Hunter Water Expenditure Review

IPART

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Hunter Water Expenditure Review

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Introduction

The Independent Pricing and Regulatory Tribunal (IPART) is reviewing Hunter Water Corporation's (HW) water, sewerage, stormwater drainage and other charges to apply from 1 July 2016. Jacobs (we) have reviewed HW's operating expenditure (opex), capital expenditure (capex) and other matters on IPART's behalf. Our review supports IPART to achieve efficient investment, asset management, operations and practices by HW.

Please note we express financial years as the end year, for example 2015/16 as 2016, unless otherwise stated.

Task 1 – Asset Planning

We have reviewed HW's long-term investment planning and asset management systems and practices, including the asset management and capital project decision-making and budgeting processes. We consider that HW's capital planning processes, for long-term planning, are well designed and sufficiently detailed, given the organisation's size and annual capex. HW maintains the connection between its corporate strategy and its planning and approvals processes. HW's planning approach provides a good basis for efficient capital investment, which allows it to adapt to changing circumstances. Sufficient review and approval processes are in place at portfolio and project levels to drive efficiency.

Generally, HW's cost estimation processes are effective. Sometimes, HW chooses a project option that is not the lowest whole-of-life cost for available compliant options. Where this is the case, we have recommended individual cost savings for some sampled items.

We consider that HW's long-term capital investment strategy and processes promote efficiency through the focus on key capital drivers, strategic priorities and performance measures. However, we have not seen the application of HW's own processes, that require assessment of the capex/opex trade-off in all cases, when determining which project option to pursue (e.g. we did not establish that trade-offs are evaluated for business driver only cases). HW advised that it adopts a life cycle least-cost approach that should include this assessment. It may be that we have not reviewed enough material. Generally, however, HW's processes and practices reflect good industry practice.

On adopting project prudence drivers, we note that HW does not exclusively use IPART's regulatory drivers to justify the need for a project. We consider that HW should do this. We recommend that all projects be considered firstly against IPART's drivers (excluding the discretionary driver). We also recommend that HW formally align its other (day-to-day) drivers to IPART's drivers and document that mapping process. This will help to ensure that parts of future capex projects are not found to be imprudent, for want of an IPART driver.

We have reviewed the relationship and consistency between HW's short and long term planning documents and conclude that its planning systems provide consistency between the 5-year and 10-year capex programs. However, alignment between one-year capital plans and long-term plans is not robust. This may be a function of HW's project implementation processes which accommodate changes in circumstances.

From our review of HW's asset management planning systems, we consider that systems linking asset management decisions with current and future levels of service and performance requirements are appropriate. We note that IPART's consultant in 2012 reported that "… a number of Asset Management Plans (including the Asset Management Policy) were still in a final draft stage and require finalisation." The 2012 Aquamark benchmark also revealed that HW received low scores for process documentation and effectiveness. We consider HW needs to make further improvements to its asset management planning systems. We recommend a new output measure that requires HW's proposed transition to ISO 55000 in time for the next review.

In addition to asset management processes and asset management planning, we consider that HW's risk and risk mitigation documents need some improvement. We consider that HW's action plans are appropriate and will improve risk management. However, HW's progress in delivering its action plans and the timelines to completion need to be made clearer, if not for this review, in time for the next.

Task 2A – Operating expenditure (opex)

Base year opex 2016

We recommend prudent and efficient opex of $128.4 million in 2016, which is $1.2 million (1.0%) more than HW's proposed $127.2 million for the 2016 base year.

Our base year opex is higher than HW's due to a timing difference in HW's payments for its defined benefits superannuation contribution. During the 2013 price determination, HW and IPART had expected an increase in the annual defined benefits superannuation cost of $2.8 million. This increase had not eventuated when HW submitted its cost proposal to IPART, so HW excluded it from the base year but included it in 2017-2020 costs.

Since then, HW received advice that up to $2.2 million of annual defined benefits superannuation cost will be incurred in 2016, subject to the NSW Treasurer's agreement.[1] Accordingly, we included the $2.2 million in our base year, which offset our other opex savings, leaving our base year $1.2 million higher than HW's base year.

We note our recommended base year opex is $2.6 million (2.0%) less than IPART's 2013 Determination.

