design processes are mature.

5.7 Conclusions

From our review we concluded that Hunter Water has well developed capital delivery processes which have been refined since the last review. These processes should provide a basis for an efficient approach to capital investment.

Options analysis is appropriate and includes multi-criteria and financial analyses; assumptions are transparent. The cost estimating process has been improved over recent years.

Processes are in place for robustly challenging the need for expenditure, for example review groups and Gateway Reviews. The recently developed portfolio management process is considered leading practice.

We consider there is potential to derive further efficiencies through the cost estimating process and the selection of a procurement approach which is appropriate to the nature of the works planned and the sharing of risks with contractors. We consider the experience of the Hunter Water Alliance and the scope for bundling work should deliver further efficiencies. Hunter Water has assumed further efficiencies relating to scope and costs which we discuss in Section 7.

6. Operating Expenditure

6.1 Methodology

In this section, we present the results of our review of the efficiency of Hunter Water's operating expenditure. We identify the major cost drivers and explain the variances in the current price path expenditure against the 2009 Determination. We comment on the prudence and efficiency of operating expenditure in the 2009 Determination period which is used to inform our view of future efficiency. We comment in Section 3 on the strategic review of the business and the structures and systems used to plan and manage expenditure.

We then make an assessment of an efficient level of expenditure for the period 2014 to 2018, taking into account our discussions with Hunter Water, documents presented and subsequent answers to questions we raised. We note the scope and level of efficiencies proposed by Hunter Water. We discuss the cost drivers and efficient cost level recommendations for each of the operational areas – operations, maintenance and administration – and the specific activities contained therein.

The methodology for the review of operating expenditure has focused on an evaluation of:

(i) Historical expenditure for financial years ending 2010 to 2012;

(ii) The current budget for year ending 2013; and

(iii) The projected costs for the financial years ending 2014 to 2018.

The evaluation of operating expenditure was undertaken using Hunter Water's 2012 Submission. Our assessment is based on the actual operating expenditure in the Submission, the robustness and confidence of these expenditures taking into account the basis of the estimates and the confidence of the need, timing and scope of the requirements. We also take into account whether additional expenditure proposals have been through the internal approval and challenge processes.

We have interviewed the functional managers, reviewed supporting reports and documents and assessed the current position on the development and implementation of corporate systems used to set budgets, control and monitor costs and allocate expenditure to the IPART expense types.

We have taken particular attention to the efficiency proposals at functional level made by Hunter Water in its ssubmission.

We present our analysis of the future expenditure proposals by Hunter Water and comment for each activity on the potential for efficiencies through the robustness of estimates, the need and timing of expenditure and absorbing of some activities within base opex as a surrogate for the application of internal challenge and budget control.

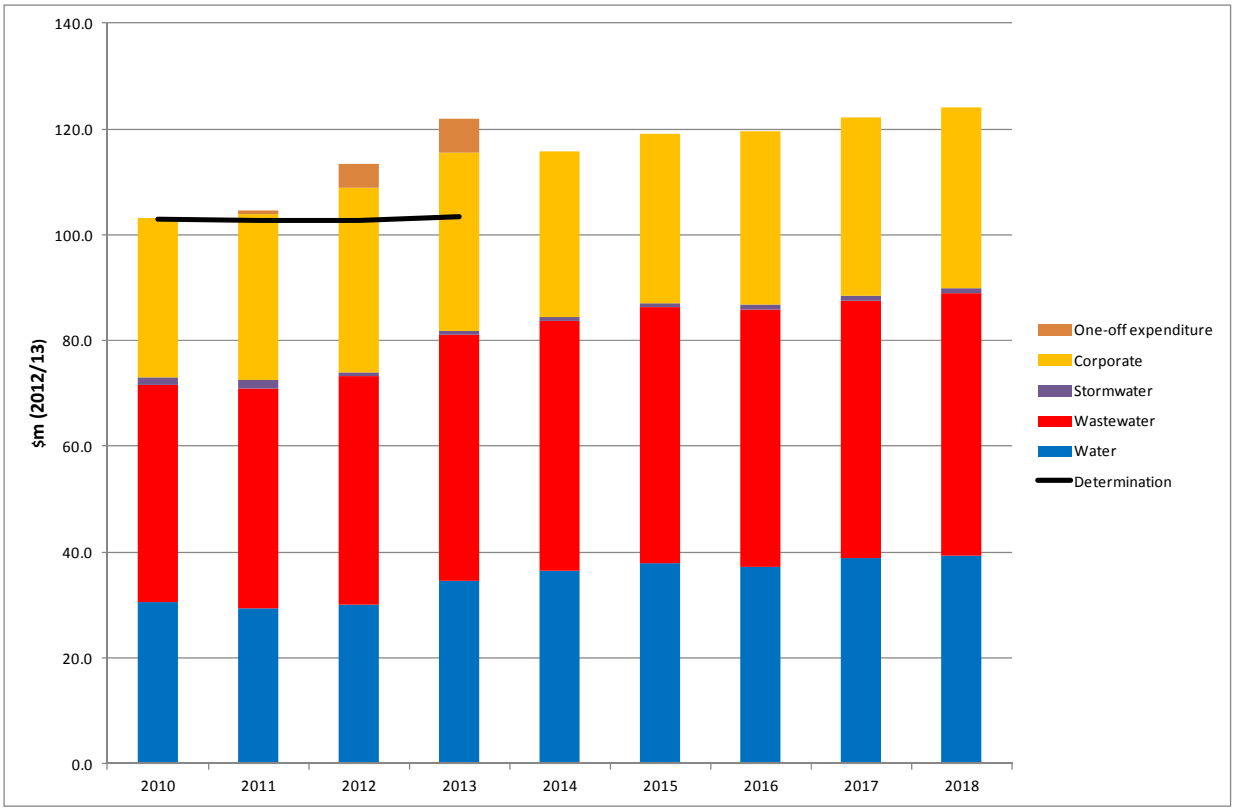
Our views on future efficiencies are based on the hypothesis of a Frontier Company, the continuing efficiencies that it makes through innovation and technological development and the catch up efficiency required of Hunter Water to achieve the performance of a Frontier Company over time.

In this Section, all expenditure is reported at the 2012/13 base year.

6.2 Overview

In the 2009 Determination[5], Hunter Water was set an efficiency target based on a catch-up efficiency of 1% per annum and continuing efficiency of 0.8% per annum pro-rated to controllable costs. Hunter Water has reported[6] an over-achievement against this target after taking into account other additional costs not envisaged at the 2009 Determination.

Actual and forecast operating expenditure over the period 2010 to 2018 in total and by product is shown in Figure 6-1. The Figure compares actual expenditure over the years 2010 to 2012 and forecast for 2013 with the Determination. Forecast expenditure for 2012 and 2013 shows an increase above the Determination, due mainly to exogenous factors such as the Lower Hunter Water Plan (LHWP), electricity cost increases, carbon costs and one-off requirements plus some endogenous costs including disposal of spoil and water treatment residuals.



Source HWC Submission

Figure 6-1 Actual and Proposed Operating Expenditure 2010 to 2018

When we take into account these endogenous factors which we consider to be within the management of the business, the net efficiency delivered over the price path period was $0.7m above the target set. We discuss efficiency for the current price path in Section 6.3.

Hunter Water has proposed a level of operating expenditure for 2014 to 2018 up to 4.1% (cumulative) above the actual 2013 base year after some 'one-off' external costs such as the LHWP are removed. This trend is shown in Figure 6.1. The main drivers for this increase are labour-related costs, additional

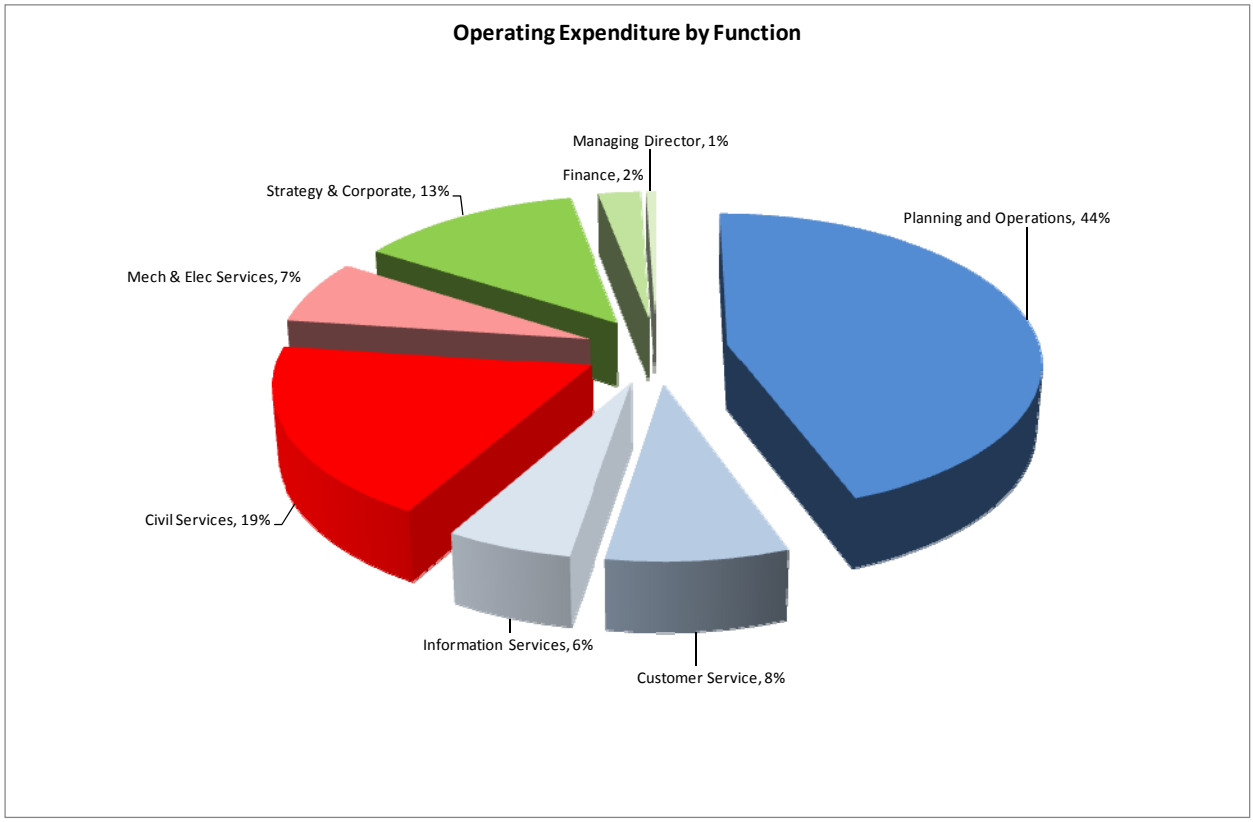
[5] Reference to the Final Determination 2009
[6] HWC Submission September 2012 Table 5.3

electricity and indirect carbon costs, additional water quality requirement and the extra wastewater treatment and associated mechanical and electrical maintenance. These are offset in part by efficiencies through labour vacancies, and reductions in temporary staff, energy efficiency, and water and wastewater treatment costs.

Expenditure by Function

We asked Hunter Water to allocate expenditure to operations, maintenance and administration as defined in the RFP. This analysis is not normally applied within the business. The Operations function includes Planning and Operations, Customer Service and Information Services. Maintenance comprises civil services and mechanical/ electrical services. Administration expenditure has been mapped to Strategy & Corporate, Finance and the Managing Director. For the future price path Operations forms 58% of total operating expenditure, maintenance 25% and administration 17%.

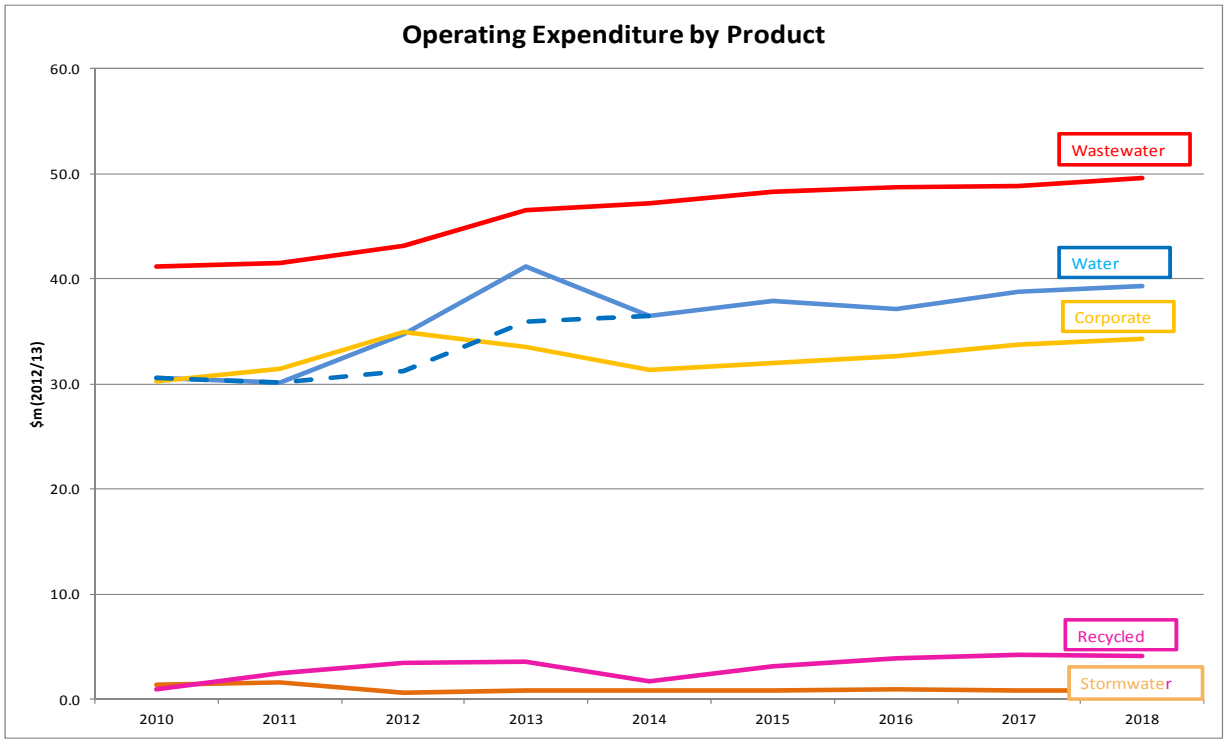
Figure 6-2 shows an analysis of operating expenditure by operations (blue), maintenance (red) and administration (green). This shows operating expenditure forming a significant proportion of total expenditure. The level of administration expenditure is similar to other agencies.



Source HWC Submission

Figure 6-2 Operating Expenditure by function in Future Price Path

An analysis of operating expenditure by Water, Wastewater and Stormwater, Corporate and Recycled Water productis shown in Figure 6-3.



Source HWC Submission

Figure 6-3 Actual and Proposed Operating Expenditure 2010 to 2018 by Product

The water service expenditure includes the LHWP expenditure in 2012 and 2013. If this expenditure is excluded, there is a gradually increasing expenditure from 2010 to 2018 shown in part by the broken line. This represents an increase of 30% or an average annual increase of 3.6%. There are increasing power costs and other costs detailed in the Hunter Water Submission.

The wastewater service expenditure shows an increase of 20% over the same period equivalent to an annual increase of 2.5%. This is mainly attributable to the additional complexity of operating and maintaining assets from the wastewater treatment plant upgrades.

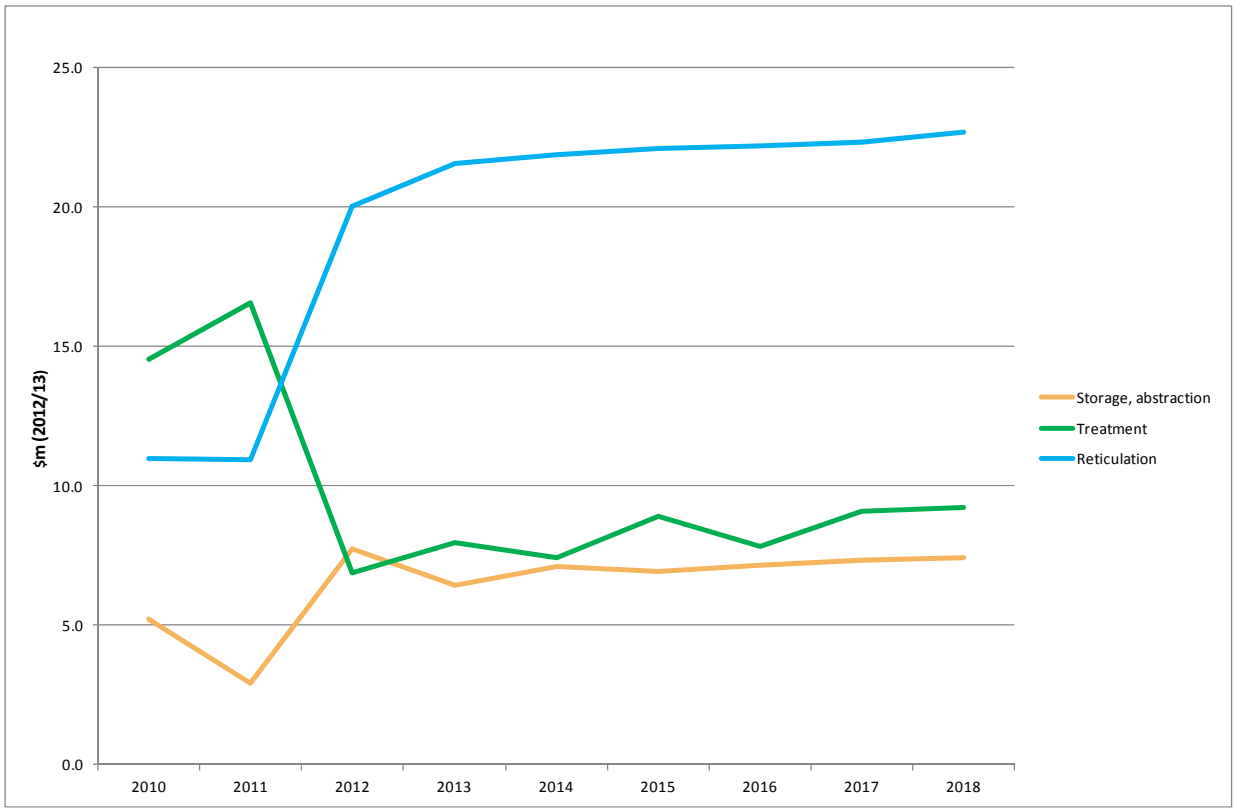
Stormwater service expenditure is a small element of total opex yet is important to maintain this service. There is a 38% reduction in operating expenditure to 2018 due to a reduction in dredging activities.

Corporate expenditure includes some one-off expenditure in 2011 and 2012. Excluding these items, there is an overall increase of 9% over the period 2010 to 2018 equivalent to an average annual increase of 1.1%.

Recycled water expenditure from 2010 are mainly indirect costs and only show an increase from 2014 as the direct cost of new projects are incurred. The recycled water service is not regulated although has a material impact where Corporate expenditure is apportioned across all services. So where recycling services increase over the period to 2018, the regulated element of Corporate expenditure will reduce.

Expenditure by Product

Water service expenditure is reported as storage and abstraction, treatment and reticulation. The trend in expenditure over the period 2010 to 2018 is shown in Figure 6-4 below. We have attributed the variance in years 2010 and 2011 to cost allocations rather than any significant variation in costs. To show trends in expenditure we have removed the LHWP costs from storage activity for 2012 and 2013. There is a level trend in storage and abstraction costs but an increasing trend in both treatment and reticulation expenditure from 2010 to 2018.

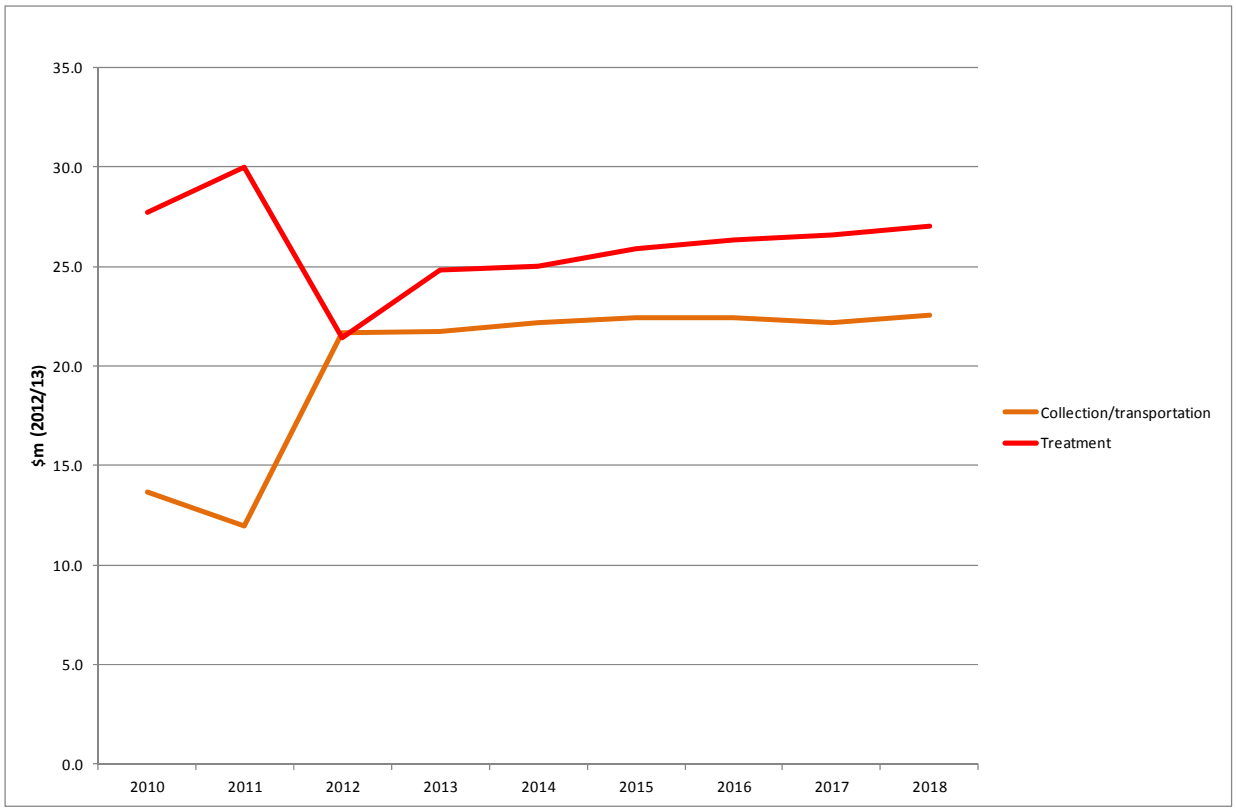


Source: HWC Submission

Figure 6-4 Actual and Forecast Water Service Expenditure

Wastewater service expenditure is reported as collection/transportation and treatment. The trend in expenditure over the period 2010 to 2018 is shown in Figure 6.5 below.

We have attributed the variance in years 2010 and 2011 to cost allocations rather than any significant variation in costs. Operating expenditure for sewage collection/ transport shows a level trend to 2018. The increasing treatment works costs relate to additional energy expenditure from unit cost increases and operational costs from additional complexity of the treatment plants.



Source: HWC Submission

Figure 6-5 Hunter Water Actual and Forecast Wastewater Service Expenditure

6.3 Operating Expenditure in Current Price Path

We are required to comment on the prudence of expenditure in the current price path and identify any areas of expenditure which are not consistent with the definition. We have analysed the operating expenditure by service area or product and identify and comment on material variances.

We have taken actual and forecast regulated expenditure for the current price path from 2010 to 2013 and compared these values with the Final Determination 2009 brought up to the 2013 price base. We have calculated the variance at product level as shown in Table 6-1. The operating expenditure for recycled water is presented in Section 8.

HUNTER WATER CORPORATION CURRENT PRICE PATH - OPEX					
($m 2012/13)	**2010**	**2011**	**2012**	**2013**	**Total Price Path**
Determination 2009					
Water	35.3	34.8	34.7	35.2	140.0
Wastewater	39.4	39.5	40.3	41.2	160.5
Stormwater	1.4	1.6	1.7	1.4	6.1
Corporate	26.8	26.8	26.1	25.6	105.3
Total opex in Determination	**103.0**	**102.7**	**102.8**	**103.4**	411.8
Actual Expenditure					
Water	30.5	30.1	34.7	41.2	136.5
Wastewater	41.2	41.5	43.1	46.5	172.3
Stormwater	1.4	1.6	0.6	0.8	4.4
Corporate	30.2	31.4	34.9	33.5	130.0
Actual Expenditure	**103.3**	**104.6**	**113.3**	**122.0**	**443.2**
Variance					
Water	-4.8	-4.7	0.0	6.0	-3.5
Wastewater	1.7	2.0	2.8	5.3	11.8
Stormwater	0.0	0.0	-1.1	-0.6	-1.7
Corporate	3.4	4.6	8.8	7.9	24.7
Total Variance	**0.3**	**1.9**	**10.6**	**18.6**	**31.3**

Source: 2009 Determination and HWC Submission

Table 6-1 Operating Expenditure Variance in Current Price Path

This variance analysis for the current price path shows an increase of $31.3m above the Determination. We discuss below the reasons for this variance by product and then by specific drivers.

Water Service Variance

One-off expenditure on the LHWP in 2012 and 2013 is $3.2m and $5.3m respectively; excluding this expenditure shows a reduction of $12m compared with the Determination. Expenditure in 2010 and 2011 included efficiencies of some $4.5m below the Determination. These efficiencies were reduced in 2012 and 2013 as additional costs including electricity costs, carbon price and specific water treatment and spoil disposal costs.

Wastewater Service Variance

The wastewater expenditure shows an increase of $11.8m compared with the Determination. Expenditure in 2010 and 2011 was marginally above the Determination. Significant increases in 2012 and 2013 also relate to electricity costs, carbon price and reallocation of some biosolids into the regulated business. The Company demonstrated that in 2009 some opex costs had been allocated equally to all four services including recycled water. It has revisited this allocation and included $0.4m in wastewater. We reviewed this analysis and found that this reallocation was appropriate.

Stormwater Variance

Stormwater expenditure forms some 1.5% of expenditure in the current price path. The trend shows savings in 2012 and 2013 which, while are small relation to the total expenditure are significant. Hunter Water commented that:

HWC had originally provided for $0.7m (m $2009) to be incurred to undertake soil dredging of Lower Throsby Creek. In managing competing cost pressures HWC has decided to defer this silt removal and accept the operational risk of increased flooding in an attempt to limit the impact of other unforseen cost increases upon customers.

Corporate Variance

The variance analysis in the current price path shows Corporate expenditure continuing at an average $6m/a above the Determination. Hunter Water advised that the 2009 Determination assumed that a greater proportion of the efficiency savings were apportioned to Corporate while it has made these savings in operational areas of the business. Expenditure includes $4.1m corporate overhead which in 2009 had been allocated to the non-regulated recycled water business.

Variance Analysis by Driver

HUNTER WATER CORPORATION CURRENT PRICE PATH - VARIANCE ANALYSIS					
($m 2012/13)	**2010**	**2011**	**2012**	**2013**	**Total Price Path**
Variance					
Water	-4.8	-4.7	0.0	6.0	-3.5
Wastewater	1.7	2.0	2.8	5.3	11.8
Stormwater	0.0	0.0	-1.1	-0.6	-1.7
Corporate	3.4	4.6	8.8	7.9	24.7
Total Variance above Determination	**0.3**	**1.9**	**10.6**	**18.6**	**31.3**
Reasons for variance in Determination - exogenous factors					
One-off: Lower Hunter Water Water Plan/ Land use strategy	0.0	0.0	3.2	5.3	8.5
Carbon costs (indirect)	0.0	0.0	0.0	3.3	3.3
Electricity costs	0.0	1.1	2.5	2.9	6.5
One-off expenditure (1)	0.0	0.6	1.3	1.3	3.2
Total Exogenous Factors	**0.0**	**1.7**	**7.1**	**12.8**	**21.6**
Reasons for variance in Determination - as a result of reallocation to regulated business					
Reallocate biosolids to regulated business	0	0.1	0.2	1.2	1.5
Reduction in Corporate opex to recyled water	0.4	1.1	1.2	1.4	4.2
Total Reallocated Expenditure	**0.4**	**1.2**	**1.4**	**2.6**	**5.7**
Reasons for variance in Determination - endogenous factors (as a result of Hunter Water intervention)					
Excavated spoil and disposal	0.0	0.0	1.0	1.0	2.0
Water treatment residuals disposal	0.0	0.0	0.0	1.1	1.1
Other minor variances	-0.1	-1.0	1.1	-0.3	-0.3
Total Endogenous Factors	**-0.1**	**-1.0**	**2.1**	**1.8**	**2.8**
Variance analysis on Determination					
Total explained variance	**0.3**	**1.9**	**10.6**	**17.2**	**30.0**
Unaccounted for variance on Determination	0.0	0.0	0.0	-1.4	-1.3
Note 1: One-off expenditure includes credit and hardship program, debt portfolio management and water efficiency					

Source: HWC 2008 & 2012 Submissions

Table 6-2 Operating Expenditure Variance Analysis by Driver

In our analysis, summarised in Table 6-2 above, we have classified cost increases into:

- Exogenous factors where costs are driven by external requirements;
- Endogenous where additional costs arise within the business; and
- Reallocation of costs from the unregulated to the regulated business.

Exogenous cost drivers include the Lower Hunter Water Plan, indirect carbon costs, electricity unit cost charges, the Office of Water abstraction charges and specific Shareholder requests. We comment on each of these opex drivers.