Regulatory period opex 2017 to 2020

Our recommended costs for 2017-2020 (the regulatory period) are lower than HW's. Our savings are evident once HW includes the $2.2 million superannuation cost in its costs for the regulatory period. The following presents our findings for HW's opex for 2017-2020.

HW proposed opex of $533.3 million over the four-year period. Based on our prudency and efficiency considerations, we estimated HW's efficient opex to be $525.7 million (excluding our continuing efficiency adjustments) for 2017-2020. This reflects a $7.7 million (1.4%) saving and equates to our 'catch-up' efficiency measures, which help to ensure that HW is operating as a prudent and efficient business.

In addition, we recommend a continuing annual efficiency saving for the four years of 0.14% p.a. (based on 0.25% p.a. applied to HW's controllable costs) or $1.85 million, which reflects our expectation that a business as efficient as HW will still achieve productivity improvements over the regulatory period. HW's proposed opex, our recommended adjustments and total opex are presented in Table 1.1 below.

Table 1.1 : HW proposed and Jacobs' efficient opex 2016 to 2020 ($2016 million)

Financial Year ($2016 '000)	2016	2017	2018	2019	2020	Total 2017-2020
HW proposal	127.2	128.9	132.9	134.8	136.8	533.3
IPART 2013 price determination	131.0	n/a	n/a	n/a	n/a	n/a
Our catch-up adjustment to HW	1.23	-0.22	-1.94	-2.12	-3.39	-7.67
Our catch-up adjustment to HW (%)	0.97%	-0.17%	-1.46%	-1.57%	-2.48%	-1.44%
Our prudent and efficient opex (excl. continuing efficiency)	128.4	128.7	130.9	132.7	133.4	525.7
Our continuing efficiency (%)	0%	0.14%	0.14%	0.14%	0.14%	n/a
Portion of our prudent and efficient opex (incl. continuing efficiency) (%)	100%	99.86%	99.72%	99.58%	99.44%	n/a
Our continuing efficiency adjustment		-0.18	-0.37	-0.56	-0.75	-1.85
Our recommended opex	128.4	128.5	130.6	132.2	132.6	523.8
Change to HW proposal	1.23	-0.40	-2.31	-2.68	-4.13	-9.52
Change to HW proposal (%)	1.0%	-0.3%	-1.7%	-2.0%	-3.0%	-1.8%

Source: Jacobs' Final Report, 2015.

[1] JO1_10_1 STC letter to Treasury re HW super contributions.pdf

Our opex savings, in total over the four years relative to HW's proposals are comprised of:

- Lower labour costs than proposed by HW, by $4.09 million
- Lower costs for Head Office than proposed by HW by $1.96 million, reflecting costs associated with owning the building rather than leasing
- Increased costs for new initiatives but at lower levels than proposed, by HW by $0.87 million
- Lower costs for the MWD to undertake LHWP activities (reflecting an incorrect costing basis used originally), by $0.17 million
- Lower costs for the digitisation project, by $0.19 million
- A series of changes in the 2016 base year which have either been removed or added to reflect ongoing costs, with a total impact of $0.36 million (e.g. removal of corporate strategy/study costs and removal of an ongoing reduction in water treatment savings that HW will not realise)
- Annual productivity-based continuing efficiency of $1.85 million.

Our recommended total opex savings (including continuing efficiencies) are **$9.5 million** (or a **1.8% reduction**) to HW's proposed opex over the regulatory period. We recommend annual savings ranging from $0.4 million (2017) to $4.1 million (2020).

Our savings are in addition to HW's proposed $4.9 million of opex savings, which HW removed from its costs prior to submitting them to IPART.

Other recommendations that do not directly impact opex

We also recommend actions that do not directly impact prices but should lead to improved processes and more efficient opex forecasts in the future:

- First, HW should develop annual guidance for the (internal) opex budgeting process that specifies the basis on which forecasts are to be established. For example, they need to take into account: service requirements, and legislative requirements or obligations; inputs that must be established (e.g. required quantities and prices of goods or services); relevant assumptions (e.g. around demand estimates, inflation, labour inputs); and procurement requirements.