Endogenous costs include water treatment residuals and excavated spoil disposal costs.

There are two items where costs in the current price path were outside the regulated business and have now been included. These are Biosolids expenditure and allocation of recycled water corporate expenditure.

The analysis includes forecast expenditure for 2013. We comment later that year 2013 expenditure is likely to be overstated by $1.8m. Allowing for this adjustment in the analysis will reduce the variance to -$0.3m which e consider is not material.

Lower Hunter Water Plan

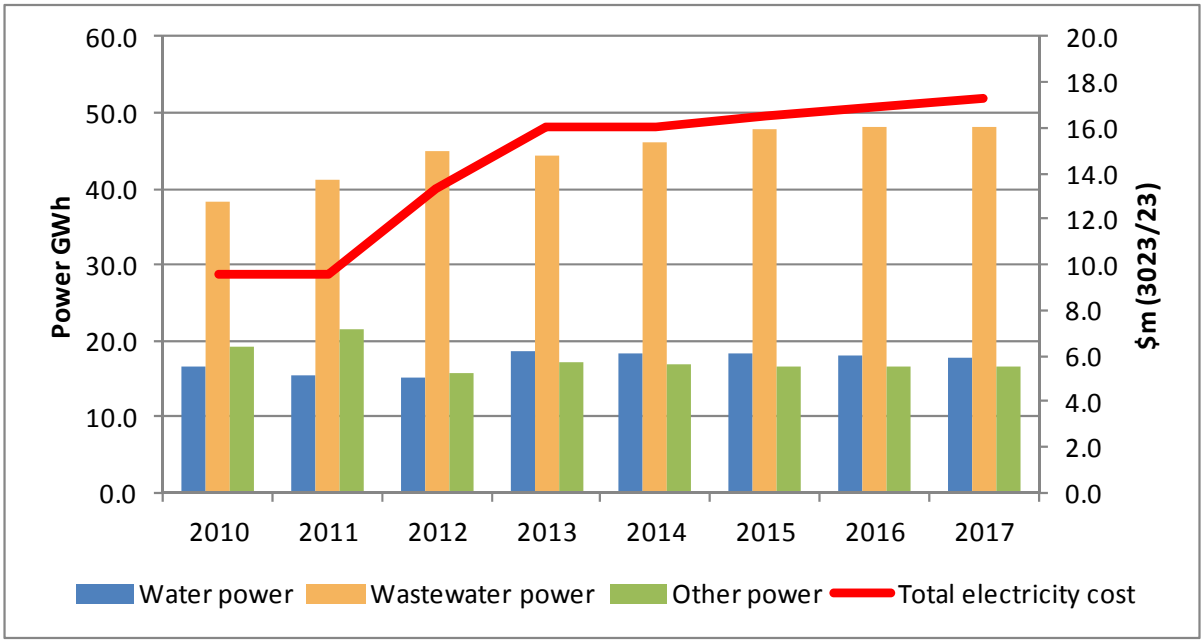
The Lower Hunter Water Plan is driven by the need for a new water resource strategy to replace the Tillegra Dam project which was discontinued within the current price path. The $8.5m costs include for a wide range of options evaluation, environmental studies, enhanced water efficiency promotion, demand modelling, community engagement and a contribution to Metro Water costs. These costs are all in the current price path and funded by Government. Hunter Water provided a detailed explanation of the activities being carried out as part of the LHP and the related costs. From this review we concluded that, except for Tillegra-related costs, this expenditure is prudent.

Tillegra costs

The one-off expenditure includes $0.4m for property maintenance and a land use strategy for the Tillegra land holdings. This is considered as a one-off expenditure and has not been continued into the future price path.

Electricity Costs

Hunter Water explained that electricity costs have increased over the current price path as a result of an increase in power consumption at wastewater treatment works and the cost of electricity purchases. The impact of increased consumption and cost is shown in Figure 6-6. These costs exclude the impact of carbon pricing.



Source: Hunter Water

Figure 6-6 Actual and Forecast Power Consumption and Electricity Costs

There is an increase in power use at wastewater treatment sites from 2010 to 2013 which Hunter Water attributes to the additional treatment processes installed during the current path. There are no material changes in power use for the water service and other power use.

The existing contract for power supply has been in place for the last four years and is due to expire at the end of 2012. The contract is being renewed for the period to December 2014. The electricity network charges make up 60% of total electricity costs and are fixed. Hunter Water has assumed that there are no material cost variables in the period from 2015 to the end of the price path period.

The impact of power consumption and increased in unit costs is to increase costs in the current price path by to $2.9m by 2013. We noted that provision had been made in the 2009 Hunter Water submission for additional power costs arising from increased consumption at wastewater treatment sites. Thus a proportion of this increase should be within the base operating expenditure determined in 2009.

Hunter Water has reported electricity optimisation savings from several initiatives including making better use of lower energy tariffs, moving to variable speed pumps and modification to processes at Belmont wastewater treatment works. A saving of 6.8GWh has been reported although this is not evident from the information provided. Further savings in energy use have been made through one-off changes including corrections to billing errors.

For the current price path, we formed the view that Hunter Water's approach to power management and electricity purchase was appropriate and efficient. For the future price path, we noted continuing increases in power usage in the wastewater service and additional savings of $0.5m per annum. Our view is that there are further opportunities to be investigated and implemented in the future price path to be more efficient in power use with, for example, further on-site power generation. As an example, Sydney Water is proposing to supply up to 20% of its energy from on-site generation over a similar period.

We formed the view that further opportunities for energy optimisation and on-site generation should be investigated during the future price path and where cost beneficial for implementation in subsequent periods.

Office of Water Charges

The form of charging for water abstractions has changed from variable charges for abstraction to a fixed charge based on water entitlements. This $1m increase from 2012 is an external cost over which Hunter Water has no control. This expenditure will continue into the future price path.

One-off Requests

Hunter Water advised of a $0.5m contribution to the State Government to fund an efficiency review of State-owned corporations. In addition a credit and hardship program was developed at a cost of a one-off $1m/a over 2012 and 2013. These costs are all in the current price path and funded by Government. A lower level of expenditure on the credit and hardship program is planned for the future price path.

Carbon Costs

Hunter Water's value of carbon emissions is below the threshold for the Carbon Tax and is likely to be the case for the next four years. Hunter Water has made an assessment of the likely carbon costs through Scope 1 – direct emission costs – which are not material, Scope 2 electricity cost pass through and supplier carbon costs and Scope 3 capital works supplier costs. The Scope 2 costs are estimated at $3.3m starting in 2013. Hunter Water commented that it had been approached by the electricity supplier to pass through some carbon costs. We formed the view that these costs have been reasonably estimated.

Water Treatment Residuals

Additional costs relate to the disposal of waterworks sludge from 2013. Hunter Water explained that the current treatment processes at Grahamstown and Dungog used alum for coagulation and flocculation. In the treatment process, the sludge draw-off from clarifiers and backwash water is discharged to lagoons for settlement and drying. Dried sludge is applied to land although because of limited space, one option is to transport to landfill. A strategy is being developed to evaluate the options and propose a least cost solution for sludge treatment and disposal. An initial estimate for the disposal to landfill was $1m every two years.

Our view is that there is scope to derive a lower cost and more sustainable solution through the strategy and a capital solution for thickening prior to disposal may offer greater benefits. As such the $1.1m operating cost has yet to be confirmed as the least total cost and environmentally acceptable solution.

We formed the view that further feasibility work should continue to identify and cost acceptable technical and environmental solutions over the future price path.

Excavated Spoil Disposal Costs

Hunter Water has included an additional $2.0m across 2012 and 2013 for the disposal of excavated spoil at two sites, the CTGM pipeline and Farley WWTW because the sites may be defined as contaminated. This is spoil from water mains and sewer repairs which have been stored at these sites. Hunter Water states that these sites have been referred to the EPA and detailed investigations have been undertaken. We question whether alternative options have been considered including recycling of waste for re-use at construction sites. The efficiency of this additional cost has not been demonstrated.

The Company commented that:

> *The waste spoil is generally not expected to contain hazardous materials and therefore the segregation and reclassification of the material is achievable which allows the resulting materials to be reused. DECCW has issued a number of general resource recovery exemptions, several of which could be utilised by Hunter Water to reuse the materials. Detailed sampling and testing is required to verify compliance with the various resource recovery exemptions.*
>
> *Hunter Water's depot sites lack available space to adequately segregate and process waste spoil. Specialised processing equipment (known as a trammel) is required in order to produce material that will comply with the resource recovery exemptions. For this reason it is recommended that*

Hunter Water commence a tender process in order to select a contractor that could receive waste spoil at licensed facilities and process the material. The processing should be able to be done at a rate significantly lower than the cost of landfill and produce a much more desirable environmental outcome."

This comment suggests that the contractor and related costs have still to be identified. We have accepted the level of expenditure in the current price path on the basis that the greater part of this expenditure is one-off to address a backlog issue. We also recognise that a lower level of expenditure is likely to be required over the future price path to dispose of spoil from ongoing activities.

Biosolids

Hunter Water advised that biosolids were excluded in error from the 2009 regulated costs as there was no market of revenue generated from sales. Hunter Water commented that

Currently Hunter Water has access to biosolids markets within close proximity to our plants. Increasing competition in the organics market is being driven by State Government regulation changes that is encouraging waste disposal operators to recycle green waste rather than dispose of it to landfill. This is resulting in more organic products that are competitors to biosolids. The likely outcome of this increased competition is a need to travel further to access markets for biosolids reuse.

Traditionally Sydney Water hasn't supplied biosolids to the Hunter Region. Now, Sydney Water is actively seeking markets in the Hunter Valley, particularly mine site rehabilitation. It is likely Sydney Water's biosolids product will be of higher quality than what Hunter Water currently produce. Although there is a large market for Stabilisation Grade B biosolids in the Hunter, not all Grade B is equal from a customer's perspective e.g. odour and consistency. Therefore, market competition is likely to drive increased transport costs as Hunter Water's biosolids are forced to more distant markets (e.g. broad acre cropping which is approx 200km away). In addition, local councils are moving towards removing organic waste from landfills which will further increase market competition.

We agree that there is good reason to include the biosolids expenditure within the regulated business for the current price path. This should not deter Hunter Water from a wider investigation and feasibility of disposal options in the future price path. We suggest that further studies are carried out in the future price path to identify cost effective and sustainable disposal routes for sludge disposal.

Reduction in Demand

We noted that the total metered consumption over the current price path was 20.6 GL less than assumed in the 2009 Determination. The marginal cost savings from this lower output is estimated at $2.4m. Hunter Water commented that:

..... the operating costs incurred during the current price path and shown in the submission (Table 5.1) are the actual expenditure and, as such, they already incorporate any saving in water operating costs as a result of lower levels of water consumption.

This saving was not explained in the Submission but we agree that it is a material contributing factor in the assessment of total operating expenditure in the current price path.

Recycled Water Overheads

In the 2009 Determination, Hunter Water expected the recycled water function to be an unregulated business with revenue, direct costs and a proportion of overheads allocated across both regulated and unregulated businesses. There has been a significant delay in the start of this business and no material direct costs have been incurred although planning work has continued, and no revenue generated to cover both direct and indirect costs. We consider that it is appropriate to reallocate a most of these costs within the regulated business.

Year 2013 Expenditure

Estimated expenditure for 2013 is $122.0m. After one-off expenditure shown in Table 6-2 is taken into account, this reduces to $115.4m.

Hunter Water reported a vacancy rate of 33 FTEs or about 7% in June 2012. The budget for 2013 assumes that these vacancies are filled and a vacancy rate of 5% is then applied from 2014. We found that this data is not consistent as it would be unusual to fill vacancies for only one year. This suggests that the outturn operating expenditure for the 2013 base year could be up to $3.6m below forecast. Hunter Water confirmed that these vacancies would not be filled and that

> *It is correct to say that there was not the same level of 'granularity' evident in labour cost estimates prepared for the current price path compared to that now available for Atkins review over the coming price path. While HWC did not specifically factor in a 'saving' in respect to anticipated vacancies for 2012/13, neither did it specifically factor in many increases which will eventuate in reality. For example, performance based regrades and progression along recognised engineering graded scales for technical staff were not specifically allowed for and will act as an offset to actual vacancies encountered.*

While these separate elements are individually identified and quantified in future projections, the challenge of delivering them is increased as a consequence of also removing temporary and contract labour allowances which had previously been included in the operating expenditure base.

We formed the view that, after making allowance for the offset costs that Hunter Water describes, the year 2013 operating expenditure is likely to be overstated by $1.8m because of unfilled vacancies. In addition, the reduction in metered water delivered should reduce the base opex by a further $0.6m.The base year expenditure would therefore be $113.0m.

Should actual expenditure increase above this value, then the reasons should be assessed in the next efficiency review.

6.4 Efficient Expenditure in the Current Price Path

Total operating expenditure in the current price path is $31.3m above the 2009 Determination, at the 2013 price base. Hunter Water was able to explain $21.6m of this increase which was driven by exogenous factors such as the LHWP, electricity, carbon costs and one-off additional requests from State Government.

Hunter Water also explained the reasons for reallocation of biosolids and some corporate expenditure to the regulated business amount to $5.7m. We concluded that the reallocation of biosolids costs was appropriate as the market for biosolids, assumed at the 2009 Determination, was not feasible at that time. This does not mean that such market opportunities would not be available in the future price path.

The market in recycled water has not developed as assumed in the 2009 Determination. At that time the Corporate expenditure was allocated across all products in proportion to direct costs as this reflects the consumption of corporate activities across the products. Our view is that it is appropriate to revisit this apportionment of Corporate costs using the same rules; this results in a return of Corporate expenditure to the regulated business.

We formed the view that other additional costs related to excavated spoil disposal and water treatment residuals disposal should be included in the base operating expenditure as these are expenditures which are attributable to the management of the business. This results in actual expenditure being $2.8m above the Determination, including an offset for minor variances. In addition we found that the year 2013 expenditure estimate is likely to be overstated by $1.8m.

In Table 6-3 we summarise the reasons for the increase in expenditure over the current price path.

HUNTER WATER CORPORATION CURRENT PRICE PATH - VARIANCE SUMMARY						
($M 2012/13)	**2010**	**2011**	**2012**	**2013**	**Total Price Path**	Line number
Total Variance above Determination	**0.3**	**1.9**	**10.6**	**18.6**	**31.3**	1
Total Exogenous Factors	0.0	1.7	7.1	12.8	21.6	2
Total Reallocated Expenditure	0.4	1.2	1.4	2.6	5.7	3
Variance Attributable to HWC	**-0.1**	**-1.1**	**2.1**	**3.2**	**4.1**	4 = 1-2-3
Explanation of Variances						
Excavated spoil and disposal	0.0	0.0	1.0	1.0	2.0	5
Water treatment residuals disposal	0.0	0.0	0.0	1.1	1.1	6
Other minor variances	-0.1	-1.0	1.1	-0.3	-0.3	7
Overstatement of 2013 expenditure	0.0	0.0	0.0	1.8	1.8	8
Marginal water cost saving	-0.3	-0.7	-0.8	-0.6	-2.4	9
Unaccounted for variance	0.3	0.7	0.8	0.2	1.9	10
Variance Attributable to HWC	**-0.1**	**-1.1**	**2.1**	**3.2**	**4.1**	11= sum(5:10)

Source: Atkins Cardno Analysis)

Table 6-3 Operating Expenditure Explanation of Variance

Hunter Water outperformed the efficiency targets in 2010 and 2011 although fell behind in 2012 and a shortfall is forecast in 2013. Assuming that the year 2013 expenditure is overstated by $1.8m, the net increase in expenditure is $1.0m above the Determination.

The 2009 Determination set a challenging efficiency target and the gains in this price path form a sound basis for the future price path. Hunter Water has reported efficiencies in the current price path including restructuring and corporate labour reductions, demand management costs, reactive maintenance fieldwork, electricity use and tariffs and legal expenditure, amounting to $14.3m over the period. A further $6m of efficiencies were achieved through identified initiatives. Additional efficiencies are reported through significant electricity savings from usage and improving the accuracy of billing.

We formed the view that a proactive approach is taken to actively identify and pursue efficiencies with the aim to meet the targets in the Determination. While there is an unaccounted for variance above the Determination, we formed the view that Hunter Water is taking a proactive approach to seeking efficiencies and to target expenditure below the Determination.

The one-off expenditure includes for $0.4m for property maintenance and a land use strategy for the Tillegra land holdings. This is considered as a one-off expenditure and has not been continued into the future price path. We do not consider this as prudent expenditure in providing service to customers.

The efficiency of expenditure on spoil removal ($2.0m) and water treatment residuals ($1.1m) has not been demonstrated and we note that further studies and investigations are planned for the future price path to identify minimum total cost solutions. Unaccounted for variance is a balancing items which reflects other cost pressures which Hunter Water explains in general terms within the Submission.

On the basis of the information we have seen, and with the exceptions for spoil and waterworks residuals above, we conclude that actual operating expenditure in the current price path is efficient and prudent.

6.5 Operating Expenditure in the Future Price Path

Hunter Water has forecast a level of operating expenditure for the period 2014 to 2018. Expenditure by product is shown in Figure 6-4.

HUNTER WATER CORPORATION FUTURE PRICE PATH - OPEX							
($m 2012/13)	2013	2014	2015	2016	2017	2018	Total Price Path
HWC Proposed Expenditure							
One-off expenditure (1)	6.6	0.0	0.0	0.0	0.0	0.0	
Water	34.6	36.4	37.9	37.1	38.8	39.3	150.3
Wastewater	46.5	47.2	48.3	48.8	48.8	49.6	193.0
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	32.7	33.7	34.3	129.7
Total opex in Regulated Business	**122.0**	**115.8**	**119.1**	**119.5**	**122.1**	**124.1**	476.4
1: One-off expenditure comprises the Lower Hunter Water Plan, Tillegra lands and buildings and development of a credit and hardship program							

Source: HWC Submission

Table 6-4 Operating Expenditure in the Future Price Path

The base year 2013 is over-stated in that a one-off expenditure of $6.6m is included in the water service. One-off expenditure comprises the Lower Hunter Water Plan, Tillegra lands and buildings and development of a credit and hardship program. Excluding this expenditure from 2013 shows an increase in regulated operating costs from $115.4m in 2013 to $122.1m in 2017, an increase of 3.2% cumulative. We also found that this base year expenditure is likely to be overstated by $1.8m because of unfilled labour vacancies. This reduces the effective base year operating expenditure to $113.6m.

Recycled water expenditure is not regulated so expenditure proposals are reported in Section 8 These costs are identified separately in the activity based costing analysis. These non-regulatory costs impact on the regulatory business because corporate costs are allocated to both business areas in proportion to relative direct costs.

Analysis by Functional Expenditure

We asked Hunter Water to provide an analysis of future operating expenditure by function – Operations, Maintenance and Administration. The analysis provided is shown in Table 6-5 and is based on grouping expenditure by function based on the new structure established in July 2012. Thus while expenditure reported for the future price path area reasonably consistent, there is a discontinuity from 2013 to 2014 because of cost reallocations. Costs include non-regulated recycled water.

The main areas of increased expenditure are for Planning and Operations, an increase from 2014 to 2017 of $5.5m (10.8%) and in Strategy and Corporate, increasing by $2.1m (3.7%) over the same period.

Operations

We understand that a greater part of these additional Operations costs relate to operation of the wastewater treatment works. We comment elsewhere that while these treatment plants have more complex processes, the new technology, with the greater ability for remote monitoring and control, should deliver efficiencies. It is possible that some labour costs may be held in Corporate which would explain some of this increase. Customer Services and IT show a relatively flat trend in expenditure.

HUNTER WATER CORPORATION FUTURE PRICE PATH - OPEX BY FUNCTION					
($m 2012/13)	**2013**	**2014**	**2015**	**2016**	**2017**
HWC Proposed Expenditure by Function (1)					
Planning and Operations	39.5	50.9	54.0	53.9	56.4
Customer Service	11.5	9.8	9.8	9.9	10.0
Information Services	9.1	6.8	7.1	7.1	7.1
Total opex in Operations	**60.1**	**67.5**	**70.9**	**70.8**	**73.5**
Civil Services	35.7	22.5	22.5	22.7	22.6
Mech & Elec Services	8.0	8.3	8.5	8.6	8.7
Total opex Regulated and Unregulated	43.7	30.8	31.0	31.2	31.3
Strategy & Corporate	14.3	15.6	16.7	17.7	17.7
Finance	4.0	2.9	2.9	3.0	3.0
Managing Director	0.9	0.6	0.6	0.6	0.6
Total opex in Administration	**19.2**	**19.1**	**20.3**	**21.3**	**21.4**
Note 1: Expenditure includes recycled water					

Source: Hunter Water ABC analysis

Table 6-5 Hunter Water Operating Expenditure by Function

Maintenance

Maintenance expenditure is relatively unchanged over the future price path period with both civil and mech/elec costs showing flat trends. Civil maintenance is expected to have a flat trend as there is no material change to workload although there is a risk that this may increase as the level of water mains replacement reduces. We question the trend of mech/elec costs, given the reasons for increased maintenance of the wastewater treatment plants. The Company explained that:

> *The increases in operational expenditure are largely due to additional new equipment resulting from the recent capital program. Regarding the capital renewal provisions; the operational expenses of maintaining individual renewed items are expected to decrease, but the operational expenses of maintaining other aging/deteriorating items are expected to increase. The renewal program was targeted to avoid a significant increase in operational expenses which would otherwise be expected to occur, but the renewal program is not estimated to be substantial enough to result in any net reduction in operational expenses.*

The Company explains in its submission that improvements in the way that mech/ elec maintenance is planned are expected to deliver additional efficiencies in the way that work is scheduled and a greater focus on planned rather than reactive maintenance.

Administration

Hunter Water explained that Strategy and Corporate costs are higher in real terms than the 2013 base year expenditure due mainly to the superannuation guarantee levy ($1.2m), Increases in land tax ($0.8m), increases in audit fees ($0.5m) and Increases in land rates and insurances.

Analysis by Driver

Hunter Water reports the cost increases over the future price path due to labour-related, electricity unit costs, carbon price, wastewater treatment, additional water quality requirements from ADWG, mechanical and electrical maintenance and strategies and studies. These are offset in part by identified efficiencies including vacancy management, optimisation of energy use, reducing wastewater treatment costs and

retiming of water treatment residuals disposal. Hunter Water shows the net impact of these changes to be an $8.3m increase in total operating expenditure over the period. We comment on significant forecast cost increases and savings.

Labour

Hunter Water reports labour related costs ($10.9m) which include for real wage growth of 1% from EBA negotiations plus other employee costs driven mainly by superannuation legislation. The largest element of the increase ($5.6m) relates to performance related pay, staff regarding and setting incentives to retain skilled employees in a competitive local market. These increases are offset in part by savings through vacancy management at a rate of 5% on the 2013 base year. We noted from an analysis of labour costs in Table 6-6 that the net impact is an increase in expenditure over the period.

HUNTER WATER CORPORATION FUTURE PRICE PATH - LABOUR OPEX					
($m 2012/13)	2013	2014	2015	2016	2017
HWC Proposed Expenditure by Expense					
Salaries	42.6	41.6	43.2	45.5	47.5
Wages	9.6	9.6	9.6	9.7	9.8
Total Labour costs	**52.2**	**51.2**	**52.8**	**55.2**	**57.3**

Source: Hunter Water ABC analysis

Table 6-6 Hunter Water Labour Operating Expenditure

We comment earlier that year 2013 is likely to be overstated by $1.8m as no allowance has been made for the current level of vacancies.

Electricity

The largest impact of increasing electricity costs is in the current price path, which we discuss in Section 3.2. Hunter Water reports a further $3.4m in the future price path mainly due to connections growth, wastewater treatment plant upgrades and increase in costs. Further energy efficiency initiatives of $2m are proposed at operational sites. Table 6-7 shows the increase in power consumption and cost over the current and future price path.

HUNTER WATER CORPORATION FUTURE PRICE PATH - POWER USE AND ELECTRICITY COSTS								
($M 2012/13)	2010	2011	2012	2013	2014	2015	2016	2017
Electricity consumption (GWh)								
Water power	16.6	15.5	15.2	18.6	18.4	18.2	18.1	17.9
Wastewater power	38.2	41.1	44.9	44.3	46.0	47.8	48.2	48.2
Other power	19.2	21.6	15.8	17.3	17.0	16.7	16.7	16.6
Total power use	**74.0**	**78.2**	**75.9**	**80.3**	**81.4**	**82.8**	**82.9**	**82.6**
Electricity costs								
Water	2.4	2.3	2.8	3.9	3.8	3.8	3.9	4.0
Wastewater	5.6	6.1	8.7	9.8	9.9	10.4	10.6	10.9
Other	1.6	1.2	1.8	2.3	2.3	2.3	2.4	2.4
Total electricity cost	**9.6**	**9.6**	**13.3**	**16.0**	**16.0**	**16.5**	**16.9**	**17.3**

Source: Hunter Water additional data

Table 6-7 Hunter Water Electricity Operating Expenditure

The Table confirms the increasing wastewater power consumption over the current and future price path mainly as a result of the additional treatment process use. There are marginal changes in water and other power use. The Table also shows the increasing electricity costs which mainly occur in the current price path. In the period from 2013 to 2017, energy use is forecast to increase by 2.9% and costs by 8.1%.

The Table includes for reductions in energy use at operational sites over the future price path period. This is equivalent to an average 3.0%/a reduction in power use and a saving of $0.5m/a.

We challenged Hunter Water to explain why further savings could not be made to reduce energy use at sites. It replied that:

> *The HWC energy team has spent significant time, and also engaged independent consultants, to identify all potential energy efficiency and renewable energy opportunities. All such NPV positive opportunities have been included by HWC in determining its target of achieving a further $0.2M per year or $2m cumulative reductions over the price path.*

We accept that Hunter Water is taking steps to identify potential energy efficiency and renewable energy opportunities over the current price path. However we consider that there are likely to be further opportunities in the medium term to increase the use of renewable energy.

Carbon

We discussed indirect carbon costs of electricity and from other suppliers impacting on the current price path in Section 6.3. This is a continuing carbon cost through Scope 1 – direct emission costs – which are not material, Scope 2 electricity cost pass through and supplier carbon costs. We formed the view that these costs have been reasonably estimated.

Electrical and Mechanical Maintenance

The upgraded wastewater treatment plants have additional treatment processes with increased technology and additional maintenance requirements at eleven of its works. Hunter Water has assumed an increase in electrical and mechanical maintenance costs of $2.1m over the period to 2017. This is an increase on the base $8m/a in 2013.

Hunter Water showed that reactive maintenance for electrical and mechanical plant formed half the number of jobs carried out and reflected $6.3m or 80% of the total cost. This proportion is relatively unchanged from the 2008 review. We would expect a more balanced approach to minimise costs between planned and reactive maintenance particularly where relatively new plant is in place at wastewater treatment works and there is a proactive approach to asset replacement.

The Company explained in its submission that improvements in the way that mech/ elec maintenance is planned are expected to deliver additional efficiencies in the way that work is scheduled and a greater focus on planned rather than reactive maintenance.We formed the view that the maintenance costs were driven by a relatively high level of unplanned work orders. With the additional treatment processes and other asset renewals there is an opportunity to place a greater focus on planned maintenance with a reduction in unplanned. Hunter Water's Submission describes the new approach to planned maintenance and a reduction in significant reactive work and costs. We concluded that some of these additional costs could be absorbed within the current maintenance budget.

The Company subsequently commented that:

> *The proposed renewal funding for mechanical/electrical was developed based on an affordability focus and the estimated optimum rates of renewal were greater than what the affordability-based capital renewal provisions would allow for. This already imposes challenging efficiency-gain targets on Hunter Water in order to avoid increasing risks of cost over-run in opex and capex, and to avoid increasing risks associated with reduced performance levels.*

We consider that decisions on asset maintenance and renewal should be made on the basis of lowest total cost solutions rather than accepting the risk of increasing operating costs which may not represent least total cost.

Wastewater Treatment

Hunter Water is proposing an additional $4.6m for wastewater treatment operations and commented that these increased costs are offset in part by a $3.1m saving proposed in the base operating costs.

In respect to remote monitoring, Hunter Water has controlled treatment facilities in this way for many years. This has allowed a number of treatment plants to essentially run unmanned with only minimal requirement for onsite operators (equivalent to less than 1 day per week). For the treatment plants with higher levels of operator involvement, remote technologies have eliminated the requirement for treatment plant operators to be onsite 24hrs a day. Further reductions in this area are unlikely while still maintaining the current level of service and therefore no reductions in operating expenditure due to remote technology is expected above the $3.1m efficiency that has already been factored in by HWC.

This addresses our challenge that we would expect to see some operating cost savings through the use of new technology and more advanced monitoring and control systems.

Hunter Water has identified $4.6m additional expenditure for additional wastewater treatment. The main increases relate to the HWA management fee ($1.6m) and reimbursable labour to HWA ($1.8m). Other costs include biosolids ($0.4m), laboratory analysis ($0.4m) and other reimbursable costs to HWA (0.5m). The additional costs to HWA are in addition to the current annual costs of $11.7m, equivalent to an increase of 9.8%/a. These are significant increases in cost which we understand have not been market tested. Given the extent of these cost increases, a Frontier Company would look to minimise such additional costs.

Hunter Water commented that:

> *Increases in labour reimbursable costs are as a result of treatment plant operators retiring from HWC and being replaced by employees at HWA, future labour costs at HWC have been factored down to reflect this.*

We formed the view that some of the additional costs related to labour substitution and process costs were appropriate although other costs including a $1.6m additional fee to HWA was not justified on the basis of information provided to us. Additional costs should be limited to $3.0m direct costs. We consider that this is in addition to the efficiencies proposed by Hunter Water on the base operations costs.

Additional Requirements for Drinking Water Standards

An additional cost of $2.1m is included for work to meet the new turbidity standard. The new standard for turbidity, as an indicator for Cryptosporidium, is < 0.2 NTU at the filtered water outlet, and <1.0 at the time of disinfection. The scope of work to address this standard includes dual turbidity monitoring at each filter and improved coagulation and flocculation. The appraisal of options is underway and no firm scope of work and related costs have been confirmed. The cost included in the Submission is predominated by the cost of increasing the alum dose. While we agree to the need for additional works, we consider that improvements relate to instrumentation and optimising treatment processes should be evaluated first.

We formed the view that an annual operating expenditure of $0.25m/a represents the most likely cost to meet the drinking water requirements.

Strategies and Studies

The $3.2m expenditure includes for catchment studies as part of an overall catchment management plan to protect sources and reduce the risk of adverse water quality in the Williams River and Grahamstown catchments. We support these catchment management studies as an essential and cost effective way to reduce risk of poor water quality which can defer additional treatment processes at plants. The question is

to what extent are these additional costs or re-deploying existing resources to these tasks without backfilling. We concluded that a proportion of these costs are from redeploying some staff. Other additional studies to focus on asset managing and servicing studies are appropriate but should be part of business as usual within base operating expenditure. We have assumed $2.6m expenditure over the period 2014 to 2017. This $0.6m adjustment is based on the assumption that a proportion of staff are carrying out these studies as part of business as usual.

Water Treatment Residuals

In the current price path, Hunter Water increased expenditure on residuals disposals to $1.1m in 2013 and included in base opex for the future price path. It is proposing efficiencies of $1.4m, equivalent to $0.35m annually over the future price path which relate to the timing of residual disposals.

In Section 6.3 we expressed the view is that there is scope to derive a lower total cost and a more sustainable solution through the strategy and a capital solution for thickening prior to disposal may offer greater benefits.

We formed the view that the proposed solution does not represent an efficient solution and further work is necessary to identify a least cost solution to be implemented in the subsequent price path.

Credit and Hardship Program

This program was established in the current price path with $1.3m expenditure in 2012/13. An additional 4.6 FTEs, some with specific debt management expertise, were appointed to manage the debt reduction program. This will continue at $0.7m per annum over the future price path. Hunter Water explained that there had been a growth in debtors over the current price path. Increasing debt is an issue that many water agencies face and it we agree that it is important to focus on effective ways to reduce this. We support this level of expenditure on the assumption that real benefits of reducing debt will be achieved.

6.6 Procurement

The new structure in place from 2012 places the responsibility for all procurement services within the Finance function. Procurement of capital works will move to Finance in the current year. The scope of goods and services procured include electricity, chemicals, fleet, insurance, water and wastewater treatment operations and normal business requirements. An open tender is normally followed with a two stage expression of interest and tender process.

Hunter Water has sought external advice on scope and timing of electricity supply procurement. This is to obtain best value for generation charges although network charges are fixed. In the recent tendering, three tenders were received from seven invited. IT procurement is now bundled to obtain a single contract across all assets; this has secured opex savings although the market is not as competitive as in Sydney. The fleet contract is up for renewal in 2013 through State Fleet.

The contract with Hunter Water Australia (HWA) is due for renewal in 2014. Hunter Water is considering its options for future operation of its water and wastewater plants. Anticipated savings have been included in the expenditure proposals.

We formed the view that appropriate processes are in place for the procurement of goods and services and there are opportunities to seek further efficiencies through a focus on the procurement strategy and implementation. We comment on capital project procurement in Section 5.5.

6.7 Allocation of Operating Costs to Capital Projects

Hunter Water has a methodology in place to allocated operating expenditure to capital projects. Staff working directly on projects complete timesheets. Their costs are allocated to the respective project. The functional overheads are estimated from each function – for example planning, operations and finance – where only costs related to the direct overhead of that function are identified and proportioned to the total

hours in each function. The process is detailed and lacks some transparency. Hunter Water has identified the need to simplify this process.

In 2011/12, capitalised operating costs were $10.0m of which $2.2m related to apportionment of overhead costs. The overhead costs represent 1.5% of the gross $155m capital expenditure in 2012. This level of overhead cost is at a similar level as we see elsewhere and is appropriate. With a significant reduction in the capital program for the future price path, this allocation should be closely monitored as we would not expect such overheads to increase above 2% of the capital program.

6.8 Transfer of Costs between Regulated and Unregulated Business

We are required to identify and analyse the transfer of costs between regulated and unregulated parts of Hunter Water's business and any subsidiaries. The one subsidiary is Hunter Water Australia (HWA). The unregulated business of HWC is the provision of recycled water. These are four areas of transactions on which we comment below:

- Sales by the regulated business (HWC) to an unregulated subsidiary (HWA);
- Purchases by the regulated business (HWC) from the unregulated subsidiary (HWA);
- Transactions of the unregulated business HWA; and
- Transactions related to Recycled Water.

Sales by the regulated business (HWC) to an unregulated subsidiary (HWA)

These sales include Board remuneration and office accommodation. These costs are reported in the AIR Table 2 as an average $0.3m/a over the current price path and $0.4m/a in the future price path. These transactions are appropriate.

Purchases by the regulated business (HWC) from the unregulated subsidiary (HWA)

HWA provides operations staff for the management and operation of the water and wastewater treatment works. HWA's contract for operational management of these works was set up in 2006 and is due to expire in July 2014. The average annual expenditure to HWA is $13.2m in the current price path and increasing over the future price path to $16m in 2017 on the assumption that this contract continues under the current terms. HWC commented that the original contract has never been market tested although the scope of work is increasing significantly over the future price path.

The direct costs to HWC include a profit element of an average $3m/a reflected in expenditure by product in the AIR. HWC then presents total operating expenditure in Table 5.1 at Group level which then nets off this profit to derive a total Group operating expenditure. These adjustments are appropriate. This Group expenditure is used as the total regulated operating expenditure in the price control.

We formed the view that the operations contract was appropriate at the time. With the new technology available for monitoring and control of treatment works and the increasing future price path expenditure that the current contract brings, there is an opportunity for HWC to consider the most cost-effective way of operations in the future.

Transactions of the unregulated business HWA

The cost of external sales is reported in the AIR Table 5.1 and is excluded from the total regulated expenditure.

We comment in Section 6.9 on transactions related to the unregulated water business.

6.9 Recycled Water

Hunter Water uses its ABC methodology to allocate direct costs to the four products – water, wastewater, stormwater drainage and recycled water using cost and expense codes in the general ledger. These items

include materials, energy, contracts and property. The allocations are appropriate. Not all staff use timesheets so that labour and other costs are apportioned to each product on the basis of function and activity. For recycled water, functional costs are estimated from a broad assessment of staff time. While current recycled functional costs are relatively small this limitation needs to be addressed in future years to provide a more robust allocation. Hunter Water recognises this is a limitation on the analysis but should be addressed with the upgraded Ellipse system.

Corporate costs, representing some 30% of total costs, are allocated across the four products in proportion to the direct costs. The current allocation to recycled water is 0.8% increasing to 3.1% in 2017. This allocation is appropriate.

The planned recycled water projects assumed in the current price path were deferred so that some corporate overheads allocated to recycled water in the 2009 Determination were excluded from the regulated business. There are some small recycled water schemes operational in the current price path serving farmers, a golf course and a power station. The marginal operating costs for these supplies are within the regulated business but are small and not material.

The Kooragang Industrial Water scheme is the largest recycled water project in the future price. The project is discussed in Section 8.4. By 2016, total operating expenditure is estimated to be 2.6m including $1.7m direct costs, $0.3m functional costs and $0.6m share of corporate overhead. There is some uncertainty on the cost allocation for the $0.6m direct costs, from our discussion above on the ABC cost allocations, although any variance is unlikely to be material. The allocation of overheads is appropriate.

There is a further recycling scheme planned at The Vintage which is planned to commence in 2013 where energy, contract and property direct costs are identified. The estimated operating costs comprising direct, functional and corporate expenditure are excluded from the regulated business. Any errors in estimating functional expenditure are not material. The apportionment of corporate costs is appropriate.

Hunter Water has included costs for the Gilleston Heights recycling project in error as the project is not being progressed in the future price path. It is appropriate to reallocate corporate costs back into the regulated business.

We formed the view that the allocation of expenditure to Recycled Water as appropriate although there is an opportunity to use the Ellipse system to derive a more robust method for apportionment. This would also allow other small marginal recycled ater costs to be allocated to the Recycled product.

6.10 Hunter Water Proposed Efficiencies

Hunter Water has taken a proactive approach to identifying cost savings across the business in the future price path. It has identified expected savings of $19.6m over the period 2014 to 2017. This varied from $4.8m in 2014 increasing to $5.0m in 2017. These expected cost savings include:

- The management of vacancies: this is the largest identified efficiency of $2.6m/a based on a 5% reduction on the 2012 establishment. This is equivalent to 24 FTEs. We noted that the number of FTEs in 2012 shows 33 vacant positions so in effect this is a continuation of vacancy management from the current price path period, albeit at a lower rate than current. The level of vacancies is likely to be similar in 2013 although the reported operating expenditure does not show this;
- wastewater treatment initiatives $3.1m ($0.5m/a increasing to $1.0m/a), which Hunter Water relates mainly to savings from the replacement of or renegotiation of the HWA operations contract;
- Other proposed efficiencies are generally to mitigate increases in the current price path including water treatment residuals management (a net $1.4m), energy optimisation ($0.2m/a increasing to $1.0m/a by 2017), credit and hardship ($0.3m/a increasing to $0.4m in 2017) and other smaller elements.

In our assessment of an efficient level of operating expenditure through to 2018, we have taken account of these initiatives. We have discussed these offsets in Section 6.5 and then quantify the net impact of efficiencies in Section 6.11.

6.11 Efficiency and Performance in the Future Price Path

We have considered the scope for cost reductions and efficiencies from five key areas:

- Business efficiencies from the 2013 base year operating expenditure;
- Opportunities for efficiency savings from additional activities and expenditure identified and estimated by Hunter Water;
- Impact of reducing water delivered on marginal operating costs;
- Reversal of corporate overheads allocated to Recycling activities not being progressed; and
- Pre-efficiency studies to lever efficiencies.

We discuss the scope for efficiency in each area and summarise our findings in Table 6.5 below.

Efficiencies on the Base Year Expenditure

Our approach to assessing efficiencies on the 2013 base year expenditure is based on continuing and catch-up efficiency. Continuing efficiency is the scope for top performing or frontier companies to continue to improve their efficiency. It reflects the continuing efficiencies being gained across all major sectors through innovation and new technologies. The continuing improvement element of efficiency relates to the increased productivity derived from process innovation and new technology that all well performing businesses should achieve, including frontier agencies. This applies to a range of industry sectors.

In the 2009 Determination, Hunter Water was set operating efficiency targets[7] of 0.8% per annum continuing and 1.0% per annum catch up as applied to controllable expenditure. The efficiency targets were offset by those identified by Hunter Water. We note that Hunter Water broadly achieved these efficiencies set for the current price path.

The 2009 Determination for water companies in England and Wales[8] established a continuing efficiency of 0.25%. This was lower than the 2004 Determination which set values from 0.8% to 1.0% including outperformance potential. This reflected the incentive to over-perform against efficiency target as there are financial benefits for each company. In New South Wales there is little incentive for an Agency to outperform and there is likely to be a tendency to use the Determination expenditure as a target. However, for consistency we have retained the 0.25% continuing efficiency.

The second element of operating efficiency is the catch-up from an agency's current position to that of the frontier utility or benchmark utility. Our qualitative assessment was based on a comparison of the agency operational control processes compared with current best practice in Australia and England. It is based on the professional judgment of our team formed from their broad and in-depth understanding of these processes across many utilities. Our assessment was based on identified improvements to processes and business opportunities which we discuss in Section 2 and 6.5 above.

We noted that a significant element of catch-up efficiency on base expenditure relates to labour salaries and wages from managing a defined vacancy rate. This was applied from 2012 and continues through the future price path. Much of this saving has been achieved in the current price path resulting in a lower base year 2013 expenditure. In effect the vacancy management approach is a medium term reduction in FTE numbers and related costs. Other efficiency proposals are in areas of the business where we agree there is scope for catch-up efficiencies. We have therefore accepted these areas of catch-up efficiency for the future price path and have made no further adjustments to base operating expenditure.

We have applied a continuing efficiency of 0.25% per annum on controllable costs in base operating expenditure. Examples of continuing efficiency include opportunities from the implementation of upgraded

[7] Review of prices for Hunter Water Corporation's water, sewerage, stormwater and other assets, IPART June 2009
[8] Future Water and Sewerage Charges 2010 to 2015 Final Determination, Ofwat 2009

business systems such as Ellipse and greater penetration of the activity based costing processes which drive efficiency. This continuing improvement element of efficiency relates to the increased productivity derived from process innovation, new technology and procurement that all well performing businesses should achieve. We have assumed that controllable costs are 50% of the base operating costs.

Opportunities for Efficiency Savings from Additional Activities and Expenditure

We have In Section 6.5 identified the scope for further cost savings in several areas of expenditure where there are material increases forecast above the base year or one-off expenditure in the base year:

- Additional wastewater treatment operations costs not market tested;
- Electrical/ mechanical maintenance costs;
- Excavated spoil disposal;
- The cost of compliance with drinking water guidelines for turbidity; and
- An element of Strategies and Studies included in base opex.

We comment below on each area of forecast additional expenditure where we have identified efficiencies.

Additional Wastewater Treatment Operating Costs

Hunter Water has identified $4.6m additional expenditure for additional wastewater treatment. The main increases relate to the HWA management fee ($1.6m) and reimbursable labour to HWA ($1.8m). Other costs include biosolids $0.4m, laboratory analysis ($0.4m) and other reimbursable costs to HWA (0.5m). The additional costs to HWA are in addition to the current annual costs of $11.7m, equivalent to an increase of 9.8%/a. These are significant increases in cost which we understand have not been market tested. Given the extent of these cost increases, a Frontier Company would look to minimise such additional costs.

We found that an element of these additional costs is not shown to be efficient and cost increases should be limited to $3.0m over the period 2014 to 2018.

Electrical and Mechanical Maintenance Costs

The upgraded wastewater treatment plants have additional treatment processes with increased technology and additional maintenance requirements at eleven works. Hunter Water has assumed an increase in electrical and mechanical maintenance costs of $2.1m over the period to 2017.

Hunter Water showed that current reactive maintenance for electrical and mechanical plant formed half the number of jobs carried out and reflected $6.3m or 80% of the total. This proportion is relatively unchanged from the 2008 review. We would expect a more balanced approach to minimise costs between planned and reactive maintenance particularly where relatively new plant is in place at wastewater treatment works and there is a proactive approach to asset replacement.

We formed the view that the current maintenance costs were driven by a relatively high level of unplanned work orders. With the additional treatment processes and other asset renewals there is an opportunity to place a greater focus on planned maintenance with a reduction in unplanned. Hunter Water's Submission describes the new approach to planned maintenance and a reduction in significant reactive work and costs. We concluded that half of these additional costs could be absorbed within the current maintenance budget.

Excavated Spoil Disposal

Hunter Water had included an additional $1.0m/a across 2012 and 2013 for the disposal of excavated spoil at two sites, the CTGM pipeline and Farley WWTW because the sites may be defined as contaminated. This is spoil from water mains and sewer repairs which have been stored at these sites. Hunter Water states that these sites have been referred to the EPA and detailed investigations have been undertaken.

We have accepted the level of expenditure in the current price path. However, we assume that costs relate mainly to a one-off expenditure to address a backlog of work, and have therefore allowed a lower level of expenditure to address ongoing excavated spoil disposal over the future price path. The impact in the future price path is to allow 25% of this annual cost for ongoing spoil disposal. This is shown as a $0.75m/a reduction over the period 2014 to 2018, allocated across the water and wastewater services. We consider there is scope for further innovation in this area which should be investigated in the future price path.

Additional Requirements for Drinking Water Standards

We found that some additional operating expenditure is appropriate to address the new turbidity standard but not to the extent of the estimated cost within the submission as this represents the likely upper limit of costs. While a feasibility study is necessary to confirm the optimum solution our experience suggests that optimisation of the treatment process should be considered before any major expenditure. We have therefore assumed that 50% of the expenditure proposals represents an efficient and prudent solution. The impact is a reduction of $0.25m/a over the period 2014 to 2018.

Strategies and Studies

Hunter Water has demonstrated the value of studies through the catchment management activities and we support this. We consider that other asset and servicing studies are important but elements form part of business as usual using staff within the business. We have assumed that 20% of these costs are business as usual and the efficient additional costs are $2.6m over the period 2014 to 2017. The impact is a reduction of $0.15m/a.

Reduction in Demand

Total demand is forecast to reduce over the future price path. This 1.5% average reduction should be applied to marginal water power costs and chemicals which we estimate to be $0.15m/a for energy and chemical costs.

Reversal of corporate overheads allocated to Recycling activities not being progressed

Hunter Water has included costs for the Gilleston Heights recycling project in error as the project is not being progressed in the future price path.

We formed the view that it is appropriate to reallocate corporate costs back into the regulated business. The impact is to increase regulated corporate expenditure by $0.3m/a over the period 2016 to 2018.

Pre-efficiency Studies to Lever Efficiencies

We consider that Hunter Water should not constrain capital expenditure for projects to deliver operating expenditure savings where there are benefits in total cost reductions.

We suggest that Hunter Water uses $1m of the capital efficiency savings as operating costs towards studies to identify operating expenditure reduction in the subsequent price path. Examples of such initiatives include energy optimisation and on-site generation, water treatment residual s thickening and disposal and biosolids disposal. We have identified outputs from these initiatives in Section 9 Outputs.

We have included an allowance of $0.2m/annum over the period 2014 to 2018.

Summary of Efficient Operating Expenditure

We summarise our view of an efficient level of operating expenditure for the period 2014 to 2018 in Figure 6-8 below.

The Table is in five sections comprising:

- the Hunter Water proposed expenditure by product for the years 2014 to 2018;
- the Atkins Cardno specific adjustments to Hunter Water additional costs generally above the 2013 base;

- the Atkins Cardno adjustment in marginal operating costs for lower water use projections;
- the application of the Atkins Cardno assumption of continuing efficiency on controllable costs; and
- the Atkins Cardno recommended efficient operating expenditure by product.

HUNTER WATER CORPORATION FUTURE PRICE PATH - ATKINS CARDNO RECOMMENDED OPERATING EXPENDITURE							
($m 2012/13)	2013	2014	2015	2016	2017	2018	Total 2014 to 2017
HWC Proposed Expenditure							
One-off expenditure	6.6	0.0	0.0	0.0	0.0	0.0	
Water	34.6	36.4	37.9	37.1	38.8	39.3	150.3
Wastewater	46.5	47.2	48.3	48.8	48.8	49.6	193.0
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	32.7	33.7	34.3	129.7
Total opex in Regulated Business	**122.0**	**115.8**	**119.1**	**119.5**	**122.1**	**124.1**	476.4
Atkins Cardno Specific Adjustments to Hunter Water additional costs above the 2013 base							
HWA additional wastewater costs (+4.5m)	0.00	-0.40	-0.40	-0.40	-0.40	-0.40	-1.6
Elec/ mech maintenance (+2.1m)	0.00	-0.25	-0.25	-0.25	-0.25	-0.25	-1.0
Spoil disposal (+$1m one-off in 2013)	0.00	-0.75	-0.75	-0.75	-0.75	-0.75	-3.0
ADWR turbidity (+$2.1)	0.00	-0.25	-0.25	-0.25	-0.25	-0.25	-1.0
Strategies and Studies (+$3.2m)	0.00	-0.15	-0.15	-0.15	-0.15	-0.15	-0.6
Corporate reverse recycle overheads	0.00	0.00	0.00	0.30	0.30	0.30	0.6
Pre-feasibility studies to lever efficiencies	0.00	0.20	0.20	0.20	0.20	0.20	0.8
Total opex adjustments	**0.00**	**-1.60**	**-1.60**	**-1.30**	**-1.30**	**-1.30**	-5.8
Atkins Cardno adjustment for marginal cost of reduction in demand							
Marginal water costs	**0.00**	**-0.15**	**-0.15**	**-0.15**	**-0.15**	**-0.15**	-0.6
Application of Atkins Cardno operating efficiency targets to base expenditure							
Continuing Efficiency adjustment	**0.00**	**-0.14**	**-0.30**	**-0.45**	**-0.61**	**-0.78**	-1.5
Atkins Cardno Recommended Efficient Operating Expenditure							
Water	34.6	35.7	37.1	36.3	37.8	38.3	146.9
Wastewater	46.5	46.0	47.0	47.4	47.4	48.1	187.9
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	33.0	34.0	34.6	130.3
Recommended Efficient Operating expenditure	**115.4**	**113.9**	**117.1**	**117.6**	**120.0**	**121.9**	468.5

Source: Atkins/Cardno analysis

Table 6-8 Atkins Cardno Recommended Efficient Operating Expenditure

6.12 Conclusions

Current Price Path

The 2009 Determination set a challenging efficiency target including Hunter Water's own efficiencies. Hunter Water has reported efficiencies in the current price path including restructuring and corporate labour reductions, demand management costs, reactive maintenance fieldwork amounting to $13.4m over the period. When we take the additional external and shareholder cost drivers and the likely lower outturn for 2013. actual expenditure is generally consistent with the 2009 Determination.

We concluded that actual operating expenditure is likely to be at a similar level as the Determination and that expenditure in the current price path was efficient.

Future Price Path

Hunter Water has taken a proactive approach to identifying cost savings across the business in the future price path. Hunter Water has explained that continuing cost increases are a total $28.0m driven by labour-related costs, rising electricity and carbon costs which are mainly uncontrollable, and controllable

costs including wastewater operations, maintenance and water strategies and treatment. To offset these increases, Hunter Water has proposed efficiencies of a total $19.6m over the period with the greater part related to vacancy management, electricity optimisation and operational improvements.

We have applied a continuing efficiency of 0.25% per annum on controllable costs in base operating expenditure. Examples of continuing efficiency include opportunities from the implementation of upgraded business systems such as Ellipse and greater penetration of the activity based costing processes which drive efficiency. This continuing improvement element of efficiency relates to the increased productivity derived from process innovation and new technology that all well performing businesses should achieve. We have assumed that controllable costs are 50% of the base operating costs.

We noted that a significant element of catch-up efficiency on base expenditure relates to labour salaries and wages from managing a defined vacancy rate. This was applied from 2012 and continues through the future price path. These efficiencies should be considered as part of the catch-up efficiency in the current price path. Other efficiency proposals are in areas of the business where we agree there is scope for catch-up efficiencies. We have therefore accepted these areas of catch-up efficiency for the future price path and have made no further adjustments.

We have identified opportunities in the additional expenditure proposed by Hunter Water for further cost savings, or inclusion in base operating expenditure, These relate to:

i. Marginal cost reductions from reduced water production;
ii. Additional wastewater treatment operations costs not market tested;
iii. Electrical/ mechanical maintenance costs;
iv. Excavated spoil disposal;
v. The cost of compliance with drinking water guidelines for turbidity; and
vi. Elements of Strategies and Studies.

We consider that Hunter Water should not constrain capital expenditure for projects to deliver operating expenditure savings where there are total cost reduction benefits. Examples of such initiatives include energy optimisation and on-site generation, water treatment residual s thickening and disposal and biosolids disposal. We have identified outputs from these initiatives in Section 9 Outputs.

Our recommended efficient operating expenditure for the period 2014 to 2018 is shown in Table 6-9.

HUNTER WATER CORPORATION FUTURE PRICE PATH - ATKINS CARDNO RECOMMENDED OPERATING EXPENDITURE							
($m 2012/13)	2013	2014	2015	2016	2017	2018	Total 2014 to 2017
HWC Proposed Expenditure							
One-off expenditure	6.6	0.0	0.0	0.0	0.0	0.0	
Water	34.6	36.4	37.9	37.1	38.8	39.3	150.3
Wastewater	46.5	47.2	48.3	48.8	48.8	49.6	193.0
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	32.7	33.7	34.3	129.7
Total opex in Regulated Business	**122.0**	**115.8**	**119.1**	**119.5**	**122.1**	**124.1**	476.4
Atkins Cardno Specific Adjustments to Hunter Water additional costs above the 2013 base							
HWA additional wastewater costs (+4.5m)	0.00	-0.40	-0.40	-0.40	-0.40	-0.40	-1.6
Elec/ mech maintenance (+2.1m)	0.00	-0.25	-0.25	-0.25	-0.25	-0.25	-1.0
Spoil disposal (+$1m one-off in 2013)	0.00	-0.75	-0.75	-0.75	-0.75	-0.75	-3.0
ADWR turbidity (+$2.1)	0.00	-0.25	-0.25	-0.25	-0.25	-0.25	-1.0
Strategies and Studies (+$3.2m)	0.00	-0.15	-0.15	-0.15	-0.15	-0.15	-0.6
Corporate reverse recycle overheads	0.00	0.00	0.00	0.30	0.30	0.30	0.6
Pre-feasibility studies to lever efficiencies	0.00	0.20	0.20	0.20	0.20	0.20	0.8
Total opex adjustments	**0.00**	**-1.60**	**-1.60**	**-1.30**	**-1.30**	**-1.30**	-5.8
Atkins Cardno adjustment for marginal cost of reduction in demand							
Marginal water costs	**0.00**	**-0.15**	**-0.15**	**-0.15**	**-0.15**	**-0.15**	-0.6
Application of Atkins Cardno operating efficiency targets to base expenditure							
Continuing Efficiency adjustment	**0.00**	**-0.14**	**-0.30**	**-0.45**	**-0.61**	**-0.78**	-1.5
Atkins Cardno Recommended Efficient Operating Expenditure							
Water	34.6	35.7	37.1	36.3	37.8	38.3	146.9
Wastewater	46.5	46.0	47.0	47.4	47.4	48.1	187.9
Stormwater	0.8	0.8	0.8	0.9	0.8	0.9	3.4
Corporate	33.5	31.3	32.0	33.0	34.0	34.6	130.3
Recommended Efficient Operating expenditure	**115.4**	**113.9**	**117.1**	**117.6**	**120.0**	**121.9**	468.5

Source: HWC Submission and Atkins Cardno analysis

Table 6-9 Proposed Level of Efficient Operating Expenditure

7. Capital Expenditure

7.1 Methodology

In this section, we present the results of our review of the efficiency of Hunter Water's capital expenditure. We identify the principal cost drivers and explain the variances in the current price path expenditure against the 2008 Determination. We comment on the efficiency of capital expenditure in the 2008 Determination period which is used to inform our view of future efficiency.

The methodology for the review of capital expenditure has focused on an evaluation of the information provided in the Information Returns and gaining an understanding of Hunter Water's external and internal environment as well as drivers for capital investment which we discussed in Sections 2 (Business Environment) and Section 3 (Strategic Review) of this report. Our views are guided by the evaluation of asset management and capital investment processes through interviews and Hunter Water presentations. We have commented on the main asset management systems and processes used to budget, track, monitor and report capital expenditure in Section 4.

We then make an assessment of an efficient level of expenditure for the period 2014 to 2018. We discuss the cost drivers and efficient cost level recommendations for each of the capital drivers - Existing Mandatory Standards, New Mandatory Standards, Growth, Business Efficiency, Asset and service reliability, Discretionary standards and Government Programs - and the specific activities contained therein.

We have selected a sample of capital projects from the 2008 Determination and proposed for 2014 to 2018 to gain an understanding of the efficiency and prudence of the investment; prudence as defined by IPART:

> *The prudence test assesses whether, in the circumstances existing at the time, the decision to invest in an asset is one that Hunter Water, acting prudently, would be expected to make. It should assess both the prudence of* ***how the decision*** *was made to invest and also the prudence of* ***how the investment was executed*** *where the asset has been built (i.e. the construction or delivery and operation of the asset), having regard to information available at the time.*

A summary of the projects reviewed is listed in Appendix A. Each project has a summary of our findings presented in Appendix B.