  HW should document how top-down savings requirements are to be applied, what those requirements are and how capex/opex trade-offs will be made. This will assist HW to demonstrate more rigour when developing opex forecasts and ensure they are prudent and efficient.
- Second, for all future ICT business cases, the consideration of additional opex and possible efficiencies (e.g. costs which could be avoided, and reduced costs associated with more streamlined processes) should be a mandatory part of the business case sign-off. This will ensure that ICT projects give full consideration to the potential for efficiencies and that these are incorporated into opex budgets.

Task 2B – Capex

The purpose of our capex review is to assess the prudence and efficiency of HW's actual and forecast capex from 2013 to 2020. Our review focused on HW's capital program policies and procedures, and a sample of 12 items (eight projects and four programs) to assess HW's capex prudence and efficiency. The 12 sample items were agreed with IPART to meet its requirements and cover all major components of HW's business.

We made three types of cost adjustments: (1) one-off changes to our sample items; (2) extrapolated changes to large unsampled forecast capex items, where HW costs showed a moderate systemic bias, due to market conditions softening since the time of its initial proposal to IPART; and (3) our recommended continuing efficiency savings relating to expected productivity improvements by HW over the regulatory period.

One-off adjustments to sampled items

First, we recommend one-off cost adjustments where our traffic light system shows orange or red. Where it is green we have not recommended an adjustment to HW's proposed costs. Table 1.2 below summarises our prudence and efficiency findings, and recommended cost adjustments for the 12 items we sampled.

Table 1.2 : Jacobs' capex review summary of the 12 sample projects

Item	Project	Prudence	Efficient option	Efficient cost	Our cost change ($ million)
1	ICT Program	🟢	🟡	🟡	-0.91
2	Mechanical - Electrical Renewals	🟢	🟢	🟢	1.38
3	High Voltage Major Upgrade	🟢	🟢	🟢	0.22
4	Chichester Trunk Gravity Main - Duckenfield to Tarro Replacement	🟢	🟢	🟡	-1.83
5	Burwood Beach Wastewater Treatment Works (WWTW) Disinfection	🟢	🟢	🟡	-11.90
6	Shortland WWTW Sludge Handling Upgrade	🟢	🟢	🟡	-2.40
7	Wyee Backlog Sewer Scheme	🟢	🟡	🟡	0.00
8	Critical Mains Renewals Program	🟢	🟢	🟢	0.10
9	Kurri WWTW Upgrade - Stage 3	🟢	🟢	🔴	-2.18
10	Seaham Weir	🟢	🟢	🟢	-1.20
11	Hunter Central Coast transfer capacity upgrade	🟢	🟢	🟢	0.37
12	Munibung Creek SW Rehabilitation Works	🔴	🟢	🟢	-1.95
Total	**2013 to 2020**				**-20.28**

Source: Jacobs' Final Report, 2016.

Key: 🟢 prudent or efficient; 🟡 partially prudent or partially efficient; 🔴 not prudent or not efficient

The result is a $20.3 million cost saving over the 2013 to 2020 period. Our findings include that HW:

- Has not always demonstrated prudence, if a project is not supported by an IPART driver
- Has considered appropriate options but sometimes selected one that was not least-cost
- Costs for some options are (now) too high, based on HW's updated data or our benchmark cost estimate
- Has not always provided a detailed business case and, therefore, not demonstrated it has selected the best option.

Extrapolation to unsampled items

Second, we extrapolated certain of the findings above based primarily on the changes in market costs. Among the projects we sampled, HW's proposed costs are materially above its now updated project costs or our benchmarked costs, for some items due to either unspent contingency allowances or a softer (cheaper) market.

This is partly because HW had to prepare its costs in 2014 for submission to IPART in 2015. Since submitting to IPART, based on our reviews, we observe that the market costs have generally fallen, making projects less expensive on average than HW originally proposed to IPART.

We do not consider that this is a deliberate overstatement of costs by HW. Rather, the timing of our review, supported by HW's updated costs and our recent cost estimates, supports our recommended conservative extrapolation of these findings to certain unsampled items (below).

We found that four projects materially exhibited this partial systemic bias and that HW had proposed costs 9% higher (based on a weighted average) than the available updated costs. In some cases, this was based on our

most recent benchmark or high-level cost estimate. In others, it was based on HW's updated capital project summaries. The recent reduced market cost of such projects is the key driver and we believe that this will apply to large forecast projects (post 2015-16) that we have not reviewed.