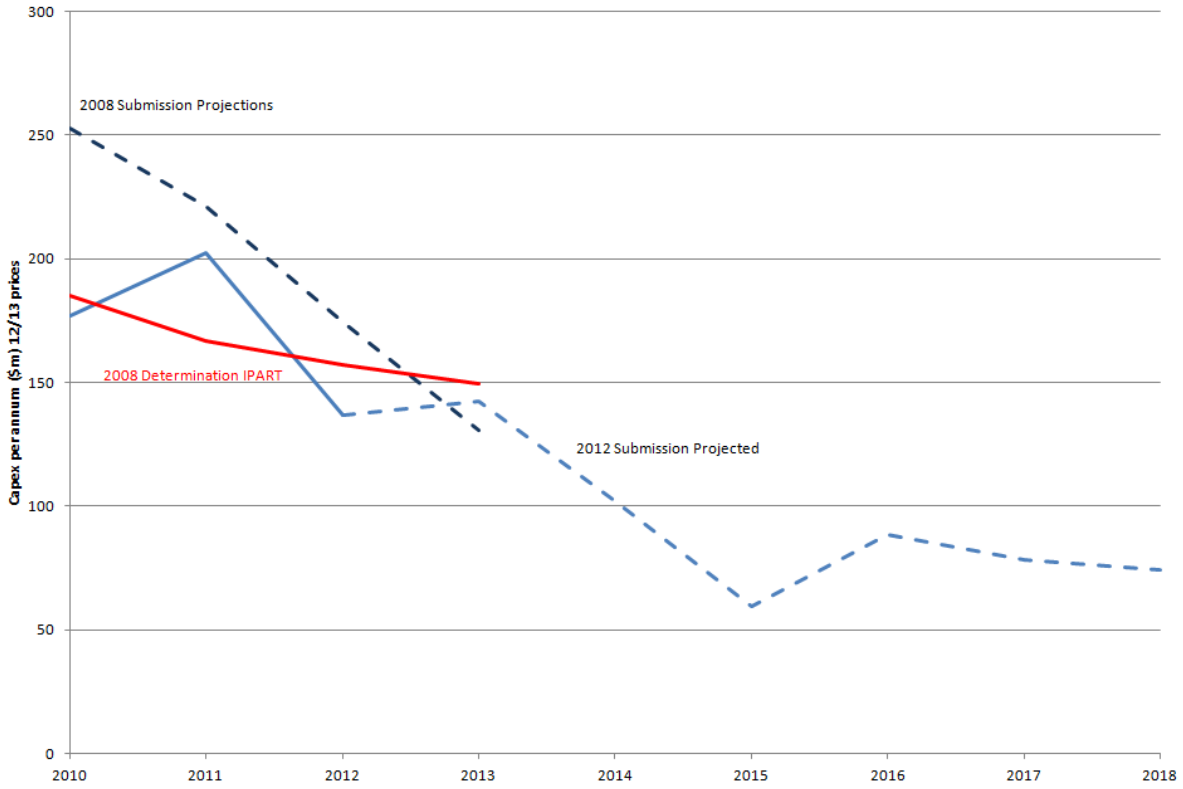
We present our analysis of the future expenditure proposals and comment on each driver on the potential for efficiencies through the robustness of estimates, the need and timing of expenditure and the impact of internal challenge and budget control.

Our views on future capital expenditure efficiencies are based on the hypothesis of a Frontier Company, the continuing efficiencies that a Frontier Company makes through innovation and technological development and the catch-up efficiency required of Hunter Water to achieve the performance of a Frontier Company over time.

7.2 Overview

Hunter Water has incurred a similar value of capital expenditure in the current price path as its submission and IPART's determination, as seen in Figure 7-1 below. Capital expenditure is $0.5m greater than IPART's determination[9]. All expenditure is presented at $12-13 prices.

[9] This is based on HWC's submission figures and excludes an adjustment to expenditure on the Enterprise Resource Plan described below because we consider it to be a priority project which should be implemented as soon as possible.

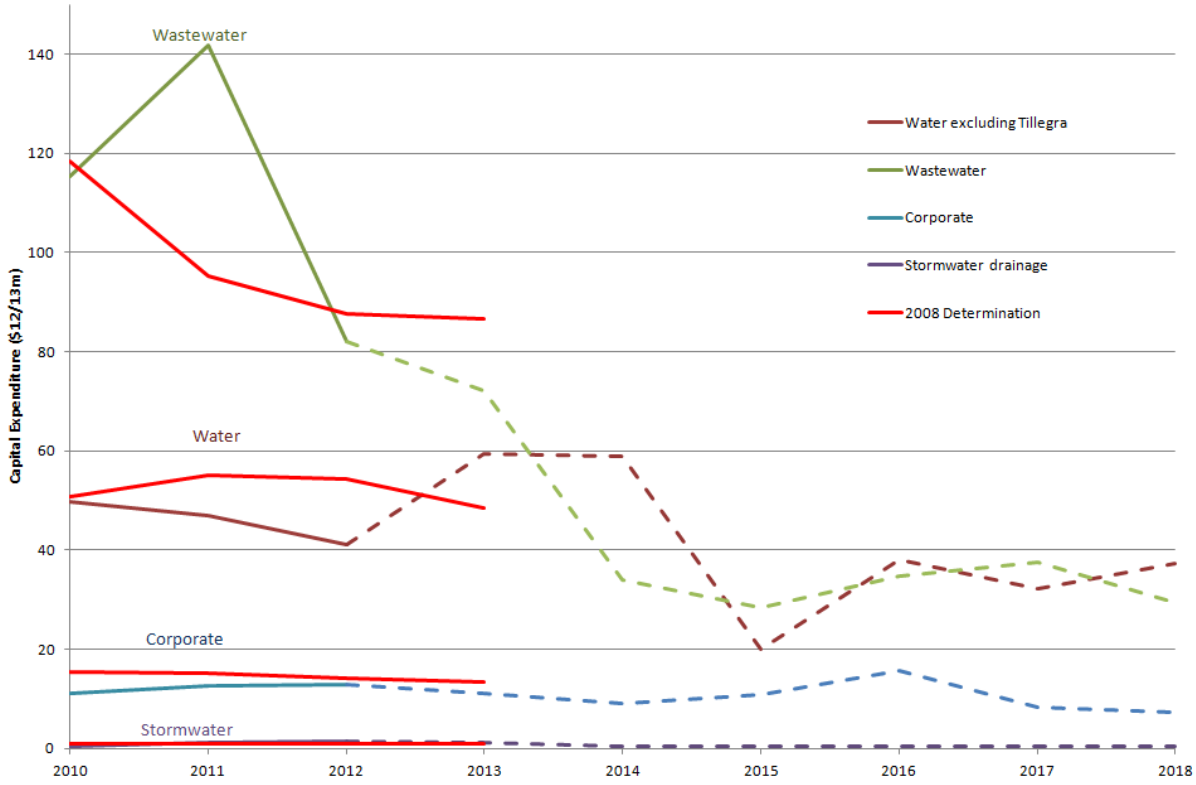


Source: Hunter Water 2012 Submission, 2008 Submission and IPART 2008 Determination

Figure 7-1: Total Capital Expenditure 2010 to 2018 (excluding Tillegra dam and recycled water)

7.3 Breakdown by Service and Driver

Expenditure was higher than the determination assumptions in the wastewater service (c$23.6m higher) and below assumption for corporate ($11.9m) and water ($11.6m). The review of sample projects suggests that much of the overspend on the wastewater service is likely to have been caused by initial underestimation at the time of the last price submission in 2008.



Source: Hunter Water 2012 Submission and IPART 2008 Determination

Figure 7-2: Capital Expenditure 2008 to 2018 (excluding Tillegra dam and recycled water)

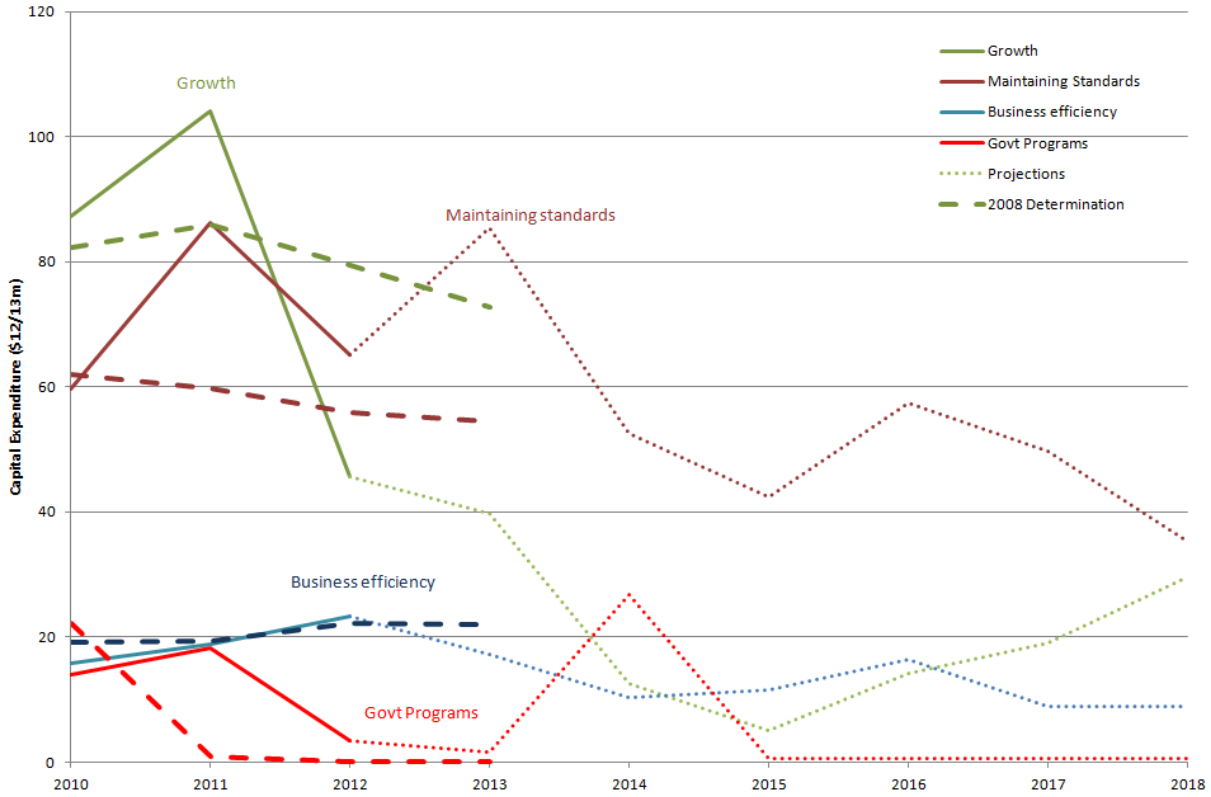
The expenditure by high level drivers is presented in Figure 7-3. These are mapped to the Hunter Water drivers as shown. The most significant variation in expenditure by service is the dramatic fall off of investment in the wastewater sector. This is understood to be largely as a result of the significant improvements made to the treatment works over the last 10 years or so to deal with environmental and growth drivers.

High Level Driver	Hunter Water Drivers
Growth	Growth
Maintaining Standards	Existing Mandatory Standards New Mandatory Standards Asset & Service Reliability Discretionary
Business efficiency	Business efficiency
Government Programs	Government Programs

Table 7-1: Definition of broad driver categories (Source: Atkins/Cardno analysis)

"Growth" and "business efficiency" expenditure are $43.6m and $7.6m below and "maintaining standards" and "government programs" are $64.1m and $14.0m above the assumptions underlying IPART's 2008 Determination. Some of this variance may be due to differences between ex ante and ex post cost classification. However, we understand that growth driven investments were scaled back in some cases during the current price path due to the lower levels of new development experienced. This suggests that

much or all of that saving has been reallocated to "maintaining standards", presumably partly to offset the overspend in the wastewater treatment improvement program.



Source: Hunter Water 2012 Submission and IPART 2008 Determination

Figure 7-3 Capital Expenditure 2010 to 2018 by broad driver (excluding Tillegra dam and recycled water)

Growth-driven expenditure is projected to decline significantly after the current price path. This appears to be consistent with Hunter Water's projection of limited aggregate demand growth and an initial reduction in potable water demand due to the Kooragang Island scheme.

The significant increase in Government Program expenditure in 2014 is due to the inclusion of $26.1m of Kooragang Island costs in the water service under "Government Programs".

We examine below the current and future price path capital expenditure by service. Recycled water expenditure is covered separately in Chapter 8.

7.4 Water Service

The historic trends and projected spend on the water service are set out in Table 7-2 and Figure 7-4 below. Both of these summaries exclude Tillegra costs/savings in the current price path.

The significant increase in Government Program expenditure in 2014 is due to the inclusion of $26.1m of Kooragang Island costs under "Government Programs". We have suggested that, for clarity, any regulated customer contributions to this scheme be dealt with separately to the water service capex allowance.

We understand that most of the increase in "growth (funded by other)" expenditure in 2018 is because the company has assigned a number of projects ($10.75m) to this year which it considers may, in reality, be delivered at some point over the period 2017-2021.

($m 2012/13) year ending June	2010	2011	2012	2013	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	8.3	21.5	13.7	28.2	26.5	12.8	19.0	13.6	9.1	72.0	81.0
New Mandatory Standards	6.6	5.0	3.8	1.2	0.1	0.1	0.8	0.1	1.2	1.0	2.3
Asset & Service Reliability	0.0	0.0	0.0	0.9	0.0	1.3	8.9	9.6	5.6	19.8	25.4
Growth (funded by other)	28.0	12.6	16.4	22.2	2.4	1.4	4.4	4.9	17.5	13.1	30.6
Government Programs	0.0	0.0	0.0	0.0	26.1	0.0	0.0	0.0	0.0	26.1	26.1
Discretionary	0.0	0.1	0.0	0.1	0.4	0.4	0.9	0.3	0.2	2.1	2.3
Business Efficiency	6.9	7.7	7.1	6.8	3.3	3.9	3.9	3.7	3.7	14.8	18.6
Total	49.8	46.9	41.0	59.4	58.8	20.0	38.0	32.2	37.3	148.9	186.3

Source: HWC 2012 Submission

Table 7-2: Summary of historic and projected water service capex by Hunter Water driver, excluding Tillegra

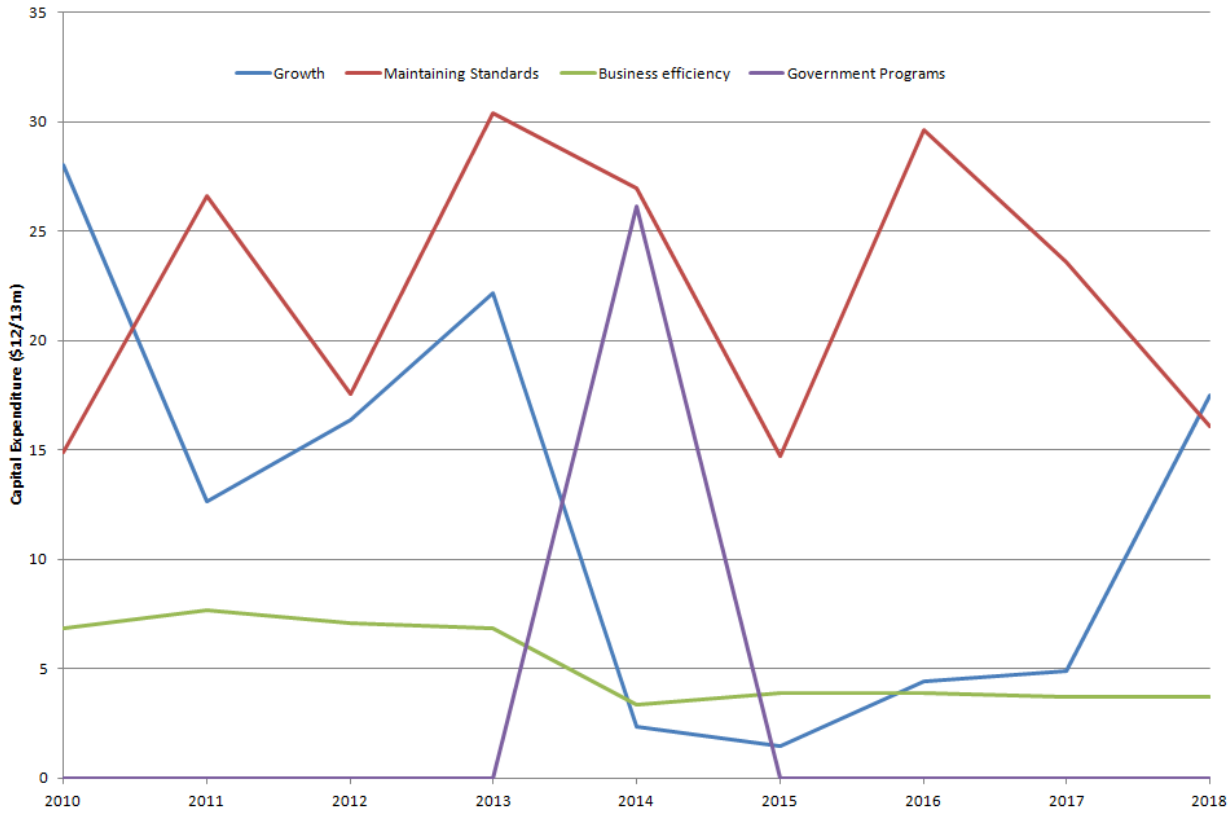
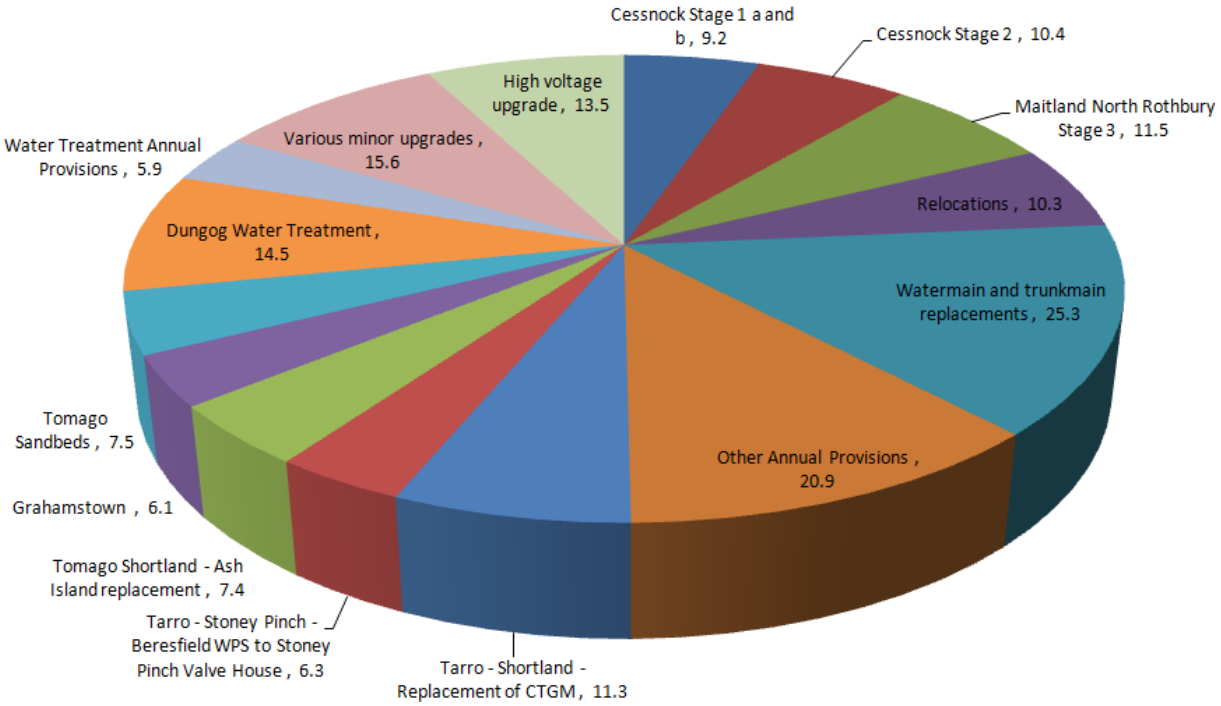


Figure 7-4 Water Service Capital Expenditure by Broad Driver 2010 to 2018 (excluding Tillegra)

Current Price Path

The large projects in the current price path are summarised in Figure 7-5 below. From this it is clear that the company has undertaken a range of large capital projects in the current price path.



Source: HWC 2012 Submission

Figure 7-5 Water Service Large Projects in Current Price Path ($12/13m)

Note: Large projects defined as projected spend greater than $5m between 2010 and 2013

Non-critical main replacement

This is an ongoing program to replace non-critical mains, typically smaller diameter reticulation mains, which will continue through to the 2013-18 price path. Non-critical mains are currently operated to failure and repaired. This continues until the increasing cost of repair renders replacement justifiable on social and economic grounds. While individual failures on non-critical reticulation mains have limited budget and system impacts, due to the large quantity of the mains, the failures as a whole influence the overall water main maintenance budget and the operational performance.

On average, 90% of the water main failures recorded each year occurred on non-critical mains. Almost all of the recorded repeat discontinuities, defined as properties that experienced 3 or more unplanned water interruptions exceeding 1 hour in duration over the year, were due to non-critical main failures. While the average duration of water interruptions due to failures on non-critical mains is much lower than that for larger critical water mains nearly 50% of properties which experienced interruptions of more than 5 hours were due to non-critical main failures.

The length replaced in the current price path is estimated to be 38.5km against a target of 46km. Expenditure in the current price path is estimated was $12.3m compared to an estimated expenditure of $9.7m. The decreased output and increased costs were due to a slight increase in contractor rates, more complex site conditions and a number of DN200 mains, larger than the average diameter replaced.

Replacement of 900 CTGM - Tarro to Shortland

The project involves the replacement of an 8.5km section of the 900mm diameter above ground Chichester Trunk Gravity Main (CTGM) between Tarro and Shortland, The main was constructed in the early 1920s and consists of a mild steel locking bar pipeline with lead joints. It is an above-ground pipeline and located in a floodplain and in extreme flood events, such as a 1 in 100 return period, it would be susceptible to failure. Renewal was required due to the age of the main and its poor condition, regular leaks, occasional major breaks, the on-going cost of maintenance, and, in the event of a major flood, the risk of extended disruption of water supply to approximately 110,000 people in the coalfields area.

The project has been completed at a significantly lower cost than estimated due to:

- Procuring the project through a design and construct contract through a very competitive tendering process;
- Design changes;
- Pipe supply through Hunter Water purchase and achieving economies of scale; and
- A significant reduction in steel prices which impacted on pipeline costs.

Cessnock Stage 1a and b

This project involved construction of c10km trunk mains, a water pumping station and a 5 ML reservoir to resolve existing loss of supply, low pressure and security of supply to the customers at Cessnock, and also to provide capacity for the growth in the area. The loss of supply and low pressure was caused by capacity constraints under peak demand when the service reservoirs would drain down. The project was delivered by the contractor panel, for pipelines and pumping stations, and a packaged contract for construction of two service reservoirs, one for this scheme and one elsewhere. The project has been delivered at less than the cost assumed in the revised Appendix D partly because of the reduction in scope as a result of lower levels of growth than originally anticipated.

High Voltage Upgrades

The project involves replacement and upgrade of 31 High Voltage (HV) sites, 28 water sites and three wastewater sites. The existing assets do not meet current standards for reliability and safety, and represent a significant risk to Hunter Water in their current state. A significant number of these sites are 40 to 50 years old. The project will be delivered in three packages with Package 1 currently at construction phase. Delays were experienced in the early phases of the project in gaining agreement with Ausgrid regarding taking over Hunter Water's HV assets. However there is a significant expenditure planned for 2013. The project will be completed in 2015.

Pump Replacements

This is an ongoing project that will continue into the future price path. It involves the renewal of water and wastewater pumps that have failed. Funding in the current price was included under general mechanical & electrical provisions split by Product and Area such as water network and sewer treatment. Hunter Water has approximately 1050 water pumps and 1500 wastewater pumps. Pumps have a relatively short asset life and ongoing renewal of this asset portfolio is required.

Switchboard Replacements

Hunter Water owns operates and maintains over 500 switchboards associated with water and wastewater facilities. It has recently begun to undertake a targeted program of condition assessments of switchboards to determine which require replacement and prioritise work. Recent condition reports indicated that over 100 switchboards in the water and wastewater network required replacement. This project involves the replacement of switchboards which have reached the end of their economic life. During this current price path the replacement of switchboards has been reactive in response to switchboard failures. A proactive

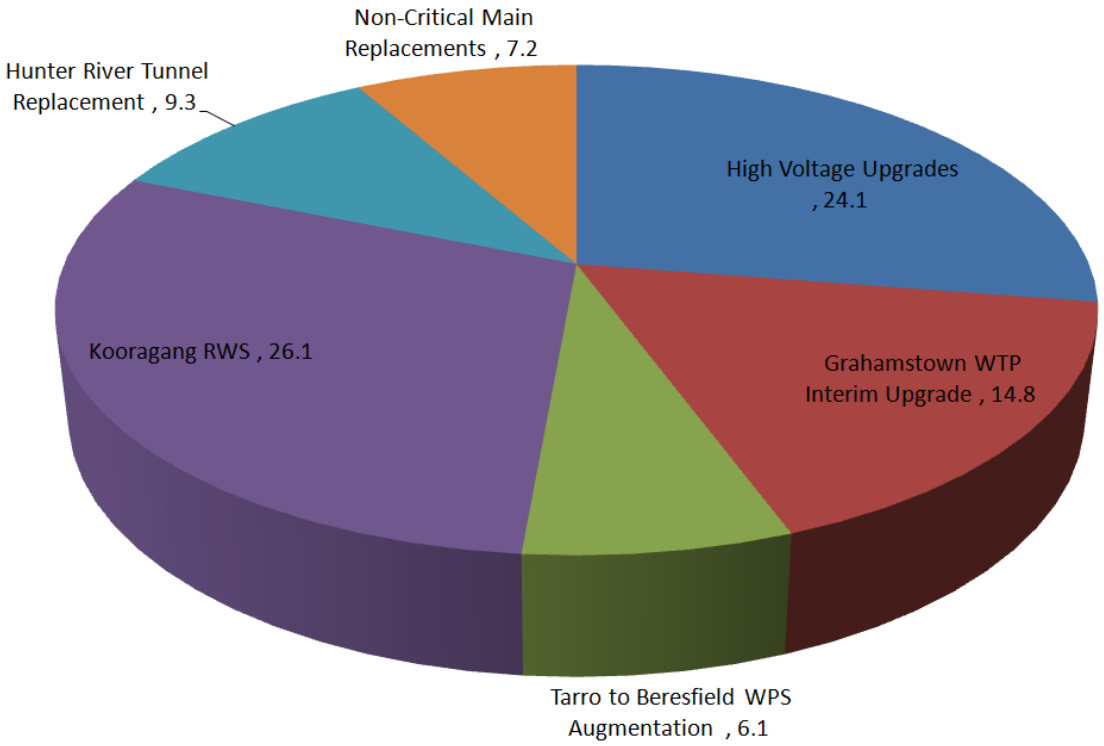
approach is proposed by Hunter Water for switchboard renewals with increasing expenditure in 2013 which will continue onto the future price path in response to the aging switchboard portfolio.

Prudence and Efficiency of Water Capital Expenditure in Current Price Path

From our review of a sample of projects in the current price path we have concluded that the water capital expenditure in the current price path is prudent and efficient.

Future Price Path

A lot fewer large projects have been identified for the next price path as made clear in Figure 7-6 below.



Source: HWC 2012 Submission

Figure 7-6 Water Service Large Projects in Future Price Path ($12/13m) (Source: "SIR Capex 2(revised by IPART" sheet)

Note: Large projects defined as projected spend greater than $5m between 2014 and 2017

Non-critical main replacement

This is a continuation of the existing renewals program. Due to a constrained capital expenditure program the expenditure in the future price path will be reduced from the planned $9.73m (actual expenditure of $12.27m) in the current price path to $7.23m in the future price path. We are satisfied of the need for this project and we discuss the implications of the 25% reduction in mains renewal investment in Section 7.8. We also note that for this expenditure is estimated to increase the operating expenditure for mains repair by up to $800k per annum by 2018. Hunter Water stated that the rate of increase is likely to develop over a number of years, therefore the initial increase is likely to only be marginal, and will be impacted by the predominant weather conditions (ie dry or wet).

They further indicated that even though the analysis has forecast an increase in failures and maintenance costs, the asset class strategy will be modified to ensure the ongoing maintenance costs will be minimised through:

- Focussing the available watermain renewals on the highest priority failure clusters, which will consider how recent the failures have occurred, how close to a cluster the failures are, and limiting the replacements to only the failure cluster,
- Modifying repair methods and costs to consider clamping over replacing, and reviewing repair durations, traffic management and restorations.

Therefore as presented, Hunter Water will continue to monitor both the asset failure performance and the on-going maintenance performance and costs, and if these proposed initiatives require further modifications, then Hunter Water will resubmit a revised renewal program into the capital prioritisation process.

Hunter Water's proposed target output is for non-critical main replacement in the next price path is 18km. This equates to an average rate of $400/m. In the current price path 35.8 km is being renewed for $12.3m which equates to an average rate of $343/m. This rate covered renewals in complex sites and larger diameter mains. We propose that in the future rice path the output target should be 21km, which at a rate of $343/km will result in the same expenditure of $7.23m.

High Voltage Upgrades

This is a continuation of the upgrade program commenced in the current price path. During our discussions with Hunter Water we noted that recent estimates were higher than that presented in the SIR. Hunter Water has subsequently confirmed that an additional expenditure of $2.4m is required in the next price path (i.e. the total project expenditure is $46.5m rather than $44.1m). We are satisfied that this project is necessary to maintain service reliability and reduce OH&S risks.

Pump Replacements

The renewal of water and wastewater pumps which have failed will continue from the current price path with minor additional allowance for proactive pump renewal. There will be an increase in expenditure from an estimated $3.2m in the current price path to $5.3m. We accept this proposal given the ageing pump fleet and the need for a more proactive approach to mechanical and electrical renewals.

Switchboard Replacements

Expenditure on switchboards for water and wastewater services will increase from $3.1m in the current price path to $6.2m. We are satisfied that this increase is required given the critical nature of switchboards, their age profile and the historically low investment in the renewal of switchboards.

Hunter River Tunnel Replacement

The Chichester Trunk Gravitation Main (CTGM) annually transports approximately 40% of the water that HWC supplies to its customers and 25% of the peak demand. The Hunter River Tunnel (HRT), which passes under the Hunter River near the town of Osterley, is a major component of the CTGM.

The current condition of the tunnel, pipework and associated valving presents an unacceptable business risk in a number of areas, specifically immediate localised and wider long-term discontinuity and maintenance safety risks. Due to the age and condition of the cast iron bends at the base of each shaft it is considered that there is a high probability of failure within the next 5 to 10 years. The project was originally programmed for completion by June 2015 but due to financial constraints has been deferred by two years. The cost is estimated to be $9.3m. We agree with Hunter Water that this is a critical investment for the next price path. Given the high risk associated with this asset and the long-term duration of customer impacts while a replacement asset is constructed, it would be preferable that this investment is undertaken as originally programmed.

We noted that the Risk Assessment, Options Report and Contingency Plan only contained a total cost of each option without any breakdown of the assumptions and component costs and contingencies. We were subsequently provided with a spreadsheet with estimates which were described as being between order-of-cost and preliminary estimates, including a 30% contingency. We would expect to see a more detailed analysis in the options report. Given the consequence of failure of the CTGM, we agree with the option for selecting twin directionally drilled river crossings.

Tarro to Beresfield WPS Augmentation

The project involves replacement of 2.2 km of a 90 year old DN900 mild steel cement lined (MSCL) main with a DN1200 main which will follow a different alignment**.** A number of previous reports have recommended replacing the pipeline because of its condition or to increase the capacity of the Beresfield WPS to supply water to the Coalfields system.

The most recent estimate for the project is $8.2m current but only $6.2m has been included in the AIR/SIR. The conceptual design and investigations will allow a more accurate total project estimate (TPE) to be developed. The project was originally programmed for June 2015 but has been deferred for two years to meet budgetary constraints. Deferring the investment by two years will increase the risk of catastrophic failure. Hunter Water estimates the likelihood of failure to be 1 in 10-20 year. The rate of deterioration of a mild steel main is quite slow although the rate of deterioration will increase over time. If a major failure occurs then Hunter Water would need to re-prioritise its program. It will also need to be satisfied that its contingency plans are effective.

We are satisfied with the need for this project. Hunter Water will be challenged to deliver the project within the reduced budget. However, as this project is currently in the planning stage there are opportunities for achieving some cost efficiencies through value management processes and an appropriate project delivery method. As the economy is likely to slow over the next few years there may also be opportunities for Hunter Water to take advantage of a more competitively priced construction sector. This may require the project to be brought forward to deliver the project at the reduced estimate.

Grahamstown WTP Interim Upgrade

The Grahamstown Water Treatment Plant (WTP) is Hunter Water's largest and most important treatment asset. On average Grahamstown WTP supplies potable water to 40% of Hunter Water Corporations customers. During summer conditions the reliance on the plant increases and the water demands of approximately 75% of Hunter Water's 500,000 customers are met using Grahamstown WTP. In 2008 an upgrade strategy for the plant recommended a significant enhancement to the plant through a Stage 3 augmentation at a cost of over $120m. This would address identified water quality risks and meet projected water demands.

As a result of the proposed implementation of the Kooragang Water Recycled Water Scheme, revised demand projections and a greater focus on catchment management to reduce water quality risks, the Stage 3 upgrade has been deferred to 2021. However, a number of interim upgrades will need to be carried out to address reliability, water quality and compliance issues. These upgrades are especially important in the context that the plant will be 50 years old by the time the stage 3 upgrade occurs and will be operating at nearly full capacity in order to meet potable water demand. The cost estimate is $14.8m due to budgetary constraints; the project completion may be deferred from June 2016 to June 2018.

The water quality risks relate to the lower than desirable detention period in the clearwater tank. This provides the final barrier against any bacterial contamination of the supply. Hunter Water is continuing to assess the effectiveness of the clearwater tank and monitors water quality as part of its drinking water quality management. It will need to be particularly vigilant during peak demand periods. Where deterioration in water quality leaving the plant, or in the distribution system, becomes evident then appropriate operational modifications or capital investment will need to be undertaken.

Prudence and Efficiency of Water Capital Expenditure in Next Price Path

From our review of a sample of projects we have concluded that the proposed water capital expenditure in the next price path is prudent and efficient.

7.5 Wastewater Service

The historic trends and projected spend on the wastewater service are set out in Table 7-3 and Figure 7-7 below. Note these figures have been adjusted to reflect errors made by Hunter Water in populating the SIR tables, as detailed in the email from Hunter Water[10].

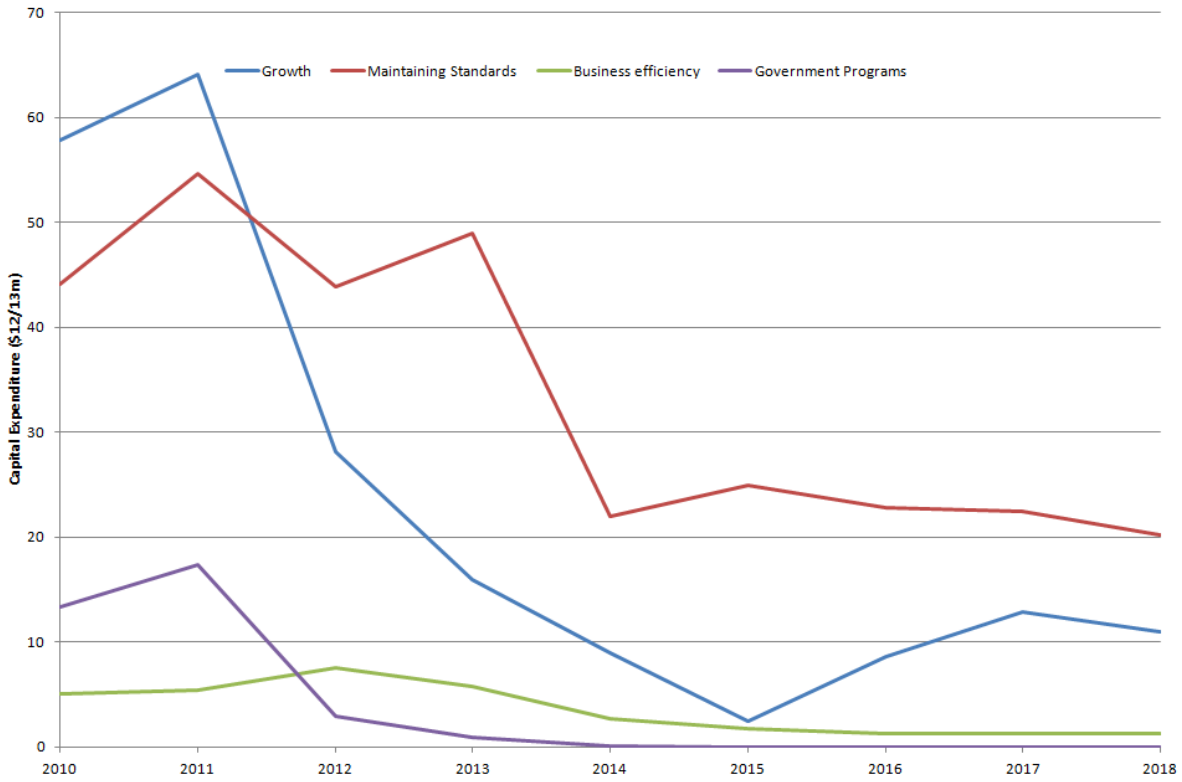
It is clear that the decrease in projected wastewater spend is reasonably consistent across the drivers with a particular drop off in "new mandatory standards" and "growth" reflecting the improvements made in recent years to the wastewater treatment works and a reduction in growth projections. The increase in discretionary expenditure in 2017 and 2018 relates to the Shortland Treatment Upgrades scheme which has been brought forward because of the Kooragang Industrial Water Scheme as discussed below.

($m 2012/13) year ending June	2010	2011	2012	2013	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	10.1	13.2	17.7	33.7	20.0	23.0	21.5	16.0	14.3	80.4	94.7
New Mandatory Standards	29.0	41.5	25.8	15.3	1.0	0.7	0.7	0.7	0.7	3.1	3.7
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4	0.4
Growth (funded by other)	57.9	64.1	28.1	15.9	8.9	2.4	8.6	12.9	10.9	32.8	43.7
Government Programs	13.3	17.4	3.0	0.9	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Discretionary	0.0	0.3	0.0	0.7	1.2	0.7	2.6	6.3	2.1	10.9	13.0
Business Efficiency	5.1	5.4	7.5	5.7	2.7	1.7	1.3	1.3	1.3	7.0	8.3
Total	**115.3**	**141.9**	**82.1**	**72.2**	**34.1**	**28.4**	**34.7**	**37.5**	**29.3**	**134.7**	**164.0**

Source HWC 2012 Submission and supplementary spreadsheets

Table 7-3: Summary of Historic & Projected Wastewater Service Capital Expenditure by Hunter Water Drivers

[10] Hunter Water email to IPART, 16 October 2012

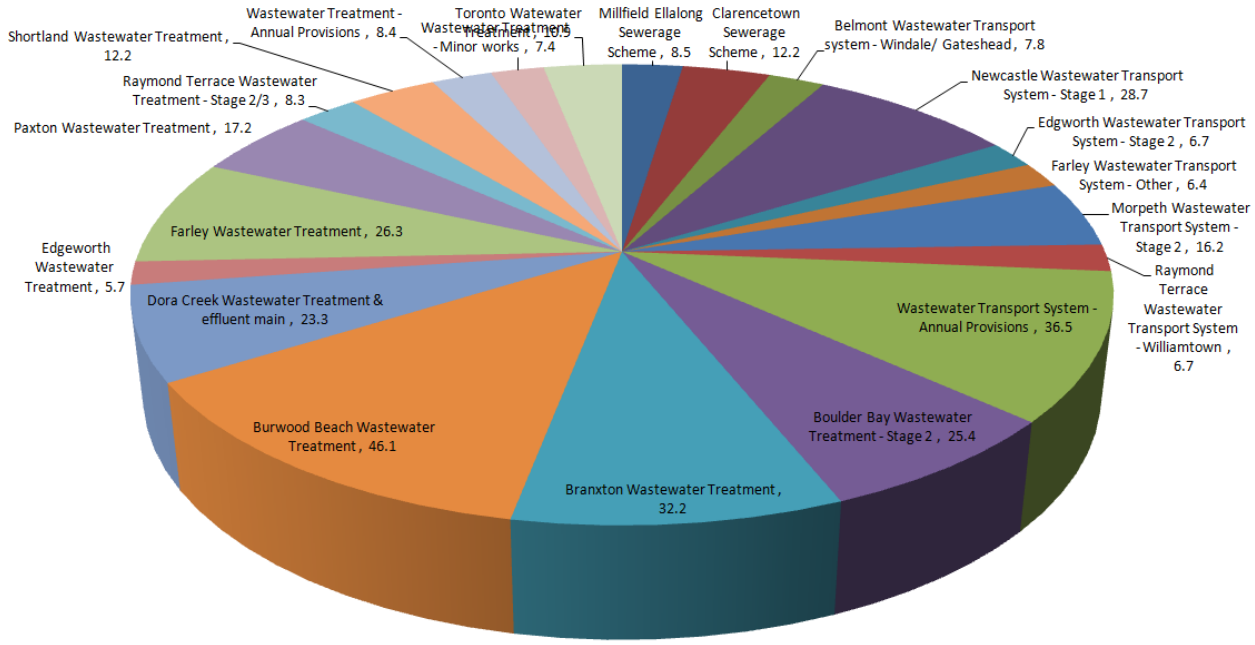


Source HWC 2012 Submission

Figure 7-7 Wastewater Service Capital Expenditure by Broad Driver 2010 to 2018

Current Price Path

The large projects carried out in the current price path are summarised in Figure 7-8 below. From this it is clear that Hunter Water has undertaken a large number of large capital projects in the current price path, of which the largest are wastewater treatment upgrades.



Source HWC 2012 Submission

Figure 7-8 Wastewater Service Large Projects in Current Price Path ($12/13m) (Source: "Capex by project")

Note: Large projects defined as projected spend greater than $5m between 2010 to 2013

Non-Critical Sewer Main Rehabilitation

The non-critical sewer main rehabilitation program is utilised to renew gravity sewer mains, extend their asset life and reduce future sewage overflows caused by blockages. An estimated 68km of sewers are to be re-lined in the current price path against a target output of 32km. The increased output is due to a focus on the re-lining of assets that experience multiple tree root related blockages. This is in response to a change in the Operating Licence whereby only 45 properties may experience three overflows per year. The sewers are being re-lined at an average cost of $99/m which e consider is reasonable. From an assessment of the planned outputs and costs estimates in the 2008 Submission the average costs was estimated to be $205/m at the time.

Williamtown/Tomago Transfer Scheme

Land at Tomago and Williamtown, in the vicinity of the RAAF Base and Newcastle Airport, has been earmarked in the Lower Hunter Regional Strategy for employment generating development. A Regional Wastewater Servicing Strategy was approved for the servicing of the area. The Regional Wastewater Servicing Strategy involves three components with two components requiring funding from the developer, Newcastle Airport, RAAF and Hunter Water. The total project is estimated as $15.9 million with Hunter Water contributing $9.3 million. We were advised that this total cost had been entered in the SIR because developer contributions are offset separately elsewhere in the RAB. In the current price path, $9.72m) is programmed to be spent of which Hunter Water's contribution is $5.73m.

The project is being delivered by a developer. From our review of the supplied documentation and discussions with Hunter Water we are satisfied that the options analysis undertaken was robust and that Hunter Water has appropriate processes in place to ensure value-for-money for the project.

Newcastle Wastewater Transport System - Stage 1

This project represents the first stage of works required to deal with capacity issues in Hunter Water's largest wastewater network, which is currently causing environmental and public health concerns. It comprises a new rising main, gravity mains and pumping stations to alleviate problems in the worst affected areas of Adamstown and Mayfield. Construction is due for completion in early 2013 and the total capital expenditure this price path is estimated at $31.3m. This is lower than the 2008 submission and revised Appendix D submissions largely because of the reduction in scope, where Waratah West system not upgraded, due to a review of the strategy.

Branxton Wastewater Treatment

This project involved cconstruction of a Membrane Bio-Reactor and Pipeline, cconversion of one of the existing maturation ponds to wet weather storage and creation of improved biosolids storage. The wastewater discharge was in breach of its Environmental Protection licence. Water quality monitoring suggested the works was exceeding the sustainable load and having an adverse impact on the receiving water.

The treatment upgrades have been delivered by the Hunter Water Treatment Alliance and the pipeline by a Network Panel contractor. The costs of this scheme have varied significantly through the project life cycle. The original Appendix D (Major Projects components of Hunter Water's 2008 Price Submission) indicated a cost of approximately $20m in 12/13 prices. This then increased significantly to nearly $49m in the revised Appendix D, as a result of poor cost estimating and scope changes as a result of factors such as worse asset condition than expected.

At $44.7m the outturn cost is less than was anticipated in the revised Appendix D submission.

Burwood Beach WWTW Stage 2 Upgrade

This project comprised significant improvements to filter media, aeration tank and system, secondary pumping stations, bypass, secondary clarifier and grit handling at the company's largest wastewater treatment works. This has been undertaken to address the poor performance of the secondary treatment process resulting in failure of the EP license, hydraulic imbalances. This has significantly reduced the plant's capacity and the lack of redundancy in equipment.

The cost of delivering the project was significantly higher than expected at the 2008 review, apparently due mainly to cost underestimation (see details below). The underestimation was recognized by the time of the revised Appendix D, which projected a cost of. $43m compared to $28m anticipated in the original submission. There appear to have been only relatively small change in scope, with only one item, new blowers, having been identified.

The project was delivered by the Hunter Treatment Alliance and the outturn cost was slightly lower than allowed for in the revised Appendix D submission.

Hunter Treatment Alliance

We are required to review the efficiency of the Hunter Treatment Alliance delivery model under which many of the upgrades to the wastewater were procured in the current price path.

In 2008 Hunter Water had planned 19 individual treatment projects with a total value of $329m. A significant proportion of these projects were to be delivered to some challenging timeframes within the 2009-13 price path. Based on its experience with wastewater treatment plants over the previous ten years Hunter Water concluded that the "business as usual" approach would not meet its objectives. Consequently a number of procurement workshops were held using an external facilitator to review eight delivery options ranging from Design, Bid, Build through to Design Build Finance Operate. The workshops concluded that the Alliance Contract would be more effective than alternative arrangements when certain constraints and conditions exist such as:

- Very tight timeframes;
- Large design and construct projects;
- Numerous complex and/or unpredictable tasks;
- Complex interfaces;
- Lack of resources;
- Complex external threats;
- High likelihood of scope changes for example due to technological change and local community concerns;
- Need for owner involvement or significant value adding by the owner during the delivery.

Hunter Water subsequently called for expressions of interest and shortlisted three groups from seven submissions. After further shortlisted the Alliance partner was selected.

Hunter Water indicated at the time of the 2008 Submission that the estimates were 'order of costs' planning estimates and the initial estimate of the current price path expenditure for wastewater treatment plants was $160m. These estimates were developed further using an independent estimator, and by the Determination had increased to $228m, mainly due to under-estimation of costs of working in a brownfield site. The Alliance accounted for nearly 80% of project expenditure. The project costs estimates through the project lifecycle and completion dates are summarised in Table 7-4. This table indicates that once the estimates had been fully developed the projects remained within the budget. The table also shows that the generally the Alliance met the target completion dates and any delays were not significant.

$m 2012/13	Estimate in 2008 Submission	Revised Estimate Following Determination	Actual / Forecast Exp. as at March Board 2012	Target Completion Date	Actual/ Expected Completion Date
Boulder Bay WWTW (Stage 2)	13	25	24	Nov-11	Oct-11
Branxton WWTW (Stage 3)	20	49	45	Mar-11	Mar-11
Burwood Beach WWTW (Stage 2 excl. UV)	28	43	43	Mar-11	Mar-11
Farley WWTW (Stage 3)	47	26	28	Jun-13	Dec-13
Morpeth WWTW (Stage 2)	15	1	1	Jun-15	
Paxton WWTW (Stage 1)	10	18	18	Mar-11	Mar-11
Shortland WWTW (Stage 3)	9	10	11	Mar-12	Sept-12
Toronto WWTW - Inlet Works	7	10	11	Jan-12	Mar-12
Total	**150**	**182**	**181**		

Table 7-4: Projects Costs and Completion Dates (Source: HWC)

Table 7-5 indicates that the variance between target and actual outturn costs were not significant. The costs in Table 7-5 exclude Hunter Water costs while Table 7-4 includes these costs and projected Alliance expenditure for incomplete projects.

Project Costs in $m 2012/13	Target Outturn Cost	Projected Actual Outturn Cost	Projected Savings
Burwood Stage 2	28.8	26.9	1.9 (6%)
Branxton	31.4	29.9	1.5 (4%)
Paxton	12.8	11.0	1.8 (7%)
Boulder Bay	17.9	17.1	0.8 (4%)
Burwood ABF	4.3	4.4	-0.1(-2%)
Toronto	8.4	8.4	0
Shortland	7.4	7.6	-0.2 (-2%)
Total	111.0	105.3	5.7 (5.1%)

Table 7-5: Comparison of Target and Actual Outturn Costs (Source: HWC)

Ernst & Young reviewed the Alliance contract in 2010 and made a number of recommendations. Hunter Water subsequently commissioned Ron Quill of Quill Consulting in early 2011 to review the Ernst & Young recommendations. Mr Quill was formerly a Sydney Water executive with significant Alliance experience. The key issues arising from the review were:

Reduction of margins

Quill Consulting concluded that the when the contract was entered into in April 2009 the margins would have been at the lower range of the market. There had been some subsequent tightening in the contracting market which had resulted in reduced margins generally but it was extremely difficult to estimate what the margins might be if the program were to go to market today. It was pointed out that when the contract was tendered it was competitively bid in the open market for a defined package of work and in all forms of contracting there needed to be fair dealing and particularly so with alliances. The parties had entered into the contract in good faith and to attempt to renegotiate the margins mid-stream would be counter-productive and create a degree of mistrust and tarnishing of Hunter Water's image as a good client in the market place. Mr Quill recommended that the margins should not be renegotiated unless all parties agreed; commercial terms should be renegotiated on any new projects added to the program. Hunter Water has negotiated a reduced margin for the Kooragang Recycled Water scheme which has been added to the original Alliance contract.

Program Management Costs

Quill Consulting stated that the proportion of management costs compared to the direct costs was similar to other alliances but he did note some potential for savings through rationalising roles within projects and/or across programs. We further noted that the Alliance structure had already changed and would likely continue to do so.

Pain/gain Structure

Quill Consulting recommended to retain the current pain/gain structure and recommended rationalising some of the KPIs.

Hunter Water advised us of the following in relation to the Alliance:

- To date the Alliance has successfully delivered seven wastewater treatment works upgrades on time, on budget and meeting required performance standards. The time performance of the Alliance has been particularly important as a number of the upgrades were required to meet regulatory commitments or address non-compliances with existing Licences. The Alliance has been able to meet these commitments within timeframes significantly shorter than previously achieved by Hunter Water using more traditional procurement models. The safety performance of the Alliance to date has been good;
- When developing the project budget or Target Outturn Cost (TOC) for each project, the Alliance has competitively tested with two or more quotes of approximately 50% of the costs used to develop the TOCs. The TOCs have been thoroughly reviewed by both Hunter Water and an expert independent estimator engaged by Hunter Water;
- To date, $630k of gain share, which is 0.5% of the cumulative value of the TOCs, is payable to the Alliance Contractor. Where savings against TOC have been achieved the Alliance has introduced a "Risk Bank" concept that that utilities savings against TOC on the first four projects to fund risk allowance on future projects. The risk bank concept has resulted in a $450k saving to Hunter Water;
- The Alliance has introduced a number of innovations to the designs provided by Hunter Water that have resulted in significant capital cost savings. The Alliance proposed alternate designs for both the Branxton and Paxton upgrades resulting in a total capital cost saving of $7m or 15% of upgrade cost. In reviewing the scope of the Boulder Bay upgrade the Alliance identified that a major component of the work, with an estimated cost of $5m, could be deferred at least 5 years. The scope of the project was then revised to account for the deferral;
- The Alliance has standardised the selection of equipment on Alliance projects where this results in the least life cycle cost to Hunter Water. The Alliance has sought to maximise its buying power to deliver lower costs for equipment procurement. In doing so they were able to negotiate a program wide deal for the provision of PLCs and variable speed drives resulting in a $1.5m saving. The Alliance has also developed program wide specifications that can be adapted for use by Hunter Water on non-Alliance projects; and
- The most significant area of improvement for the Alliance has been to improve the number of defects being encountered on completed projects. The number defects on the Burwood, Branxton and Paxton upgrades have been high. The defects are generally minor in nature and have not affected the ability of the upgraded assets to meet performance requirements such as effluent quality. However, some of the more significant defects have impacted on plant operability and maintainability. One of the major contributing factors has been the tight timeframes within which the upgrades were delivered. The Alliance has worked closely with Hunter Water to rectify the defects. Hunter Water also stated that a number of the defects identified could be described as "preferential" and would not have been accepted as defects by a contractor under traditional contracting arrangements.

We were also advised that the plants are meeting the output targets including effluent standard compliance, energy and chemical usage.

The increase in the costs from those estimated in the 2008 Pricing Submission is due to under-estimation of costs associated in working in brownfield treatment plants by Hunter Water. From our observations Hunter Water's estimating processes have improved since 2008 and the risks of 'optimism bias' in costs estimates have been reduced.

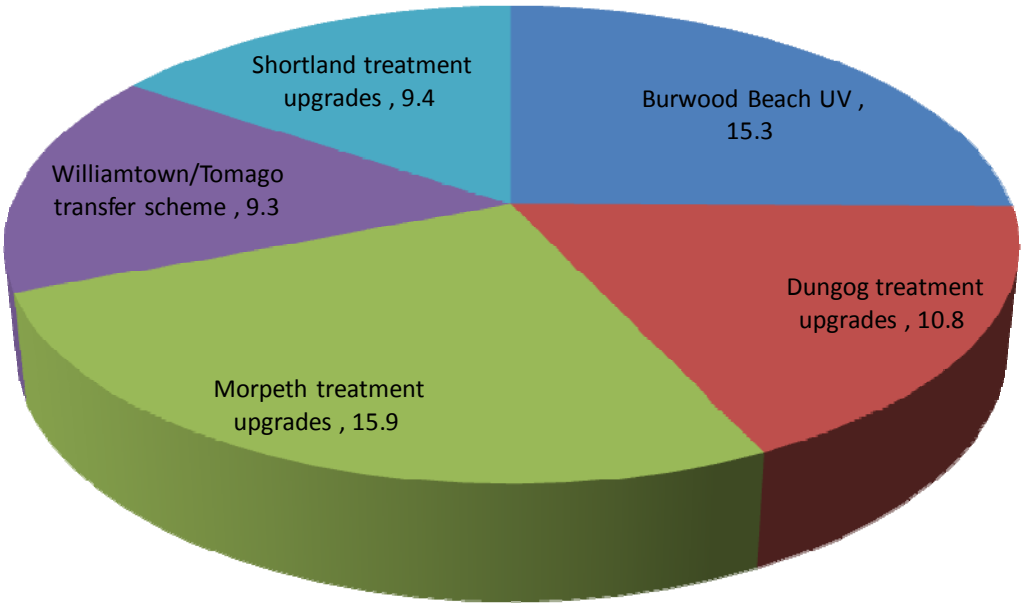
From the information provided, review of specific wastewater treatment projects and discussions with Hunter Water staff we have concluded that the Hunter Treatment Alliance delivery is efficient and was an appropriate delivery model for the wastewater treatment plant upgrades. This experience could be adopted for procurement of some projects in the current price path.

Prudence and Efficiency of Wastewater Capital Expenditure in Current Price Path

From our review of a sample of projects in the current price path we have concluded that the wastewater capital expenditure in the current price path is prudent and efficient.

Future Price Path

Fewer large projects have been identified for the next price path as made clear in Figure 7-9 below. Again it appears that the large projects are focused on treatment works upgrades.



Source HWC 2012 Submission

Figure 7-9 Wastewater Service Large Projects in Future Price Path ($12/13m)

Note: Large projects defined as projected spend greater than $5m between 2014 to 2017

Williamtown/Tomago Transfer Scheme

This project is a continuation from the current price path and details are discussed in the previous section. We are satisfied that this project is prudent and is being efficiently implemented.

Swansea Channel Crossing

The project involves the replacement and relocation a 500 mm water main and one 600mm sewer rising main crossing the Swansea Channel, partially on the bridge and underwater where the bridge opens. These are the only mains servicing a population of approximately 10,000 in the suburbs from Swansea south to Nords Wharf. These are high risk mains.

This project is seen as a high priority by Hunter Water and is programmed for completion by June 2017 as originally planned. We consider that this risk reduction initiative is prudent and the processes in developing the project to date are efficient.

Belmont 6 Rising Main

Belmont 6 rising main is a 2.7km long 750mm diameter mild steel cement lined pressure main constructed in 1976. Belmont 6 Rising Main has failed approximately 48 times, three times per year on average, with

the failures being predominantly leaks which have been able to be repaired while keeping the pump station on line. However, the failures have either been located near residences, a caravan park or nursing home or environmentally sensitive receiving waters such as Lake Macquarie or SEPP 14 wetlands, which has resulted in these failures impacting the community and the environment. Without remedial actions, the recent failure history, an average seven failures per year, is likely to increase, thereby increasingly the ability to meet the Operating Licence, through impacting on local residents and polluting the environment, while also incurring increased maintenance costs. Hunter Water considers this project as having an extreme inherent risk

Hunter Water originally proposed to renew sections 1, 3 and 4 of the pipeline at a cost of $10.6m. However, due to budgetary constraints only high priority main sections are proposed for renewal within a budget of $7.6m. Because of the high operational and environmental risks associated with this project, we consider that this should be implemented in the next price path. The partial renewal approach is not likely to be the most efficient in the longer term.

Dungog treatment upgrades

The Environmental Protection Licence for Dungog WWTW prohibits discharge when flows in the receiving watercourse are below a certain threshold defined as 50 Ml/day. The EPA has issued an official caution because the works has breached this condition.

The following works are proposed in the coming price path: completion of concept design and Environmental Impact Assessment, detailed design and construction of a new inlet works, new secondary clarifier, tertiary filtration, UV disinfection and repairs to existing assets. These works are projected to cost $11.1m in the future price path, split 70%/30% between existing mandatory standards and growth. This apportionment should be reviewed because of the change in timing of some works.

Shortland treatment upgrades

The sludge lagoons at Shortland WWTW are currently at capacity, becoming significantly overloaded with increased flows to the works in 2014 as flows are diverted as part of the Kooragang Industrial Water Scheme. Hence some of the cost of this scheme, the fact that it has been brought forward because of the extra flows from the Kooragang scheme, are "borne" by the Kooragang RAB adjustment, having been netted off the claim. We discuss this in Section 8.

The proposed works include an aerobic digester and aeration system, sludge thickening and dewatering, a biosolids building and sludge outloading facility. The cost which Hunter Water has classified as "indicative" at this stage is estimated at $16.8m of which $12.1m in the future price path.

Backlog Sewerage Schemes

The purpose of this project is to extend sewer services to qualifying 'Urban Infill' properties and 'Townships' falling within the Hunter Water Backlog Sewer Policy and Assessment Framework. Extension of sewerage services, in accordance with the Backlog Sewer Policy & Assessment Framework will be on an as needed basis for 'Urban Infill'. Under the same policy, for Townships, a project is to be established to assess, rank and prioritise delivery in consultation with EPA and Councils. A program of work will evolve over time.

From our discussions with Hunter Water we understand that the probability of many of the infill sewerage projects being implemented within the future price path is low. Consequently we have deferred $1.8m of expenditure in 2017 to 2018 and $1.0m of the 2018 expenditure into the following year.

Prudence and Efficiency of Wastewater Capital Expenditure in Next Price Path

From our review of a sample of projects we have concluded that the proposed wastewater capital expenditure in the next price path is prudent and efficient.

7.6 Stormwater Drainage

The historic trends and projected spend on the stormwater service are set out in Table 7-6 and Figure 7-10 below.