We conservatively applied half of this finding (i.e. 4.5% not 9%) to HW's 22 unsampled forecast capital projects that exceed IPART's $5 million threshold.

- We applied a 50% reduction to our identified 9% saving, which reflects our engineering judgement and the uncertainty of extrapolating such a finding to unsampled projects.
- We applied the saving to large items above $5 million, as our sample (largely) and our 9% finding were derived from large projects as defined by IPART. We did not apply this to past projects up to and including 2016, as such costs may be actuals or in the case of 2016, HW may have locked in contract prices.

Some costs HW proposed for 2016 may be high due to changed market conditions and some may not have been locked in at the time of HW's proposal. However, we have been conservative in HW's favour and not applied this saving to the 2013 to 2016 costs.

We applied our 4.5% saving to HW's unsampled large projects forecast for 2017-2020 (excluding programs and excluding two projects funded by the Housing Acceleration Fund).

Our recommended extrapolation adjustment is a $5 million cost saving over the regulatory period.

Recommended capex (incl. continuing efficiency adjustment)

In summary, our total capex savings from one-off and extrapolated adjustments are $25.3 million (3.2%) of HW's proposed capex over the period 2013-2020 (excluding our continuing efficiency adjustment). In Table 1.3 below, we present HW's proposed capex, our recommended one-off and extrapolated savings, and our continuing efficiency savings; resulting in our total recommended capex.

Table 1.3 : HW proposed and Jacobs' efficient capex 2013 to 2020 ($2016 million)

Financial Year ($2016 '000)	2013	2014	2015	2016	2017	2018	2019	2020	Total	% HW
HW proposal	106.7	97.4	85.1	112.6	113.3	92.8	89.4	93.5	790.8	100%
Our one-off adjustment	0.09	0.00	4.96	-7.76	-7.00	-2.31	3.18	-11.45	-20.28	-2.56%
Our extrapolated adjustment					-1.03	-1.52	-1.66	-0.78	-4.99	-0.63%
Our total catch-up adjustment (excl. continuing efficiency)	0.09	0.00	4.96	-7.76	-8.04	-3.82	1.52	-12.22	-25.27	-3.20%
Our prudent and efficient capex (excl. continuing efficiency)	106.8	97.4	90.1	104.8	105.2	89.0	90.9	81.3	765.5	96.8%
Our continuing efficiency (%)	0.00%	0.00%	0.00%	0.00%	-0.25%	-0.25%	-0.25%	-0.25%	n/a	n/a
Efficient portion of 2016 capex (%)	100.00%	100.00%	100.00%	100.00%	99.75%	99.50%	99.25%	99.00%	n/a	n/a
Our continuing efficiency adjustment	0.00	0.00	0.00	0.00	-0.26	-0.44	-0.68	-0.81	-2.20	-0.28%
Our recommended capex	106.8	97.4	90.1	104.8	105.0	88.5	90.2	80.4	763.3	96.5%

Financial Year ($2016 '000)	2013	2014	2015	2016	2017	2018	2019	2020	Total	% HW
Our total adjustment	0.09	0.00	4.96	-7.76	-8.30	-4.27	0.84	-13.04	**-27.47**	-3.47%
Our total adjustment to HW	0.09%	0.00%	5.83%	-6.89%	-7.33%	-4.60%	0.93%	-13.95%	**-3.47%**	n/a

Source: Jacobs' Final Report, 2015.

In summary, our total capex savings are $27.5 million (or a 3.5% reduction) of HW's proposed capex from 2013-2020. This includes our recommended continuing efficiency saving of $2.2 million (0.3%) of HW's proposed capex over the same period. We recommend annual savings ranging from zero (2014) to $13 million (2020).

Our savings are in addition to HW's proposed 5% uniform saving, which HW removed from costs prior to submitting to IPART.

Task 3 – Output Measures

HW has met the majority of the output measures set for the previous period and provided valid reasons for any under or over target achievement. We note that the number of 20 mm customer meters replaced in the period exceeded the target by more than 550% and that this was due to HW identifying a fault, in a certain type (batch) of meters, which required prompt replacement of those meters. This increase in actual replacements over target is a result of HW identifying a systemic defect (a defective backflow device) in a particular meter type. On identifying this defect, HW, rightly, ramped up its replacement program to address defective meters.