($M 2012/13) year ending June	2010	2011	2012	2013	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	0.4	0.1	0.8	1.0	0.4	0.4	0.4	0.4	0.4	1.4	1.8
New Mandatory Standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth (funded by other)	0.1	0.9	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government Programs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Business Efficiency	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0		
Total	**0.4**	**1.0**	**1.4**	**1.1**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	1.4	1.8

Source HWC 2012 Submission

Table 7-6 Summary of Historic and Projected Stormwater Service Capital Expenditure by Hunter Water Drivers

Figure 7-10StormwaterService Capital Expenditure by Broad Driver 2010 to 2018

From this it is clear that the levels of investment in stormwater in the current price path are low relative to other service areas and are expected to be even lower in the future price path. .

A number of stormwater projects were re-prioritised by Hunter Water from the capital program during the prioritisation process including:

- removal of sediment at Throsby Creek ($5.13m); and
- bank stabilisation work at Munibung Creek, Cardiff ($1.8m).

Both projects have been deferred from 2016 to 2026. The overall capital prioritisation process identified the critical projects which Hunter Water needed to undertake and the stormwater projects were ranked lower and were therefore removed from the overall program.

Hunter Water advised that the potential risks faced by deferring sediment removal at Throsby Creek, were:

- There is a marginal increased risk of increase in flood levels within the local area of around 20-50mm for the critical storm of 1 in 20 years. The Consultant undertaking the modelling was confident that this impact was seen to be very minor and would not be seen to exacerbate flooding and increasing damage costs;
- Odour issues during summer at low tides will continue when some of the sediment banks are exposed and heated up. Customer complaints for the odour issues may increase over time. We queried Hunter Water as to whether there were alternative, less costly alternatives that could be implemented during the next price path. We were advised that due to the location of the sediment within the centre of the creek, the fact that the sediment is covered in water the majority of the time and the limited access to the creek there is no cheap solution to removing the odours;

In the case of Munibung Creek, Hunter Water is still planning on doing some work at key locations within the creek due to the risk to infrastructure. Hunter Water advised that a small amount of existing funding is currently available and additional funds is likely to be used from the price path provision to ensure the key critical areas are addressed. Customer complaints about the creek are likely to continue for the areas where work cannot be undertaken due to funding constraints;

We were advised that if a significant problem does arise within the next 4 years which will have critical implications on Hunter Water then these projects will be resubmitted to the prioritisation process, and the business will determine whether the projects are the highest priorities and should proceed; and

We propose that given the existing low expenditure on stormwater and the likely continuation of customer complaints then an allowance ($0.9m per year) should be made in 2016/17 and 2017/18 to at least address potential problems in Muninbung Creek and minimise customer complaints.

Prudence and Efficiency of Stormwater Capital Expenditure in Current Price Path

From the information provided we have concluded that the capital expenditure in the current price path is prudent and efficient.

Prudence and Efficiency of Stormwater Capital Expenditure in Next Price Path

From our review of a sample of projects we have concluded that the proposed stormwater capital expenditure in the next price path is prudent and efficient.

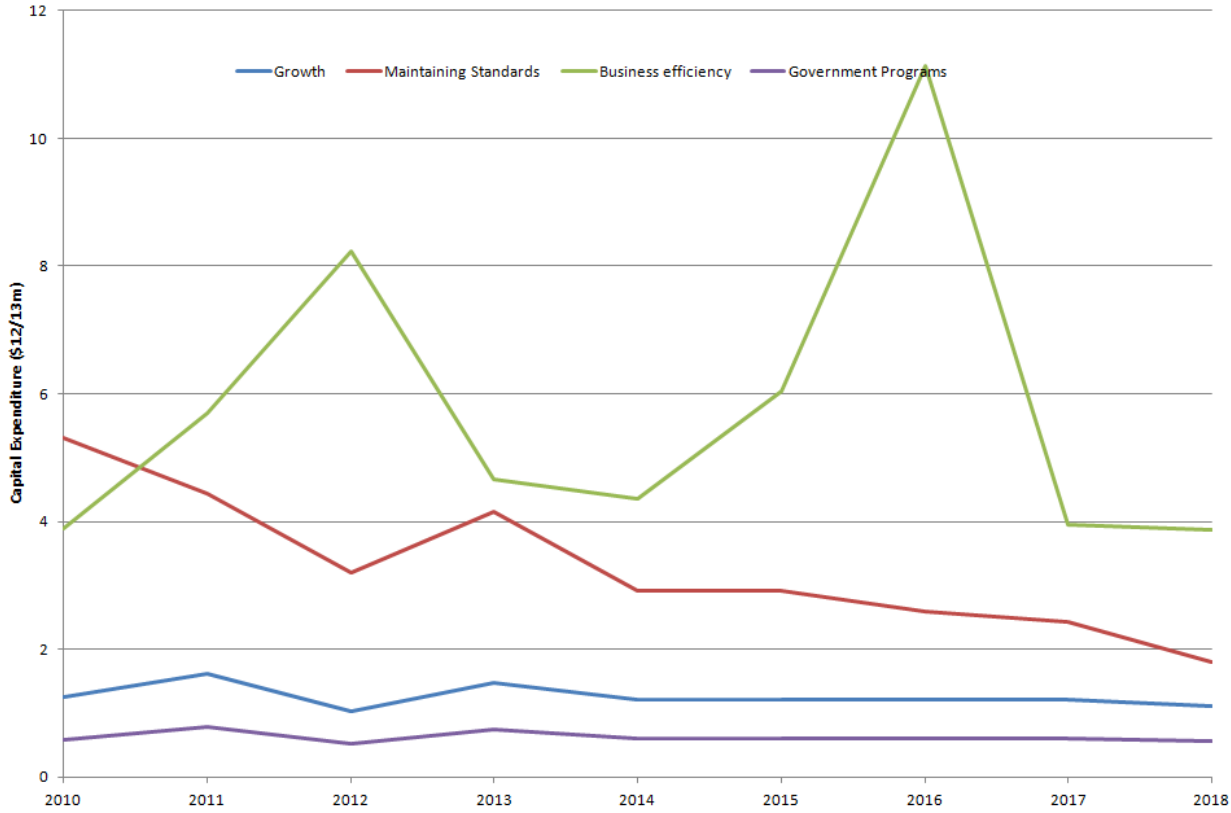
7.7 Corporate Services

The historic trends and projected spend on the water service are set out by driver in Table 7-7 and Figure 7-11. These figures are based on "SIR Capex 2(revised by IPART)" as this is the only source of this breakdown. However, they do not match Hunter Water's paper submission because of discrepancies which are corrected for in Table 7-15 below.

($m 2012/13) year ending June	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2014-17 Total**	**2014-18 Total**
Existing Mandatory Standards	4.9	3.6	2.6	1.7	1.2	0.9	1.2	1.2	1.2	4.6	5.8
New Mandatory Standards	0.6	0.9	0.5	2.0	1.6	1.2	1.3	1.2	0.6	5.3	5.9
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth (funded by other)	1.3	1.6	1.0	1.3	1.2	0.9	1.2	1.2	1.1	4.5	5.6
Government Programs	0.6	0.8	0.5	0.6	0.6	0.4	0.6	0.6	0.6	2.3	2.8
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Business Efficiency	4.0	5.7	7.9	4.1	4.2	4.4	11.1	3.9	3.9	23.5	27.4
Total	**11.4**	**12.6**	**12.5**	**9.7**	**8.7**	**7.8**	**15.5**	**8.2**	**7.3**	40.3	47.5

Source HWC 2012 Submission

Table 7-7: Summary of Historic and Projected Corporate Capital Expenditure by Hunter Water Drivers

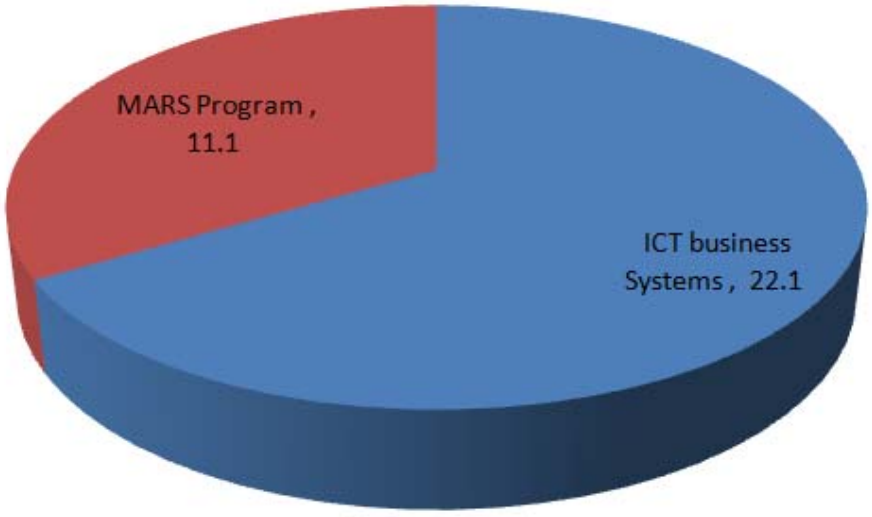


Source HWC 2012 Submission

Figure 7-11 Corporate Service Capital Expenditure by Broad Driver 2010 to 2018

Current Price Path

There are only two large projects in the current price path as summarised in Figure 7-12 below.



Source HWC 2012 Submission

Figure 7-12 Large Corporate Projects in Current Price Path ($12/13m) (Source: "Capex by project")

Note: Large projects defined as projected spend greater than $5m between 2010 and 2013

Enterprise Resource Plan (ERP) Upgrade

To address the risk of maintaining unsupported software systems, an ICT transformation program known as MARS (Management of Assets, Resources & Systems) was established in July 2009. The MARS Discovery project analysed business requirements and recommended a case for transformational change across the business. Hunter Water subsequently decided that it was not feasible to proceed with the MARS Project within its assumed restraints of capital expenditure. An ICT review also found that the organisation did not have the required level of IT capability. Consequently .Hunter Water decided that the optimal solution would be to upgrade its ERP system, Ellipse and migrating the Asset Operations Management System (AOMS) data into Ellipse.

The driver for replacing or upgrading the corporate ERP and AOMS is to eliminate the risk associated with continuing to run critical corporate systems beyond their intended end of life and reduce the extent of spreadsheet-based finance systems. Hunter Water has brought forward the expenditure on this project due to the risks associated with current systems.

The most recent business case has estimated the cost of the project to be $11.7m but the SIR has $9.9m allocated.

We agree that this is a priority project which should be implemented as soon as possible. . Hunter Water is bringing forward expenditure on the ERP with $3.6m being spent in this price path compared to $1.2m in the SIR. We therefore consider that an additional $2.4m is rolled into the RAB at the end of the current price path.

Hunter Water provided data on MARS expenditure in this price path. This included:

AHANA	$0.63m
Expenditure which is being used for the ERP (e.g. process maps, documented business requirements etc)	$2.05m
MARS – Field computing	$2.33m
MARS – GIS implementation	$4.03m

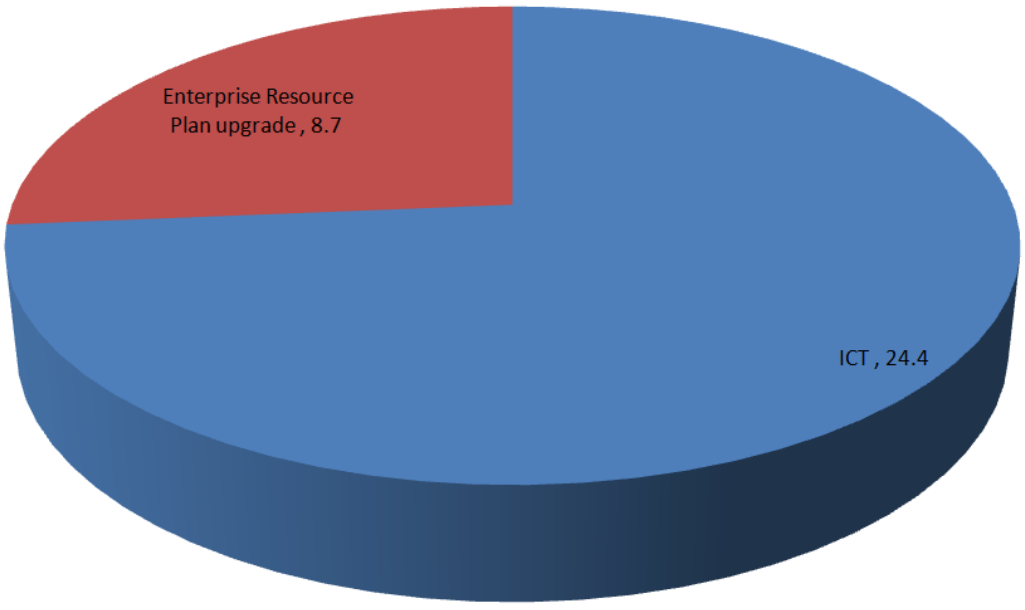
Hunter Water indicated that they had written off $0.58m but could not account for a further $0.29m. Consequently we consider that $0.87m should not be included as efficient expenditure in the current price path.

Prudence and Efficiency of Corporate Capital Expenditure in Current Price Path

From our review of a sample of projects in the current price path we have concluded that the corporate capital expenditure in the current price path is prudent but some of the expenditure ($0.87m) on the MARS project is inefficient.

Future Price Path

The level of corporate investment proposed for the next price path period is reasonably similar to that in the current price path and is made up of only two large projects as seen below.



Source HWC 2012 Submission

Figure 7-13 Large Corporate Projects in Future Price Path ($12/13m)

Note: Large projects defined as projected spend greater than $5m between 2014 and 2017

Enterprise Resource Plan (ERP) Upgrade

This project is a continuation of the project commenced in 2012.and expenditure is being brought forward in recognition of the importance of this project in enabling Hunter Water to respond more effectively to any deterioration in asset performance. We have rephased forward the expenditure on the ERP and reduced

forecast expenditure from $8.7m to $8.1m as there will be a higher level of expenditure in the current price path.

ICT Expenditure

This project is to maintain and renew the ICT infrastructure to support business systems comprising Asset Information Systems, Customer Care and Billing and Information Systems for the Capital Program Management and Gateway process. Infrastructure renewal relates to computers, data services, datacenter and storage, communications and resilience. The project excludes the ERP upgrade. Actual expenditure in the current price path was $28m excluding the ERP. Work included upgrading the asset information systems, customer care and billing and ICT infrastructure.

In the current price path, expenditure is $4.4m above the 2009 Determination, mainly as a result of further expenditure on the ICT infrastructure. This was as a result of a more holistic view of requirements than originally estimated in 2009. Plans for the future price path includes a detailed assessment of requirements and a clear summary setting out the deliverables, program and costs to maintain ICT assets. This has progressed through Gateway 1 of the IT project management process. The original cost estimate of $28.1m has been reduced to $24.4m in the SIR, representing a 13% reduction on the Gateway 1 estimate. We formed the view that the need for and scope of the upgrading and replacement work had been planned in detail and that capital efficiencies had been included in the SIR submission.

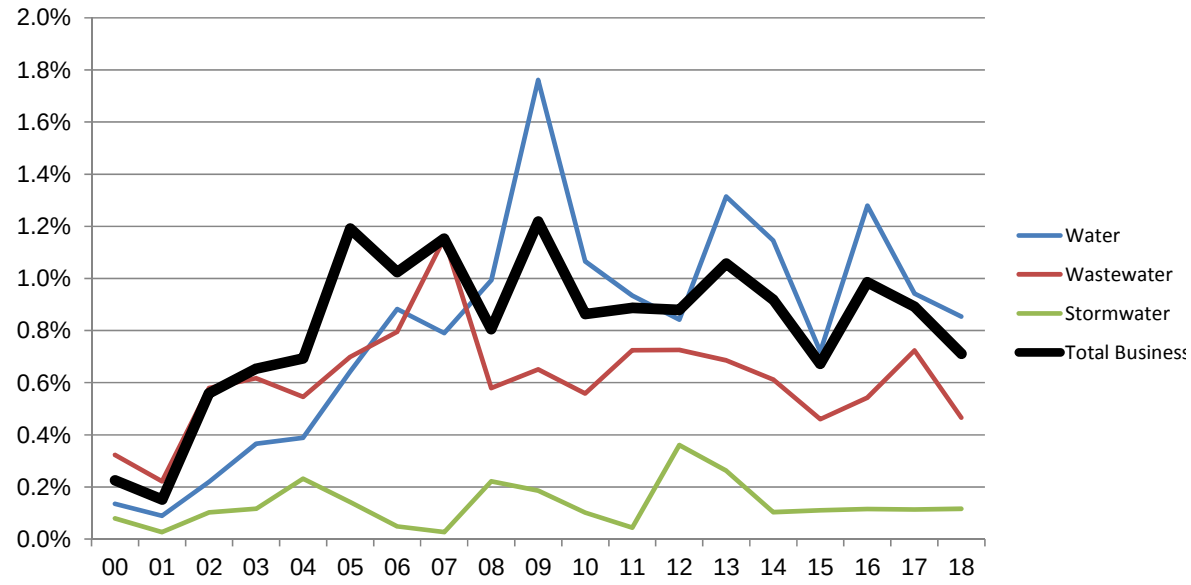
Prudence and Efficiency of Corporate Capital Expenditure in Next Price Path

From our review of a sample of projects we have concluded that the proposed corporate capital expenditure in the next price path is prudent and efficient.

7.8 Renewal Expenditure and Service Levels

We have analysed the relationship between Operational Licence performance and historical renewals expenditure to test the impact of lower expenditure in the future price path. Much of the financial information was sourced from AIR/SIR spreadsheets provided with the 2004, 2008 and 2012 Pricing Submissions. This financial information was further supplemented by information provided by Hunter Water. The analysis is at a macro levels but does give some insight into historical and proposed asset renewals investment by Hunter Water.

Figure 7-15 indicates that since the mid- 2000s renewal expenditure has increased for the whole business and has been in the order of 0.8% to 1.2% of asset value. Renewals expenditure for water assets in that period has ranged from 0.8% to 1.8% while for wastewater asset this has ranged from 0.6% to 1.1%. Renewals expenditure for stormwater assets has ranged from around 0.1% to 0.3% reflecting the predominance of long lived assets in the portfolio. Within the future price path a slight decline in renewals expenditure is evident.



Source HWC 2004, 2008 & 2012 Submissions

Figure 7-14 Renewals Expenditure as a Percentage of Gross Replacement Cost

As a general comment we would have expected the renewals investment for the business as well as for water and wastewater assets to be in the order of 1.5% to 2.0%. There is limited information in the public domain on the renewals expenditure as a percentage of current (gross) replacement costs for Australian water utilities. This information for the larger Australian water utilities was published in WSAA facts up to 2001 but unfortunately was unavailable after that period. Table 7-8 summarises the renewals percentages. The data is quite variable and the rate of renewals will depend on a range of factors such as the age of the asset base and valuation methodology adopted which makes any comparison difficult. The assets will have aged a further 10 years since the information was presented and it is likely that renewals expenditure would have increased. Based on the range of figures available it appears from the SIR information that Hunter Water's renewals expenditure on water is mid-range while the wastewater expenditure could be at the lower end of the range. However, from the information within WSAA, the renewals percentage for wastewater is only marginally lower than the average for other utilities.

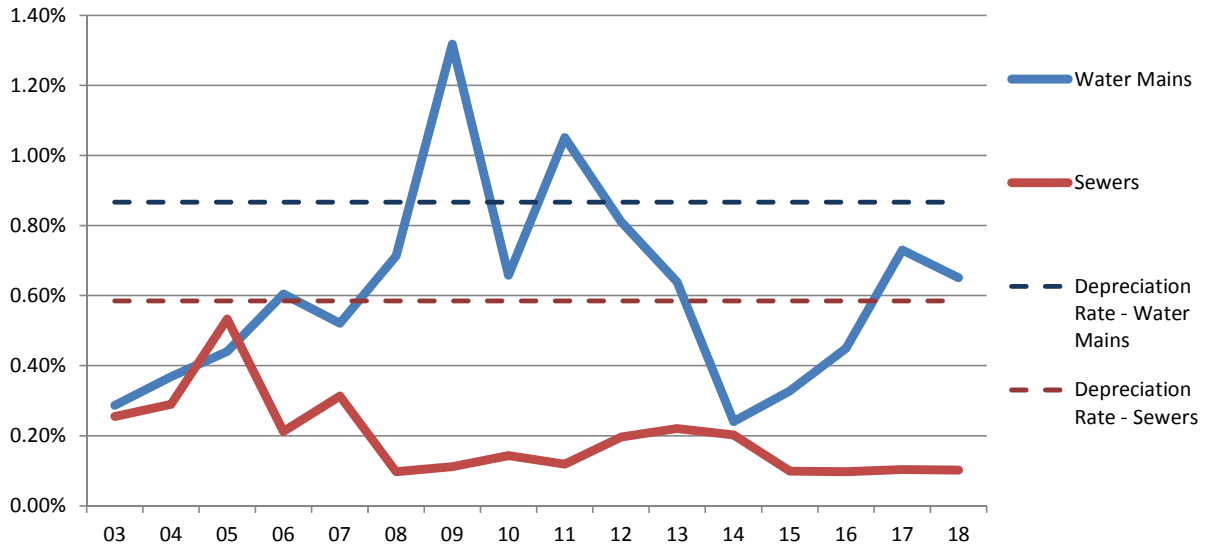
Utility	Water (%)	Wastewater (%)
Brisbane City Council	0.47	0.87
City West Water	2.68	1.36
Hobart Water	0.36	
Hunter Water	**0.27**	**0.75**
SA Water	0.45	0.36
South East Water	1.63	0.89
Sydney Water	0.73	1.12
Yarra Valley	1.83	0.98
Unweighted average	1.05	0.95

Source: WSAA facts 2001

Table 7-8 Renewals Expenditure by the Larger Australian Water Utilities 1996-2001

Figure 7-15 compares mains renewal expenditure, as a percentage of gross replacement cost, with the depreciation rate. From 2008 to this year the water main renewals expenditure has been higher than the depreciation rate but is programmed to reduce over the next few years then increase towards the end of the next price path. In the case of sewerage mains the renewals is undertaken through relining rather than replacement which would be significantly more expensive. This approach is reflected in Hunter Water's valuation for sewer mains where a residual value is applied. Based on this approach to the valuation we have applied a depreciation rate of 0.58% to sewers.

Figure 7-15 indicates that the rate of renewal has consistently been below this level. However, this has apparently not had a detrimental impact on service levels as shown in Figure 7-2.



Source: Atkins Cardno analysis

Figure 7-15 Mains Renewal Expenditure as a Percentage of Gross Replacement Cost

Figure 7.16 illustrates the relationship between water mains renewal expenditure and the level of unplanned interruptions. This shows that as renewals investment has increased since 2002 there has been a decline in the number of interruptions. The peaks are associated with major failure of critical trunk mains. It is likely that as the renewals expenditure reduces over the next couple of years there will be an increase in service interruptions. Hunter Water modelling indicates that there could be a 25% increase in reticulation main failures by the end of the next price path. This will impact on the base level of interruptions but the significant impacts will arise from any major trunk main failures which could result in exceedance of Operating Licence limits.

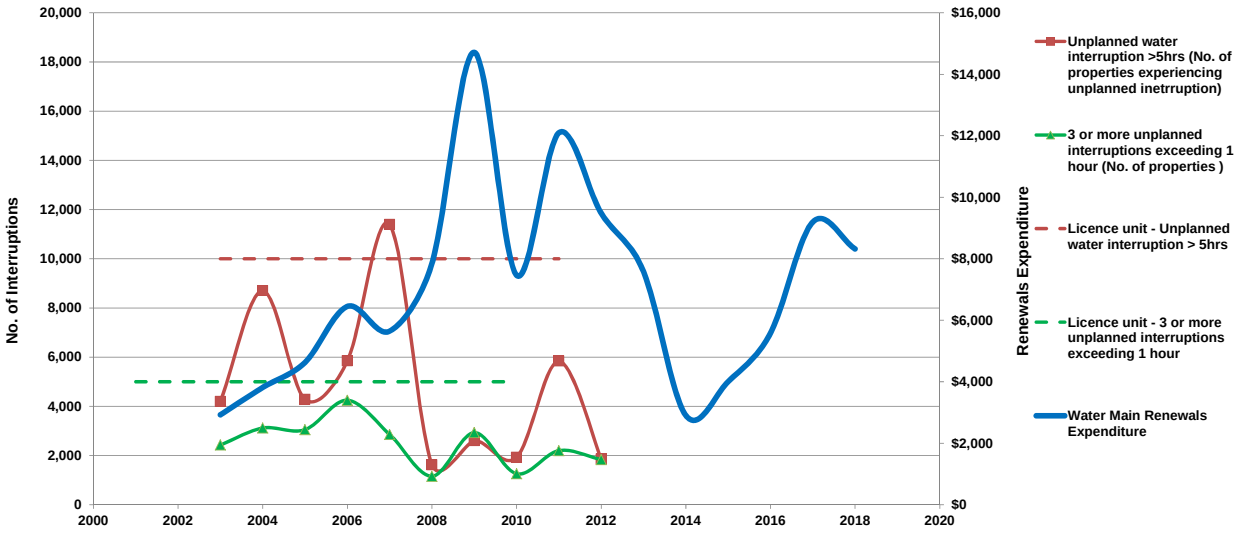


Figure 7-16 Water Main Renewals Expenditure and Service Interruptions

Figure 7-17 shows that while the investment in sewer renewals has declined since 2004 there has been a continued reduction in dry weather overflows which are mainly caused by tree root intrusion. This suggests that Hunter Water has been quite effective in targeting its sewer main renewals. From the available trends illustrated in the Figure it appears that the impact of any reduced sewer mains renewals expenditure may not be significant in the short term provided that the Hunter Region does nor experience any major drought events. There is some headroom between the current performance level and Operating Licence limit which provides some factor of safety in the event that there is a significant reduction in rainfall.

Our hypothesis is that sewers which are watertight on installation may not become susceptible to tree root intrusion until the joint deteriorates to allow the entry of roots and this increase in deteriorated joints will be gradual.

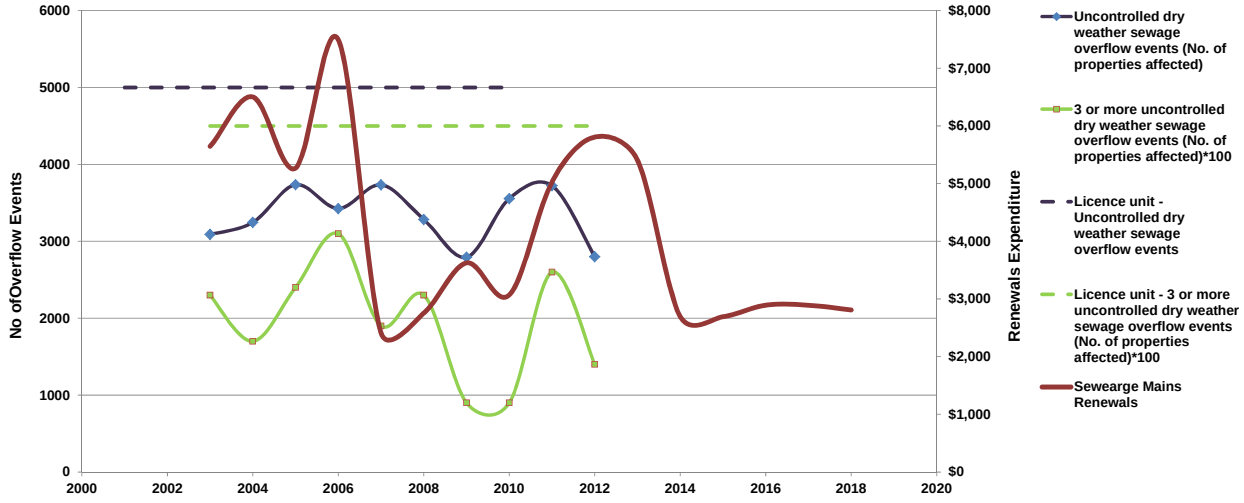


Figure 7-27 Sewerage Mains Renewals Expenditure and Dry-Weather Overflow Events

Summary of Findings

Based on benchmarking figures available it appears that Hunter Water's renewals expenditure on water infrastructure is mid-range while the wastewater expenditure could be at the lower end of the range.

Reduced investment in mains renewals will have an impact on the reticulated water main failures although, in the future price path, unlikely to result in failure against the Operating Licence standards. There is still a risk that any major trunk main failures could cause failure against the Operating Licence standards. Hunter Water will need to ensure that its contingency plans will minimise the impact of failures on customers. .

Reduced investment in sewer mains renewals is unlikely to have a significant impact on sewer dry weather events in the future price path providing recent climatic conditions continue and the Hunter region does not experience a major drought. Hunter Water should continue to develop the relationships between expenditure and performance to inform future efficiency reviews.

7.9 Prudent and Efficient Expenditure in the Current Price Path

The IPART brief requires us to comment on the efficiency and prudence of capital expenditure in the current price path. The prudence test relates to how decisions are made on the basis of information available at that time and how the investment was executed.

We have considered the efficiency and prudence of capital investments during the 2008-12 price path and comment in the following sections.

Our review found that the processes supporting capital investment generally followed those outlined in Section 5. Supporting documentation was readily available which suggests that mature processes are in place are followed corporately. We observed that a range of options were considered in the planning process and lifecycle costs and risks used to determine the optimal solution.

We have commented on the significant under-estimation of costs of the wastewater treatment upgrade program. Cost estimating processes appear to be improving and use was made of independent estimators, as required. In some instances we noted opportunities for improvement in setting out the basis of cost estimates presented in reports. We would expect technical reports to clearly document the basis of the estimate including assumptions, exclusions, contingencies applied etc along with a breakdown of the estimates. While estimates were well documented in some reports, this practice was not always the case.