We expect under-achievement of output targets, to a certain extent, considering the shortened review period from that originally envisaged. The four-year regulatory period was reduced to three years. As such, some programs and projects had been planned for 2017, which now fall out of the regulatory period. Further, it is not always possible to apply a pro-rata adjustment to the targets, as the program of expenditure to meet a particular target may be weighted, to the beginning or end of the initial four-year regulatory period.

We consider that where output measures differed from the target, by more than can be explained by the shortened review period, HW has provided valid reasons for under achievement. We recommended output measures for the next regulatory period (refer Section 8).

Depreciation

We recommend that IPART uses the following weighted asset lives for the whole corporation to calculate regulatory depreciation for the 2017 to 2020 regulatory period.

Table 1.4 : HW proposed and Jacobs' recommended asset lives (years) for depreciation

Assets	Jacobs' recommendation	HW's proposal
Existing	62	70
New	67	100

Our recommendation is easy to implement, as it accords with the past IPART practice of using two simple asset lives, and is consistent with HW's proposed method (albeit with different numbers).The impact on regulatory depreciation is a matter for IPART to determine, if it accepts our recommendation.

Important note about your report

This section sets out the assumptions and limitations that apply to this report.

The sole purpose of this report is to present Jacobs' (our) findings and recommendations as part of this review of Hunter Water Corporation's (HW) costs, in accordance with IPART's scope.

We have relied upon and presumed accurate information presented to us by IPART and HW. In some cases we have similarly relied upon information in the public domain, where available from credible sources.

We exclude any warranty or guarantee (expressed or implied) in relation to the data, observations and findings in the report to the extent permitted by law.

This report should be read in full with no excerpts to be used as being representative of our findings.

This report has been prepared exclusively for our client and no liability is accepted for any use or reliance on the report by third parties.

1. Introduction

1.1 Purpose

The Independent Pricing and Regulatory Tribunal (IPART) is reviewing Hunter Water Corporation's (HW) maximum charges that will apply from 1 July 2016 for water, sewerage, stormwater drainage and other services. IPART appointed Jacobs (we/us) to assist them in determining an efficient level of capex and opex.

We have reviewed HW's past and forecast operating expenditure (opex) and capital expenditure (capex), and other matters on behalf of IPART, as its expenditure review consultant.

We are experienced in assessing monopoly water service providers' costs. Accordingly, this report supports IPART's purposes for such a review, which include incentivising:

- Efficient investment and asset management decisions
- Efficient operations and practices by HW.

1.2 Timing

HW's current price path started in July 2013 and IPART will start HW's new prices on 1 July 2016.

The maximum charges set by IPART for the upcoming determination period will cover a period of likely four (up to five) years from 1 July 2016. IPART will confirm this during the review.

1.3 IPART's drivers

IPART's drivers include considering a broad range of matters, when making determinations, including:

- Consumer protection – protection of consumers from abuses of monopoly power; the quality, reliability and safety standards of the services concerned and social impact of pricing decisions and impact on inflation
- Economic efficiency – need for greater efficiency in the use and supply of services; the need to promote competition; and the need to consider demand management and least-cost planning
- Financial viability – cost of providing the services concerned, the appropriate rate of return on public sector assets and impact of pricing decisions on the agency's borrowing, capital and dividend requirements
- Environmental protection – need to promote ecologically sustainable development through appropriate pricing policies.

1.4 Financial years

We express financial years as the end year throughout the report, for example 2015/16 as 2016, unless otherwise stated.

1.5 Dollar values in report

We express dollar values in constant dollar terms relative to the 2016 (2015/16) base year - abbreviated as $2016.

1.6 Report structure

The report includes the following:

- Task 1: Strategic review of HW's long-term investment plans and asset management systems and practices

- Task 2: Detailed review of the HW's past and proposed operating expenditure (opex) (Task 2A) and capital expenditure (capex) (Task 2B)
- Task 3: Review of performance against past output measures and to propose new output measures for the next determination period if appropriate, with a focus on capex.