Procurement processes appear to be appropriate for the type of program or project being implemented. Hunter Water adopts a range of project delivery approaches. The adoption of a Design and Construct approach to the Replacement of the 900 diameter CTGM – Tarro to Shortland project had realised significant cost savings. Procurement procedures were rigidly adhered to.

We found that the adoption of an Alliance Contract delivery method for the Wastewater Treatment Plant Upgrade program was appropriate and a number of benefits had been realized from this approach Hunter Water had followed a rational and prudent approach in the selection of an appropriate delivery method.

There had been a significant investment in the MARS project during the current price path. This had delivered a number of projects including AHANA, Field computing and GIS implementation. Other activities included in the MARS project are being used as a basis for implementation of the ERP Upgrade. Hunter Water has written off $0.58m but not account for a further $0.29m. Consequently we consider that $0.87m expenditure is not efficient.

We note that the SIR for the ERP upgrade has $1.2m expenditure in the current price path. Hunter Water has subsequently clarified that it expects expenditure of $3.6m in the current price path. We have included for an additional $2.4m expenditure in this price path.

We are required to report on:

The extent to which the expenditure approved in the 2009 Determination has delivered the service standards and outcomes on which the expenditure was based.

We comment in Section 3.4 that performance against the Operational Licence measures is significantly below the reference levels and that EPA licence parameters have been achieved except at treatment plants where improvements are being implemented.

Review progress against the output measures identified at the 2009 Determination

We comment on progress against output measures in Section 9. In the water service, we noted over-performance on trunk mains and work on other assets as deferred because of lower growth rates than assumed in the Determination. Sewer main renewal over-performance in condition assessment was offset by under-performance on critical sewers. Work on sewage treatment and pumping station upgrades as under–target. The growth in demand was significantly lower than forecast which has enabled some projects to be deferred. There as a $61.8m underspend on growth offset by a $68.4m increase in maintaining and new standards.

Provide an opinion on the prudence and efficiency of Hunter Water's capital expenditure

We noted an error of $4m in discretionary expenditure in the DIR we have corrected. We have also identified an element of the MARS Information Systems project which as not efficient. On the basis of the sample project reviews and inspection of other projects in the SIR, we formed the view that other expenditure was prudent and efficient.

The 2009 Determination set an efficient level of expenditure for delivery of performance and outputs over the price path. Comparison against actual expenditure indicates that Hunter Water has spent $0.5m above the Determination. Given that there has been under-delivery of outputs, particularly to meet growth which has been deferred to future price paths, we consider an element of the over-expenditure is not efficient. We found that $0.3m, half of the net overrun of expenditure above the Determination, is not efficient.

Nominate a value of expenditure considered imprudent or inefficient

We summarise in Table 7-9 the adjustments applied to actual expenditure to derive an efficient level of expenditure in the current price path.

HUNTER WATER CORPORATION - EFFICIENT EXPENDITURE IN CURRENT PRICE PATH					
($m 2012/13) year actual expenditure	2010	2011	2012	2013	2010-13 Total
Water (excl Tillegra)	49.8	46.9	41.0	59.4	197.1
Wastewater	115.3	141.9	82.1	72.2	411.6
Stormwater	0.4	1.0	1.4	1.1	4.0
Corporate	11.4	12.6	12.5	9.7	46.1
Total actual expenditure	176.9	202.4	137.0	142.5	658.9
Atkins/Cardno Recommended Adjustments					
Atkins/Cardno Recommendation: MARS project non-prudent expenditure (corporate)		-0.4	-0.4		-0.9
Atkins/Cardno Recommendation: ERP adjustment (corporate)			-0.7	3.1	2.4
Atkins/Cardno Recommendation: inefficient expenditure	-0.1	-0.1	-0.1	-0.1	-0.3
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE					
Water (excl Tillegra)	49.8	46.9	41.0	59.4	197.1
Wastewater	115.3	141.8	82.1	72.2	411.4
Stormwater	0.4	1.0	1.4	1.1	4.0
Corporate	11.4	12.1	11.4	12.8	47.7
Total efficient expenditure	176.9	201.9	135.8	145.5	660.1

Source: HWC SIR and Atkins Cardno analysis

Table 7-9 Atkins/Cardno Assessment of Efficient and Prudent Expenditure in the Current Price Path

Prudent and Efficient Expenditure in 2009

We have compared actual expenditure in 2009, the last year of the previous price path, as reported in the SIR with the allowed expenditure as set out in Table 7.4 of the 2009 Determination[11]. This is shown in Table 7-10 below.

HUNTER WATER CORPORATION - CAPEX in 2009						
($m 2008/09)	HWC AIR 2008	In 2009 Determination (1)	2009 Determination excluding Tillegra	In 2012 AIR (2)	Variance with Determination	Include in RAB
Expenditure in 2008/09						
Water excluding Tillegra	53.4	47.4	47.4	57.2	9.8	53.4
Tillegra	20.7	20.7	0.0	26.6	0.0	0.0
Wastewater	83.4	74.5	74.5	70.8	-3.7	70.8
Stormwater	0.6	0.6	0.6	0.5	-0.1	0.5
Corporate	8.9	8.9	8.9	8.6	-0.3	8.6
Total capex	**167.0**	**152.1**	**131.4**	**163.7**	**5.7**	**133.3**
(I) IPART Determination Table 7.4 and Atkins Cardno Report Table 11.1						
(2) SIR worksheet 'capex by project'						

Source: 2009 Determination and Atkins/ Cardno report

Table 7-10 2008/09 Expenditure Variance Analysis

Expenditure on Tillegra is included in the SIR worksheet 'capex by project'. The total variance analysis excluding Tillegra actual expenditure shows an increase on $5.7m on the Determination, of which water is an increase of $9.8m and wastewater a reduction of $3.7m (2008/09 price base).

In the Atkins Cardno report[12], we commented that:

> *We believe that the water program will fall short of the forecast for 2009 by $6.0m for the water service and the balance [-$9m] will be incurred against the wastewater program. Therefore we have reduced Hunter Water's forecast expenditure for 2009 by [$15.0m to arrive at our assessment of prudent expenditure for the water service.*

The total adjustment for the 2008/09 expenditure was $15m. The adjustments are shown in column 2 of Table 7-10 above to arrive at the capex in the Determination.

Hunter Water's actual expenditure on the water service was $3.8m above its original estimate and $9.8m above the Determination. Conversely, wastewater expenditure was $12.6m below its original estimate and $3.7m below the Determination.

The targets set for 2008/09 were on the basis of achievability of expenditure in the year. We accept that Hunter Water has over-achieved in the water service although the reasons for expenditure above the budget are not explained. The wastewater expenditure was below the Determination and an adjustment is therefore appropriate. We recommend that the RAB should include water expenditure up to the value of the original estimated outturn and wastewater capex up to the value of the actual outturn. This is unless Hunter Water is able to explain the reason for the water capex variance. The total RAB adjustment is therefore $133.3m.

7.10 Hunter Water proposed efficiencies in Future Price Path

Hunter Water has applied challenging program level efficiencies and deferments to its capital program in order to constrain the total capital expenditure to $350m across the Future Price Path. It appears to have

[11] Review of prices for water, sewerage, stormwater and other services for Hunter Water Corporation, IPART 2009
[12] Review of capital and operating efficiency of Hunter Water corporation, Atkins Cardno 2008

carried out an initial efficiency/deferment exercise to bring the expenditure down to $350m and then a further exercise of rephrasing/efficiency reductions on a number of planned wastewater service projects, as follows, in order to make room in the program for a $4.5m allowance for backlog sewers.

- Dungog WWTW Upgrade
- Farley WWTW Reuse Scheme
- Wastewater Switchboard Replacements
- Non-Critical Sewermain Rehabilitation -future provisions
- Burwood Beach WWTW- Upgrades
- Edgeworth WWTW Upgrades
- Morpeth WWTW Upgrade

A summary of the impact of these efficiencies is presented in Table 7-11 below.

$m at 2012/13	2014	2015	2016	2017	2018	2014-18 Total
Total expenditure pre-efficiency adjustment	117.0	83.3	98.0	86.7	81.8	**466.8**
Program level adjustment	-10.9	-6.3	-9.4	-8.3	-7.4	**-42.4**
Additional adjustment to accommodate backlog sewer contribution	-0.3	-0.3	-0.1	-3.8	-3.5	**-8.0**
Total expenditure post efficiency adjustments	106.1	77.0	88.6	78.3	74.3	**424.3**
Aggregate efficiency applied	**9.6%**	**8.0%**	**9.7%**	**14.0%**	**13.4%**	**10.8%**

Source: spreadsheet received HWC 26 October 2012

Table 7-11: Summary of Hunter Water's proposed capital expenditure efficiencies

We consider that Hunter Water has set itself a challenging target but that it should nonetheless be achievable in aggregate across the price path period.

We consider it likely that the degree of efficiency will increase through the price path period particularly because of the extent of committed expenditure under construction or tendered in the early stages years of the price path, which will constrain the efficiency opportunities available. We therefore question the ability to deliver the level of efficiencies proposed in 2014 and 2015 but consider it feasible for Hunter Water to meet its objectives within the envelope set out by optimising the program of expenditure within the price path and mobilising significant effort and management focus to achieve greater efficiencies in 2016 and 2017.

In order to ensure that compliance is not unduly affected we consider that it will be essential for the business to continue to strengthen its understanding of the associated risks and further expand and develop risk mitigation plans where appropriate.

7.11 Prudence and Efficiency in Future Price Path

We examine below the case for adjustments to Hunter Water's proposed capital expenditure in the SIR submission to reflect our view of prudent and efficient expenditure for the future price path. Our views are based on our review of the company's processes and planning, the Information Return, discussions with Hunter Water and the review of sample projects. We have undertaken this task in isolation from the Hunter Water's own efficiency proposals discussed above, and then compared the results. We discuss our methodology and the results below.

Our assessment of the level of capital efficiency which could be achieved by Hunter Water in the future price path is a progression of the methodology which we applied to our review in 2008. It is based on a methodology developed by Ofwat and applied to water companies in England and Wales for nearly 15 years. This methodology applies the concepts of continuing and catch-up efficiency.

Continuing efficiency is the scope for a top performing or Frontier Company to continue to improve its efficiency. It reflects the continuing efficiencies being gained across all major sectors through innovation and new technologies. Catch-up efficiency is the scope for all other utilities to reach the performance of a Frontier utility. This concept was developed and applied by the Water Services Regulatory Authority (Ofwat) in England and Wales for the 1999 Periodic Review and also used in the 2004 and 2009 Periodic Reviews. It has been subject to independent scrutiny by the UK Competition Commission. Our assessment of catch-up relates to three capital processes: strategic planning, the method of cost estimating and the procurement processes.

In 2008, Hunter Water was set capital efficiency targets of 0.5% per annum continuing and catch-up efficiency rising over the period to 4.5% by 2012-13.

Our methodology takes the proposed expenditure for the period 2013 to 2017 in the SIR and makes adjustments for any inconsistencies. We then take a view on the phasing of expenditure, where timing is dependent on external factors such as growth. On this point we note that Hunter Water has developed an appropriate model of new development and has assumed significantly lower levels of growth-driven investment than in the current price path. We have therefore accepted the company's view on the phasing of investment.

We have then made adjustments to specific programs or projects which we have reviewed. We have commented above on specific projects and relate to the re-phasing of the delivery of outputs

We then arrived at an adjusted expenditure profile against each driver. To this adjusted expenditure profile we have applied the efficiency target that we assess later in this Section. The derivation of our assessment of efficient expenditure for the future price path following adjustments and application of efficiencies is set out below and compared to Hunter Water's own assessment.

7.11.1 Continuing Efficiency

We have assumed a continuing capital efficiency of 0.4% per annum over the period 2013 to 2017 to reflect the impact of new technology and innovation which all agencies, including a frontier agency, should achieve. This value is based on the efficiency targets set for Sydney Water in 2012 and the efficiency target set by Ofwat in 2009 for continuing efficiency targets for water utilities in England. We suggest that any significant differences between the forecast and outturn continuing efficiency should be considered from a retrospective analysis of prudent expenditure at the next price path review.

7.11.2 Catch-up Efficiency

We have applied our judgment to determine the level of catch-up efficiency that could be achieved by Hunter Water from 2013 to 2017 based on our assessments of the capital processes and the review and analysis of sample projects representative of the program as a whole. We have identified three areas where Hunter Water should be able to make improvement to its processes to move towards "frontier" level over time and deliver material efficiencies over the price control period: improvements to investment planning, including more effective program management, improvements in cost estimating and the management of contingencies, and the impact of optimised procurement processes.

Investment Planning

This reflects our view on program management and internal efficiency; that is the potential for some of the projects identified to be scaled back or deferred without unduly jeopardising risk and performance and also of Hunter Water's ability to do things internally more efficiently and lower the general amount of overheads capitalised to projects. We are of the view that the business efficiency projects implemented by Hunter

Water in recent years, particularly investment in information systems such as ERP, should translate to more efficient capital investment planning and programming. . The implementation of the QMS should also contribute to improved efficiencies.

While the asset management process is mature within Hunter Water a number of improvement initiatives exist as identified in the WSAA 2012 asset management Performance Improvement Project. Particular improvements include the information management processes and a greater focus on mechanical-electrical assets.

We have commented in Section 5 on the continuing improvements in investment planning processes. The challenging constrained capital expenditure imposed by Hunter Water will further stimulate the organisation to further seek efficiencies in its processes

Cost estimates

We recognise that, in 2008 Hunter Water underestimated the costs involved in delivering some significant schemes. However, we found that the robustness of cost estimation appears to have improved. Based on the information Hunter Water has provided, we consider that the cost estimates used for price path submission contain a relatively high element of contingency compared to the efficient and prudent expenditure required to deliver the specific outcomes targeted. We have therefore made an allowance for cost estimation efficiency.

Procurement

Hunter Water puts significant effort into procurement efficiency. However, we consider that there may be further efficiencies to be gained by bundling of contracts, for example for switchboard and mech/elec work, using its purchasing power in the marketplace and critically challenging past practices. The success of the Hunter Water Alliance provides the opportunity to use similar risk sharing approaches to procurement. Hunter Water already is aware of the need for continual improvement in procurement to achieve the challenging targets it has set itself.

Although the level of efficiency will vary between different services, for simplicity (given that a comparison is being made with Hunter Water's own efficiency assumptions) we have presented these at company level.

Timing of Expenditure

We consider that Hunter Water should monitor changes in the economy and construction market prices and take advantage of any opportunities of more competitive construction costs in a subdued market. This could result in higher risk projects being brought forward at a lower cost. We have not factored this opportunity in our efficiency estimates as it is difficult to predict economic factors in the long term. However, we are of the view that the construction market in Australia is cooling and likely to remain relatively subdued over the next couple of years. There may be potential costs saving opportunities available through having projects developed to a level so that Hunter Water can respond quickly to favourable market conditions.

Our assessment of the level of continuing and catch-up efficiencies achievable in the future price path is shown in Table 7-12 below.

Ref	Efficiency Scope (% in annum)					
	Element	2014	2015	2016	2017	2018
1	Continuing efficiency at the frontier	0.4	0.4	0.4	0.4	0.4
2	Cumulative continuing efficiency	0.4	0.8	1.2	1.6	2.0
3	Catch-up efficiency: investment planning	0.4	0.8	1.2	1.4	1.6
4	Catch-up efficiency: cost estimating	0.5	1.0	1.5	2.0	2.5
5	Catch-up efficiency: procurement	0.3	2.0	4.9	5.0	5.0
6	**Total efficiency**	**1.6**	**4.6**	**8.8**	**10.0**	**11.1**
	Hunter Water's Proposed Aggregate Capital Efficiency for comparison	9.6	8.0	9.7	14.0	13.4

Source: Atkins/Cardno analysis

Table 7-12 Future Price Path – Atkins/Cardno Assessment of Company Level Efficient Capital Efficiencies

Efficient Level of Expenditure

Given that, in aggregate over the future price path period, Hunter Water's own efficiency assumptions are more challenging than our own efficiency assessment would have been we have retained the company's efficiency assumptions and simply made a small number of adjustments to the company's projections.

The adjustments made to Hunter Water's post-efficiency capital expenditure figures are as follows:

- Rephasing of $1.8m of backlog sewer schemes costs in 2016-17 and $1.0m in 2017-18 within the wastewater service into the post 2018 price path as we consider it unlikely that that many of the infill projects will be implemented in the four year period;
- Removal of the Kooragang Island expenditure from the water service capital expenditure as it is dealt with separately as a RAB adjustment (see Chapter 8 below);
- Reduction of $7.4m to the allowance for water service "growth" expenditure in 2018 as we understand that Hunter Water has assigned the expenditure for a number of schemes to this year which it considers, in reality, may happen at some point over a four year period starting from 2018;
- Rephasing the Hunter River Tunnel Replacement forward for completion in June 2015 rather than the proposed June 2017. We agree with Hunter Water that this is a critical investment for the next price path. Given the high risk associated with this asset and the long-term duration of customer impacts while a replacement asset is constructed, it would be preferable that this investment is undertaken as originally programmed;
- Hunter Water has advised that the most recent estimate for the HV upgrade shows an increased expenditure in the next price path of $2.4m. We have included this adjustment; and
- Rephasing of the Muninbung Creek rehabilitation forward to 2016/17 and 2017/18 with$0.9m allocated in each year. Customer complaints are likely to continue. Deferring two major stormwater projects for 10 years to 2026 could be considered as transferring today's costs to future

generations. The cost is not significant and will continue to allow Hunter Water to continue its stormwater capital expenditure at similar levels to previous years.

Rephasing forward of the expenditure on the ERP and reducing forecast expenditure from $8.7m to $8.1m.In the case of non-critical mains replacement we consider that the rate adopted was too high in comparison to that achieved in the current price path. We have adjusted the output measure for this program from 18km to 21 km. A summary of our efficient expenditure assumptions is set out below.

Water Service

We summarise our proposals for prudent and efficient capital expenditure for the water service in Table 7-13 below.

HUNTER WATER CORPORATION PROPOSAL - CAPEX - WATER SERVICE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	26.5	12.8	19.0	13.6	9.1	72.0	81.0
New Mandatory Standards	0.1	0.1	0.8	0.1	1.2	1.0	2.3
Asset & Service Reliability	0.0	1.3	8.9	9.6	5.6	19.8	25.4
Growth (funded by other)	2.4	1.4	4.4	4.9	17.5	13.1	30.6
Government Programs	26.1	0.0	0.0	0.0	0.0	26.1	26.1
Discretionary	0.4	0.4	0.9	0.3	0.2	2.1	2.3
Business Efficiency	3.3	3.9	3.9	3.7	3.7	14.8	18.6
Total	58.8	20.0	38.0	32.2	37.3	148.9	186.3
Atkins/Cardno recommended adjustments for specific programs or projects							
Reallocation: remove Kooragang Island (Govt Prog)	-26.1					-26.1	-26.1
Atkins/Cardno Recommendation: bring forward Hunter River Tunnel Replacement (ASR)	2.8	6.5	-2.8	-6.5		0.0	0.0
Atkins/Cardno Recommendation: additional HV expenditure (EMS)	2.2					2.2	2.2
Atkins/Cardno Recommendation: 2018 "growth" deferral					-7.4	0.0	-7.4
ADJUSTED EXPENDITURE BEFORE APPLICATION OF EFFICIENCY TARGETS							
Existing Mandatory Standards	28.6	12.8	19.0	13.6	9.1	74.1	83.2
New Mandatory Standards	0.1	0.1	0.8	0.1	1.2	1.0	2.3
Asset & Service Reliability	2.8	7.8	6.1	3.1	5.6	19.8	25.4
Growth	2.4	1.4	4.4	4.9	10.1	13.1	23.2
Government Programs	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discretionary	0.4	0.4	0.9	0.3	0.2	2.1	2.3
Business Efficiency	3.3	3.9	3.9	3.7	3.7	14.8	18.6
Total	37.6	26.5	35.2	25.7	29.9	125.0	154.9
Atkins/Cardno recommended additional capital efficiency targets (beyond those applied by the company)							
Continuing Efficicency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
Catch-up efficiency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	28.6	12.8	19.0	13.6	9.1	74.1	83.2
New Mandatory Standards	0.1	0.1	0.8	0.1	1.2	1.0	2.3
Asset & Service Reliability	2.8	7.8	6.1	3.1	5.6	19.8	25.4
Growth	2.4	1.4	4.4	4.9	10.1	13.1	23.2
Government Programs	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discretionary	0.4	0.4	0.9	0.3	0.2	2.1	2.3
Business Efficiency	3.3	3.9	3.9	3.7	3.7	14.8	18.6
Total (excluding Kooragang RWS)	37.6	26.5	35.2	25.7	29.9	125.0	154.9

Table 7-13: Atkins/Cardno assessment of efficient expenditure in the next price path period for the water service (excluding Kooragang Island)

Wastewater Service

We summarise our proposals for prudent and efficient capital expenditure for the wastewater service in Table 7-14 below.

HUNTER WATER CORPORATION PROPOSAL - CAPEX - WASTEWATER SERVICE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	20.0	23.0	21.5	16.0	14.3	80.4	94.7
New Mandatory Standards	1.0	0.7	0.7	0.7	0.7	3.1	3.7
Asset & Service Reliability	0.0	0.0	0.0	0.4	0.0	0.4	0.4
Growth	8.9	2.4	8.6	12.9	10.9	32.8	43.7
Government Programs	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Discretionary	1.2	0.7	2.6	6.3	2.1	10.9	13.0
Business Efficiency	2.7	1.7	1.3	1.3	1.3	7.0	8.3
Total	34.1	28.4	34.7	37.5	29.3	134.7	164.0
Atkins/Cardno recommended adjustments for specific programs or projects							
Atkins/Cardno Recommendation: Rephase backlog sewers (growth/discretionary)				-1.8	-1.0	-1.8	-2.8
Atkins/Cardno Recommendation: additional HV expenditure (EMS)	0.2					0.2	0.2
ADJUSTED EXPENDITURE BEFORE APPLICATION OF EFFICIENCY TARGETS							
Existing Mandatory Standards	20.3	23.0	21.5	16.0	14.3	80.7	94.9
New Mandatory Standards	1.0	0.7	0.7	0.7	0.7	3.1	3.7
Asset & Service Reliability	0.0	0.0	0.0	0.4	0.0	0.4	0.4
Growth	8.9	2.4	8.6	12.0	10.4	31.9	42.3
Government Programs	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Discretionary	1.2	0.7	2.6	5.4	1.6	10.0	11.6
Business Efficiency	2.7	1.7	1.3	1.3	1.3	7.0	8.3
Total	34.3	28.4	34.7	35.7	28.3	133.1	161.4
Atkins/Cardno recommended additional capital efficiency targets (beyond those applied by the company)							
Continuing Efficicency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
Catch-up efficiency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	20.3	23.0	21.5	16.0	14.3	80.7	94.9
New Mandatory Standards	1.0	0.7	0.7	0.7	0.7	3.1	3.7
Asset & Service Reliability	0.0	0.0	0.0	0.4	0.0	0.4	0.4
Growth	8.9	2.4	8.6	12.0	10.4	31.9	42.3
Government Programs	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Discretionary	1.2	0.7	2.6	5.4	1.6	10.0	11.6
Business Efficiency	2.7	1.7	1.3	1.3	1.3	7.0	8.3
Total	34.3	28.4	34.7	35.7	28.3	133.1	161.4

Table 7-14: Atkins/Cardno assessment of efficient expenditure in the next price path period for the Wastewater service

Stormwater

We summarise our proposals for prudent and efficient capital expenditure for the stormwater service in Table 7-15 below.

HUNTER WATER CORPORATION PROPOSAL - CAPEX - STORMWATER							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	0.4	0.4	0.4	0.4	0.4	1.4	1.8
New Mandatory Standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth (funded by other)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government Programs	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Business Efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.4	0.4	0.4	0.4	0.4	1.4	1.8
Atkins/Cardno recommended adjustments for specific programs or projects							
Atkins/Cardno Recommendation: bring forward Muningbung Scheme				0.9	0.9	0.9	1.8
ADJUSTED EXPENDITURE BEFORE APPLICATION OF EFFICIENCY TARGETS							
Existing Mandatory Standards	0.4	0.4	0.4	1.3	1.3	2.3	3.6
New Mandatory Standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government Programs	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Business Efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.4	0.4	0.4	1.3	1.3	2.3	3.6
Atkins/Cardno recommended additional capital efficiency targets (beyond those applied by the company)							
Continuing Efficicency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
Catch-up efficiency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	0.4	0.4	0.4	1.3	1.3	2.3	3.6
New Mandatory Standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government Programs	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Business Efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.4	0.4	0.4	1.3	1.3	2.3	3.6

Table 7-15: Atkins/Cardno assessment of efficient expenditure in the next price path period for the stormwater service

Corporate Capital Expenditure

We summarise our proposals for prudent and efficient capital expenditure for the corporate service in Table 7-16 below.

HUNTER WATER CORPORATION PROPOSAL - CAPEX - CORPORATE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Existing Mandatory Standards	1.2	0.9	1.2	1.2	1.2	4.6	5.8
New Mandatory Standards	1.6	1.2	1.3	1.2	0.6	5.3	5.9
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth	1.2	0.9	1.2	1.2	1.1	4.5	5.6
Government Programs	0.6	0.4	0.6	0.6	0.6	2.3	2.8
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Business Efficiency	4.2	4.4	11.1	3.9	3.9	23.5	27.4
Total	8.7	7.8	15.5	8.2	7.3	40.3	47.5
Atkins/Cardno recommended adjustments for specific programs or projects							
Atkins/Cardno Recommendation: ERP adjustment (Business Efficiency)	6.0	0.4	-7.0	0.0	0.0	-0.6	-0.6
ADJUSTED EXPENDITURE BEFORE APPLICATION OF EFFICIENCY TARGETS							
Existing Mandatory Standards	1.2	0.9	1.2	1.2	1.2	4.6	5.8
New Mandatory Standards	1.6	1.2	1.3	1.2	0.6	5.3	5.9
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth	1.2	0.9	1.2	1.2	1.1	4.5	5.6
Government Programs	0.6	0.4	0.6	0.6	0.6	2.3	2.8
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Business Efficiency	10.2	4.8	4.1	3.9	3.9	22.9	26.8
Total	14.7	8.2	8.5	8.2	7.3	39.7	47.0
Atkins/Cardno recommended additional capital efficiency targets (beyond those applied by the company)							
Continuing Efficicency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
Catch-up efficiency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Tota	2014-18 Total
Existing Mandatory Standards	1.2	0.9	1.2	1.2	1.2	4.6	5.8
New Mandatory Standards	1.6	1.2	1.3	1.2	0.6	5.3	5.9
Asset & Service Reliability	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth	1.2	0.9	1.2	1.2	1.1	4.5	5.6
Government Programs	0.6	0.4	0.6	0.6	0.6	2.2	2.8
Discretionary	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Business Efficiency	10.2	4.8	4.1	3.9	3.9	22.9	26.8
Total	14.7	8.2	8.5	8.2	7.3	39.7	47.0

Table 7-16: Atkins/Cardno assessment of efficient expenditure in the next price path period for the corporate service

7.12 Conclusions

We have reviewed Hunter Water's processes for preparing and delivering capital projects and have examined specific projects to confirm how these processes are applied.

We have carried out an assessment of potential continuing and catch-up efficiencies to reflect investment planning, the cost estimating process and procurement. The efficiencies imposed on the capital expenditure by Hunter Water, at an average of 10.8%, are greater than those suggested by the frontier company method. As such we have adopted Hunter Water's suggested capital program, subject to a number of adjustments to reflect known errors, cost classification and phasing of outputs in specific programs or projects.

We consider that Hunter Water has set itself a challenging target but that it should be achievable. Figure 3-3 shows that Hunter Water's forecast capital expenditure (in real terms) is returning to pre-2009 levels. Figure 7-15 shows that renewals expenditure as a percentage of current replacement costs has been

relatively stable since 2005. These factors provide us with some reassurance that Hunter Water's proposed expenditure forecasts while challenging are not unrealistic.

In order to ensure that compliance is not unduly affected we consider that it will be essential for the business to continue to strengthen its understanding of the associated risks and further expand and develop risk mitigation plans where appropriate. We consider that Hunter Water has the capability and flexibility to research and develop leading practice in the area of risk management in response to the constrained capital expenditure

We show in Table 7-17 below the capital expenditure proposed by Hunter Water, the adjustment we have made and our findings on the level of efficient capital expenditure for the future price path.

HUNTER WATER CORPORATION PROPOSAL - CAPEX - COMPANY LEVEL							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Water	58.8	20.0	38.0	32.2	37.3	148.9	186.2
Wastewater	34.1	28.4	34.7	37.5	29.3	134.7	164.0
Stormwater	0.4	0.4	0.4	0.4	0.4	1.4	1.8
Corporate	8.7	7.8	15.5	8.2	7.3	40.3	47.6
Total	101.9	56.6	88.5	78.3	74.3	325.4	399.7
Atkins/Cardno recommended adjustments for specific programs or projects							
Reallocation: remove Kooragang RWS (Water)	-26.1					-26.1	-26.1
Rephase Hunter River Tunnel Replacement (Water)	2.8	6.5	-2.8	-6.5		0.0	0.0
Additional HV expenditure (Water)	2.2					2.2	2.2
Deferaal of 2018 "growth" expenditure (Water)					-7.4	0.0	-7.4
Rephase backlog sewers (Wastewater)				-1.8	-1.0	-1.8	-2.8
Additional HV expenditure (Wastewater)	0.2					0.2	0.2
Bring forward Muningberg Scheme (Stormwater)				0.9	0.9	0.9	1.8
Rephase ERP expenditure (Corporate)	6.0	0.4	-7.0	0.0	0.0	-0.6	-0.6
Total	-14.9	6.9	-9.8	-7.4	-7.5	-25.2	-32.7
ADJUSTED EXPENDITURE BEFORE APPLICATION OF EFFICIENCY TARGETS							
Water	37.6	26.5	35.2	25.7	29.9	125.0	154.9
Wastewater	34.3	28.4	34.7	35.7	28.3	133.1	161.4
Stormwater	0.4	0.4	0.4	1.3	1.3	2.3	3.6
Corporate	14.7	8.2	8.5	8.2	7.3	39.7	47.0
Total	87.0	63.5	78.7	70.9	66.8	300.2	367.0
Atkins/Cardno recommended additional capital efficiency targets (beyond those applied by the company)							
Continuing Efficicency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
Catch-up efficiency (%)	0.0%	0.0%	0.0%	0.0%	0.0%		
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2012/13) year ending June	2014	2015	2016	2017	2018	2014-17 Total	2014-18 Total
Water	37.6	26.5	35.2	25.7	29.9	125.0	154.9
Wastewater	34.3	28.4	34.7	35.7	28.3	133.1	161.4
Stormwater	0.4	0.4	0.4	1.3	1.3	2.3	3.6
Corporate	14.7	8.2	8.5	8.2	7.3	39.7	47.0
Total (excluding Kooragang RWS)	87.0	63.5	78.7	70.9	66.8	300.2	367.0

Table 7-17: Atkins/Cardno assessment of efficient capital expenditure in the next price path (excluding Kooragang RWS adjustment)

8. Recycled Water

IPART's document "Pricing arrangements for recycled water and sewer mining" defines recycled water as:

> *Water that has been treated to enable its use for certain industrial, commercial, and/or household applications, but does not or is not intended to meet the standards for drinking water required by the National Health and Medical Research Council's Australian Drinking Water Guidelines."* [13]

Recycled water schemes can have a number of drivers including:

- Users' demand;
- Requirements in planning instruments such as BASIX;
- Environment protection licence requirements restricting effluent discharges to waterways;
- Operating licence requirements to reduce potable water demand; and
- Government mandates

IPART has set out that the direct costs of recycled water schemes should be recovered from users of the scheme or from users and other beneficiaries, based on the drivers and benefits of a scheme.

8.1 Expenditure in the Current Price Path

Operating Expenditure

The actual and forecast expenditure in the current price path period is significantly lower than has been assumed in 2009. This is because the expected development of the recycled water projects was delayed. The impact of this delay is shown in Table 8-1 below.

HUNTER WATER CORPORATION CURRENT PRICE PATH - RECYCLED WATER OPEX VARIANCE ANALYSIS					
($m 2012/13)	2010	2011	2012	2013	Total Price Path
Assumed Expenditure					
RW Direct	0.4	1.3	1.9	2.0	5.7
RW Overhead	0.4	1.1	1.6	1.6	4.7
RW Total	0.9	2.5	3.5	3.6	10.4
Actual Expenditure					
RW Direct	0.1	0.1	0.7	0.7	1.6
RW Overhead	0.0	0.0	0.3	0.2	0.5
RW Total	0.1	0.1	1.0	0.9	2.1
Variance					
RW Direct	-0.3	-1.2	-1.2	-1.3	-4.1
RW Overhead	-0.4	-1.1	-1.3	-1.4	-4.2
RW Total	-0.8	-2.4	-2.5	-2.7	-8.3

Source: HWC 2008 & 2012 Submissions

Table 8-1: Projected and Actual RW Operating Expenditure in the Current Price Path

The impact of the delay has been to defer $4.1m of direct costs. The overhead cost is an apportionment of Corporate and other overhead costs which are apportioned across all products in proportion to direct costs.

[13] Pricing arrangements for recycled water and sewer mining, IPART, September 2006

As the direct costs have not been incurred because of deferral of recycling projects, the $4.2m of overhead costs has been reallocated to regulated products in the business. This adjustment is appropriate.

Capital Expenditure

The actual/forecast capital expenditure in the current price path is significantly lower than was projected by Hunter Water at the 2008 submission and the subsequent revised Appendix D submission, as summarised in Table 8-2 and Figure 8-2 below.

This appears to have been mainly due to slower development than originally envisaged and, in the case of Kooragang Industrial Water Scheme, the time it has taken to establish commercial agreements.

Scheme	Total expenditure in current price path $12/13m			HWC Explanation[14]
	2008 Submission	Revised Appendix D	Actual/forecast 2012 Submission	
Mandatory (price-regulated) schemes				
Thornton North (Chisholm)	6.8	5.9	0.3	Slow development leading to deferral of project.
Cooranbong North	5.6	0.0	Negative $15k in 2009-10	Project cancelled
Gillieston Heights	6.5	7.7	0.7	Slow development leading to deferral of project.
SUBTOTAL	*18.8*	*13.6*	*1.0*	
Voluntary schemes				
The Vintage	n/a	n/a	5.1	Vintage is a 'voluntary' scheme thus is unregulated
Non price regulated schemes				
Kooragang Island	46.0	65.8	21.0	Project in design phase, commissioning expected June 2014. Expenditure is lower due to delays in signing commercial agreement with end user.

Source: HWC 2008 & 2012 Submissions and Revised Appendix D.

Table 8-2: Projected and Actual RW Capital Expenditure in the Current Price Path

[14] Appendix C, Hunter Water 2012 Submission

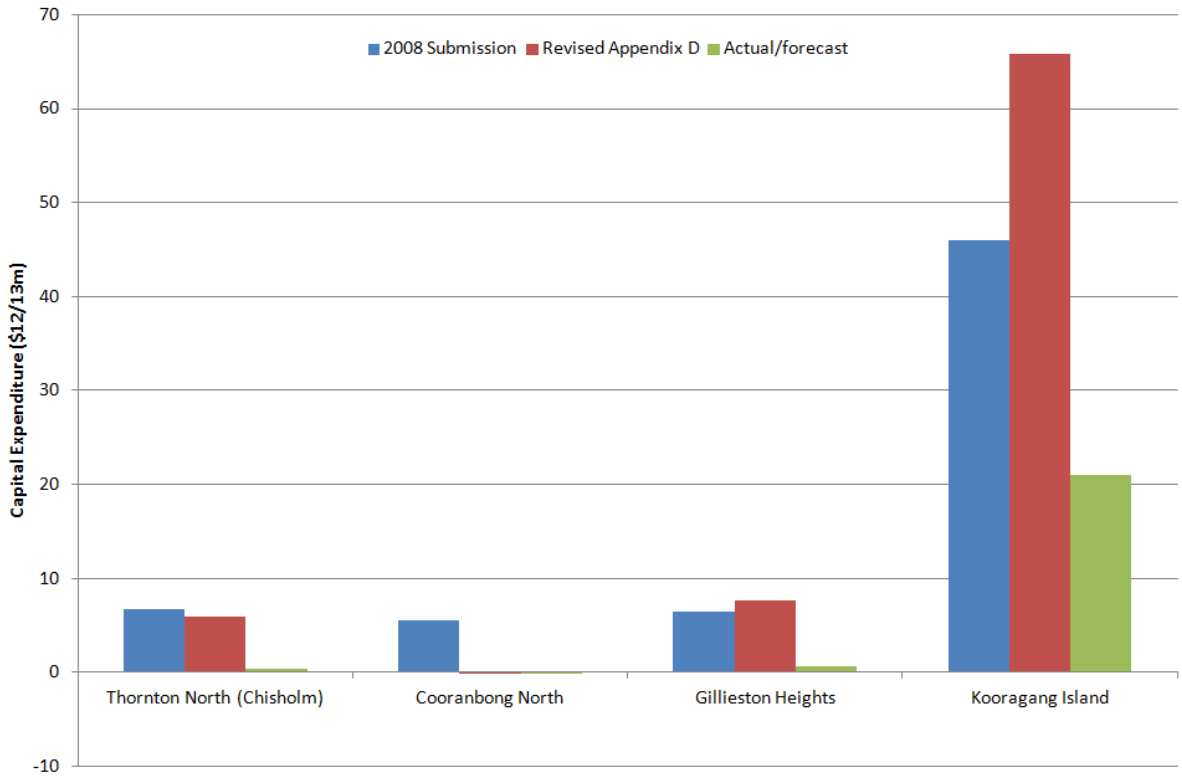


Figure 8-1 Evolution of Recycled Water Capital Expenditure in the Current Price Path (excluding voluntary schemes)

Hunter Water has provided us with a copy of the recycled water components of its asset and work in progress (WIP) registers which confirms that there are recycled water assets for all of the above schemes with the exception of Cooranbong, which is on the WIP register only.

8.2 Ringfencing of Recycled Water Costs

A significant number of Hunter Water's wastewater treatment plants "recycle" at least some of the treated effluent rather than discharge it to a watercourse. In many cases there are no material additional costs associated specifically with recycling because the Environment Protection (EP) Licence requires the same, similar, or sometimes more stringent, treatment for discharge than is required for recycled water use[15]. In many cases, the recycling has been justified on the basis of the unacceptability to the EPA of discharge to watercourses in certain conditions rather than due to a specific demand for the recycled water.

Based on the high level review undertaken with Hunter Water, summarised in Appendix C, we have not been able to identify any cases where existing water reuse from WWTWs should be classified as "recycled water" and has not already been so, suggesting that Hunter Water has appropriately ring fenced recycled water assets.

Operating costs associated with Recycled Water are discussed in Section 6 above.

[15] Such as the National Guidelines for Water Recycling.

8.3 Proposed Investment in the Future Price Path

Hunter Water has not included any regulated expenditure in it submission for the next price path, with both Gillieston Heights and Thornton North due to be completed in the current price path period[16]. Hunter Water subsequently commented that both these projects had been deferred beyond 2018.

The only expenditure identified by Hunter Water which is related to recycled water concerns the Kooragang Industrial Water Scheme, which falls outside of regulated expenditure as summarised below.

Scheme Name	SIR ID No.	Service & Driver	Proposed Expenditure 2014-2017[2] ($12/13m)	Comment
Kooragang Island: Treatment Plant[2]	XR1	Section 16A Scheme	$22.1m spread over 2013-15	Not assessed here as understood to be outside of the regulatory settlement.

Source: HWC 2012 Submission

Table 8-3: Recycled Water Investment Proposed in the Future Price Path

8.4 Assessment of Deferred and Avoided Costs

Kooragang Industrial Water Scheme

The Kooragang Industrial Water Scheme is the only recycled water investment for which Hunter Water is claiming an avoided/deferred cost benefit. It is proposing to complete implementation of the scheme in the next price path and has submitted a Business Case as part of its September 2012 Price Submission setting out a claim for $15.7m of avoided and deferred costs.

We have reviewed the business case and accompanying spreadsheet model as detailed in Appendix D. We have made a number of adjustments to the avoided and deferred cost claim:

- To take account of Hunter Water's latest capital program, particularly the later timing of Grahamstown WTP upgrade than was assumed in the avoided and deferred cost claim, and of the wider system impacts of the scheme on both the water supply and wastewater service.
- Adoption of a longer, 30 year, horizon consistent with the guidance and use of $12-13 price base rather than $11-12.
- The avoided and deferred costs are sensitive to the volume of recycled water sales and the consequent reduction in potable water use. As detailed in Appendix D, we consider that there is a risk that the volumes will be less than Hunter Water has assumed.

We have concluded that, depending on the outturn volume of recycled water sales, the appropriate value of avoided and deferred costs, which we understand will be applied as an adjustment to RAB, lies somewhere in the envelope of $5.9m to $9.5m. We consider that it would not be unreasonable to assume an avoided and deferred cost of approximately $7.5m, representing the likelihood that recycled water use will be between the contractual minimum and the potable demand profile assumed by Hunter Water.

We are also aware of a Section 16A Direction relating to a $10m subsidy for this scheme in addition to the avoided and deferred cost claim. As agreed with IPART, we have not reviewed the efficiency and prudency of this subsidy.

8.5 Conclusions

The actual/forecast capital expenditure in the current price path is significantly lower than was projected by Hunter Water at the 2008 submission and the subsequent revised Appendix D submission. This appears

[16] Based on the "SIR Capex 2 (revised by IPART)" and "RW Mandated 1" sheets in Hunter Water's MS Excel submission

to have been mainly due to slower development than originally envisaged and, in the case of Kooragang Industrial Water Scheme, the time it has taken to establish commercial agreements. We have not seen any evidence to suggest that the investments undertaken are imprudent.

Hunter Water has not proposed any regulated recycled water investment in the next price path period.

We have undertaken a high level review of water recycling at existing wastewater treatment plants. We have not been able to identify any cases where the assets should be classified as "recycled water" where they are not already classified as such, suggesting that Hunter Water has appropriately ring fenced recycled water assets.

We have evaluated Hunter Water's proposed RAB adjustment related to the Section 16A directive and avoided and deferred costs associated with the Kooragang Industrial Water Scheme. We consider that it would not be unreasonable to assume an avoided and deferred cost of approximately $7.5m, representing the likelihood that recycled water use will be between the contractual minimum and the potable demand profile assumed by Hunter Water. This is lower than indicated in Hunter Water's submission because of the amendments to the analysis to bring it in line with the relevant guidance and to reflect the possibility that sales volumes are less than the case presented.

However, we note that if significant investments are proposed by the Lower Hunter Water Plan, or if contractual sales volumes are varied significantly, consideration should be given to amending the avoided and deferred cost calculations accordingly.

9. Output Measures

9.1 Output Measures

Efficiency is typically defined as a relationship between inputs and outputs. Typical inputs include capital and labour resources, while typical outputs for a water business include maintaining required standards, meeting customer expectations and growth in demand. A business can be more efficient if it produces the same outputs for reduced inputs. Cost savings that are achieved at the expense of required outputs are not efficiency savings. It is therefore important to include defined and measurable outputs to assess whether a business has achieved the efficiency targets that it has been set. Output Measures are used as a means of monitoring the progress of the water business in delivering its plans. They enable the assessment of prudent expenditure and they allow reporting of variance from targets and are therefore important for future efficiency reviews. The Output Measures are not in themselves targets to be achieved in the price control period as there may be good reasons for variance. The main issue is to be able to identify actual outputs achieved against the related expenditure to provide greater clarity on any efficiency gains.

9.2 Past Performance

Hunter Water has reported on the output measures that were set in the 2009 IPART Determination to track the delivery of the Corporation's capital program over the period from 2008 to 2012. Hunter Water reports. Generally Hunter Water has met most of the targets with valid reasons provided for any under or over target achievement. Particularly noteworthy is the delivery of the delivery of the sewage treatment plant upgrades which was a significant project involving the upgrades at nine plants. All upgrades except one are complete or scheduled for completion within the current price path. The remaining plant is slightly delayed by six months.

Water Services

- **Length of critical water mains undergoing condition assessment -** There was a slight decrease in output;
- **Length of trunk mains for renewal/ upgrade -** Over target. 6.58km will be delivered over the price path compared to the 3.5km target. The increased output was due to renewal by slip-lining rather than replacement for two projects and one project being funded from outside the price path provision;
- **Pump Stations Constructed/Upgraded -** Three of the four nominated pump stations have been completed with the fourth being deferred due to revised growth projection;
- **New Reservoirs Constructed -** Three of the nominated reservoirs have been completed with the fourth being delayed by a year due to developer reconsideration of land development; and
- **Water Treatment Upgrades -** The Anna Bay plant upgrade has been delayed by 6 months due to difficulty in obtaining approval for upgrade of high voltage power supply. The Grahamstown plant upgrade has been deferred due to revised demand projections and a better understanding of water quality risks.

Wastewater Services

- **Length of critical sewer mains to undergo condition assessments** – Over target. 132.6km of critical sewers were inspected against a target of 120km;
- **Length of critical sewer mains renewed/refurbished** – Under target. 5.2km of mains were renewed against a target of 6km. The decreased output is due to focus on cast iron sewers. There have been concerns about the equipment and processes used to effectively manage the risks of de-scaling with equipment becoming stuck. In the last 12 months the relining contractor purchased improved de-scaling equipment, however there is now a backlog of work;

- **Length of non-critical sewer mains renewed/refurbished** – Over target. 68km of sewers were renewed against a target of 32km. The increased output is due to focus on the relining of assets that experience multiple tree root related blockages. A change to the licence limit, whereby only 45 properties may experience 3 overflows per year has influenced decision making;
- **Priority sewerage programs** – On target. Both nominated schemes have been completed;
- **Sewage treatment plant upgrades** – Slightly under target. Eight of the nine nominated plant upgrades are complete or scheduled for completion within this price path. The remaining plant is scheduled for completion in December 2013, six months later than planned; and
- **Sewage pump station upgrades** – Under target. 16 upgrades have been undertaken against a target of 30. Improved system performance and revised strategies to address overflow issues have allowed the remainder to be deferred.

Stormwater Drainage

- **Stormwater drainage channel rehabilitations** – One system on target, one below and one slightly above target.

Corporate

- **Replace customer meters** – The replacement of 20mm customer meters was over target due to an increase in unscheduled exchanges because of higher failure to register rates. There was a decreased output in the replacement of meters over 20mm diameter due to the performance of the existing meter fleet.

9.3 Measures for Future Price Path

The following measures as listed in Table 9-1 are based on outputs proposed by Hunter Water and our subsequent discussion with Hunter Water. Progress on major projects against the program is reported by Hunter Water in its annual Periodic Pricing Reports to IPART.

Output (or activity) Measure	Target Output (4 Year Price Path	Target Output (5 Year Price Path)
Water Services		
Renewal/reliability of distribution mains	21 km (18 km proposed by HWC)	26km
Water - Length of critical trunk mains undergoing condition assessment	67kms	84km
Critical trunk main replacement	3 km	3.8km
Water treatment plant upgrades - chemical storage systems	3 systems	3 systems
High Voltage Upgrade	28 sites	28 sites
Wastewater Services		
Renew non-critical mains	41 km	51km
Length of critical trunk mains undergoing condition assessment	148km	185km
Length of critical sewer mains renewed/refurbished – referring to cast iron program	4.2km	5.2km
High Voltage upgrade	3 sites	3 sites

Output (or activity) Measure	Target Output (4 Year Price Path	Target Output (5 Year Price Path)
Mechanical & Electrical Assets		
Telemetry upgrade	138 sites	172 sites
Pumps replaced	342 pumps	430 pumps
Switchboards replaced	40 sites	50 sites
Drainage		
Stormwater drainage channel rehabilitations	0.6 km	0.8km
Corporate		
Replace customer meters 20mm	13,200 meters	16,300 meters
Enterprise Resource Plan - Stage 1 implementation (ie Ellipse upgrade excluding AOMS)	Complete by 30 April 2014	Complete by 30 April 2014
Feasibility Studies on Capex to Save Opex		
• Energy optimisation and on-site electricity generation • Water treatment residuals management • Recycling of excavated spoil • Biosolids disposal		

Table 9-1 Proposed Output Measures (Source: Atkins/Cardno)

Significant under-achievement of the proposed target outputs will increase Hunter Water's risk in relation to asset and service failure. Significant over-achievement in some areas may be necessary as Hunter Water re-prioritises investment in response to an unacceptable deterioration in customer service levels. This may result in a commensurate under-achievement in other areas as a result of a constrained capital investment program. We would expect these adjustments to be justified through Hunter Water's project/ program prioritisation and business case processes.

9.4 Conclusions

Hunter Water has met most of the targets with valid reasons provided for any under or over target achievement. Particularly noteworthy is the delivery of the delivery of the wastewater treatment plant upgrades which was a significant project involving the upgrades at nine plants. All upgrades except one are complete or scheduled for completion within the current price path. The remaining plant is slightly delayed by six months.

Measures are proposed for the future price path which relate mainly to asset replacement work with targets defined on the current proposals in the capital program. Given the focus on constraining capital expenditure it is important for Hunter Water to demonstrate the sustainability of assets over the future price path period.

Appendices

Appendices B and D contain information that is commercial-in-confidence to Hunter Water. IPART has removed these appendices from the report.

Appendix A - Capital Projects Reviewed

Projects or Programs Reviewed	2008-12	2013-18
	Total ($'000)	Total ($'000)
Backlog sewer schemes		8,000
Belmont 6 Rising Main		7,561
Branxton Wastewater Treatment	44,673	
Burwood Beach WWTW Upgrade Stage 2	42,212	
Cessnock Stage 1 a and b	17,201	
Dungog WW Treatment Stage 2		13,000
Enterprise Resource Plan upgrade	1,206	8,724
Grahamstown WTP Interim Upgrade		14,817
High Voltage Upgrades	16,355	27,748
Hunter River Tunnel Replacement		9,264
Newcastle WW Transport Upgrade Stage 1	33,337	
Non-Critical Main Replacements	12,275	9,048
Non-Critical Sewermain Rehabilitation	6,760	5,155
Replacement of 900 CTGM - Tarro to Shortland	11,456	
Shortland Treatment Upgrades		16,800
Swansea Channel Crossing		4,622
Tarro to Beresfield WPS Augmentation		6,147
Water and Wastewater Pump Replacements*	3,200	6,727
Water and Wastewater Switchboard Replacements*	3,050	7,730
Williamtown/Tomago transfer scheme	6,664	9,251
	198,389	**154,594**

*Note – Expenditure in current price path is estimate

Appendix B - Summary Sheets for Capital Projects

Appendix C – High Level Review of Water Recycling at Existing Works

We have undertaken a high level review of the water recycling which already takes place from Hunter Water's wastewater treatment works (WWTW) to establish whether the costs of water recycling are correctly allocated.

We have carried this out by questioning Hunter Water about each of its WWTW where some or all of the treated effluent is not discharged directly to a receiving watercourse. The results have been summarised against a number of fields in the columns below:

Column Number	Explanation
1	WWTW name
2	Recycled water use, i.e. who and what is the treated effluent being used for if it is not being discharged directly to a receiving watercourse.
3	We have highlighted whether and what form of disinfection each WWTW has, as an indicator of whether additional cost has been incurred to allow recycling to take place, given that disinfection is often a requirement for recycling.
4	We have reviewed the conditions of the Environment Protection Licence to identify whether recycling is a requirement of the EPA rather than a decision of Hunter Water's.
5	We have reviewed Hunter Water's recycled water flow diagrams which identify the assets it considers to belong to the recycled water service or third parties rather than the wastewater service.
6	Where assets have not been identified as part of the recycled water service by Hunter Water, additional cost appears to be being incurred due to recycling and it is not a requirement of the EP licence we asked Hunter Water to demonstrate that recycling is the least cost way to achieve its EP licence requirements, i.e. to deliver the wastewater service.
7	We have added summary comments based on the points above.

1.WWTW Name	2.Recycled water use[1]	3. Disinfection? (Indicator of additional cost)	4.EP licence/other conditions	5.Recycled water assets identified by HWC	6.Least cost option appraisal for RW?	7.Comment
Branxton	Golf course Woodlots Farm The Vintage (golf course and accommodation)	Y- tertiary treatment and chlorine	EP licence specifies faecal coliform limit and chlorination	Chlorination, pond, dechlorination, chlorine analyser, etc classified as RW assets.	Not examined as assets explicitly identified as RW, i.e. the costs are sitting outside of the regulated wastewater business.	The company has explicitly identified elements of its system as RW assets as one of the RW users requires chlorination for its use. We have confirmed that assets have been allocated to RW at this site by inspection of Hunter Water's asset register. Hunter Water have also assigned some opex to RW from 12-13 on.
Clarence Town	HWC use it for irrigation on own land.	Y- oxidation ditch.	EP licence requires oxidation ponding. Discharge is only allowed when flow in the receiving water course is >3000l/s.	No	Not examined as constraint on discharge means that a degree of "recycling" is required.	A degree of "recycling" appears to be an EP licence requirement as discharge is only allowed in certain conditions.
Dungog	Dungog farmer	Y- maturation ponds. Filtration and UV disinfection currently being built.	Discharges are only permitted when river flow is greater than 50Ml/d. Effluent application to land is regulated in the EP licence. The licence required HWC to investigate maximising reuse and reducing the volume of discharge.	No	HWC has carried out an options appraisal to deal with current non-compliance and capacity. This compared RW and full discharge options. It found that microfiltration and UV with recycling were the least cost strategy.	Recycling appears to be justified on least cost grounds.

1.WWTW Name	2.Recycled water use[1]	3. Disinfection? (Indicator of additional cost)	4.EP licence/other conditions	5.Recycled water assets identified by HWC	6.Least cost option appraisal for RW?	7.Comment
Dora Creek	Eraring Energy	N- just secondary treatment	Not examined as there is no advanced treatment (i.e. additional cost) at the site)	No	Not examined as there is no advanced treatment	The recipient apparently does all of the processing on their site, leaving the company with no additional costs associated with RW.
Cessnock	Oaks Golf	Y- UV	Licence requires ponding (disinfection), doesn't require UV, apparently because it hasn't been updated. Environmental Impact Statement and planning approval for the works set out the need for UV as ponding was causing issues (algae).	No. The third party owns the recycled water pumps, etc. (commissioned c.2004)	Not examined as it is understood that UV was a requirement in order to achieve effective disinfection in accordance with the EP licence.	Third party ownership of RW assets. Disinfection is a requirement of the EP licence, suggesting the costs belong in the WW business. The UV system was built c8 years ago.
Edgeworth	Oceanic Coal Waratah	Y (UV and ponding)	Ponding and faecal coliforms are not a requirement of the EP licence. All treated effluent is either pumped to Toronto WWTW, discharged via the emergency spillway, which is the only EPA licensed discharge point from Edgeworth, for which no concentration or volume limit exists, or reused.	No	A high level options appraisal was carried out in 2007 to allow compliance with spill frequency standards. This found UV disinfection to be the least cost option. The pre-existing pond could either be optimised for disinfection or balancing not both, so to comply with required spill frequencies UV disinfection was added.	Recycling appears to be justified on least cost grounds.

1.WWTW Name	2.Recycled water use[1]	3. Disinfection? (Indicator of additional cost)	4.EP licence/other conditions	5.Recycled water assets identified by HWC	6.Least cost option appraisal for RW?	7.Comment
Farley	Farley farmer Will supply the Gillieston dual reticulation scheme.	Y -maturation ponds. UV being constructed, commissioning in 2013. UV will allow decommissioning of the ponds and supply to Gillieston. The ponds are apparently causing BOT and TSS issues, leading to breaching of load limits on licence because of algae.	No faecal coliform limit, just requires ponding.	Yes. Hunter Water's RW flow diagram identifies RW treatment, reservoir and pipeline which will be classified as RW when constructed.	Yes. The Stage 3 Upgrade Options Briefing found UV to be the least cost method of achieving disinfection to deal with the pond performance. The Hunter River Catchment Effluent Management Master Plan suggested that a "treat and discharge" strategy would be the least cost method of meeting the water quality objective in the Hunter. However, more detailed analysis carried out by Hunter Water specific to Farley[17] suggests that reuse is a significantly lower cost option than treat and discharge.	Recycling appears to be justified on least cost grounds. The RW Plant is being designed to supply the Gillieston dual reticulation scheme and is being classified as RW asset by Hunter Water.

[17] "Hunter catchment plants effluent management comparison farley only.xls" provided by Hunter Water

1.WWTW Name	2.Recycled water use[1]	3. Disinfection? (Indicator of additional cost)	4.EP licence/other conditions	5.Recycled water assets identified by HWC	6.Least cost option appraisal for RW?	7.Comment
Karuah	Karuah- agri enterprise, land owned by HWC.	Yes- UV	Recycling is implicit in EP licence as defined discharge points are to land or wet weather overflow only. EIS says will only discharge to river once in 4 years. EP licence has faecal coliform requirement.	No. Reuse is owned and run by HWC.	11 options considered (according to EIS). There were some lower cost options, but these involved direct discharge which was stated as being "not acceptable to EPA".	Considered by HWC to have been a least cost acceptable option. The system was commissioned c.12 years ago and as such we have not reviewed the options in detail.
Kurri Kurri	Kurri Golf Course Kurri TAFE	Y- UV	EP licence requires UV disinfection	Yes. Storage pond and pumping stations.	Yes. The preferred option was to discharge to creek. RW came later.	UV is an EP licence requirement. HWC has explicitly identified elements of its system as RW assets as they have been added to the process to allow RW use.
Morpeth	Easts Golf McColl Engineering Morpeth Famers Planned to supply Thornton North (after future price path)	Y- UV	EP licence requires UV disinfection	Yes. Although much/all of it not yet constructed.	Option wasn't designed for RW. RW come later.	HWC has explicitly identified elements of its system as RW assets as they are being added to the process to allow RW use.

1.WWTW Name	2.Recycled water use[1]	3. Disinfection? (Indicator of additional cost)	4.EP licence/other conditions	5.Recycled water assets identified by HWC	6.Least cost option appraisal for RW?	7.Comment
Paxton	Onsite plantation "Woodlot" belonging to HWC.	No. Use of MBR.	EP licence requires HWC to develop a sustainable effluent management strategy including effluent reuse. Department of Environment and Climate Change NSW (DECC) state that they expect no discharges over the summer months (21 October 2008). The EPA have stated that it expects the strategy to include effluent reuse (21 Sept 12).	No	Not examined.	It appears that the current reuse is in lieu of discharging to watercourse and not a water recycling scheme per se. Further recycling appears likely to be a requirement of the revised EP licence. However, we note that Hunter Water appears not to have included for investment for this in the future price path, a potential risk to its capital program.

Sources: HWC website & discussions with Hunter Water (recycled water use), EP licences, options appraisals, correspondence and Recycled Water Flow Diagrams provided by Hunter Water.

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