There are additional sections on other issues raised by IPART (e.g. avoided costs, recycled water, and assumed asset lives for the purpose of IPART estimating regulatory depreciation).

2. Task 1 - Review of investment planning and asset management

2.1 Purpose and scope

The purpose of Task 1 is to review HW's long-term investment planning and asset management systems and practices. As part of this we have reviewed HW's long-term investment plan (minimum of 10 years), so that the medium-term proposals (four years of the determination period from 2017 to 2020) can be considered in the context of its longer term plans.

Our scope is to provide advice on:

a) Whether the long term capital investment strategy is the most efficient, and whether processes supporting this including procurement processes, whole-of-life-cycle planning and assessment of capex and opex trade-offs are best-practice, and therefore likely to result in prudent and efficient investment decisions

b) The key assumptions that are driving expenditure (e.g. asset replacements, demand forecasts, growth assessments, environmental requirements, licensing standards), including the reasonableness of these assumptions and how they have been considered and tested by HW

c) The consistency of HW's proposed five-year capex program with its long term (10 years) program of capex, and implications and risks associated with the five-year program for the long term program including any capex/opex trade-offs

d) The robustness of systems linking asset management decisions with current and future levels of service and performance requirements, including customer service and environmental outcomes

e) The way in which HW manages the risks associated with asset failure or underperformance

f) Issues relating to HW's process for determining and prioritising future infrastructure expenditure and asset management decisions.

2.2 Long Term Capital Investment (1a)

In this section we review and comment on HW's long term capital investment programme and planning processes and comment on consistency between its short term (1 and 5 year) and longer term (10 and 20 year) capital investment plans. We comment on the consistency of the planning processes and their implementation, and whether or not they represent good industry practice. Where we consider that there are deficiencies (i.e. the processes are not in keeping with good practices, or where we have observed that the processes are not being consistently implemented or adhered to, or where we consider there are opportunities for improvement) we note these considerations and provide substantiating comments and recommendations.

We have noted the recommendations by Atkins Cardno in its report "Review of HW Corporation's Operating and Capital Expenditure" and its observations of HW stated plans to improve and enhance its processes, and note as to whether HW has implemented the recommendations successfully or whether HW has implemented its own stated plans for enhancements to the processes.

2.2.1 Strategic Planning Framework

HW maintains a high level Strategic Planning Framework that guides the design of its various business processes, maintains the visibility of its priorities, and assists with decision making within those processes. The Strategic Planning Framework has five dimensions:

- Core business drivers – core business considerations related to the external environment
- Corporate identify – vision, mission, and values
- Future state – desired outcomes to reach in 2020 with clear targets reflective of the HW vision statement

- Strategic priorities – financial management, governance, infrastructure decision making, community satisfaction, and workforce performance
- Corporate scorecard – measures of performance

2.2.2 2015-16 Strategic Plan

The long-term investment planning and asset development occurs within the Strategic Planning Framework. Performance targets for the following five-year period are set out in the strategic plan and strategic priorities are aligned with these targets. The strategies are reviewed and updated annually to ensure any changes in the external business environment are recognised, appropriately considered, and addressed where necessary. The strategic plan identifies key business drivers for the period affecting these strategies. HW's strategic priorities (identified in its 2015/16 Strategic Plan) are:

- Transition to a high performance "leading" workforce culture and business model
- Achieve a Baa1 (BBB+) investment grade rating or better
- Achieve sustainable first quartile water industry infrastructure outcomes
- Achieve an independently verified improvement in stakeholder, customer, and employee satisfaction by the delivery of meaningful programs over the life of the plan
- Achieve an independently audited material improvement in risk management, business controls and legislative compliance over the life of the plan

2.2.3 Planning Group

The HW Planning Group is responsible for investment planning. There are four teams making up the Planning Group as show in Figure 2.1. The group resides entirely within the HW Planning and Operations Division and operates with oversight from the Planning Review Committee. The Planning Review Committee composition is executive and senior management, and its purpose is to ensure alignment with the HW Statement of Corporate Intent, prudency of decisions, and consideration of the business drivers. The Planning Review Committee also serves some governance functions such as the establishment and maintenance of a suitable reporting framework.

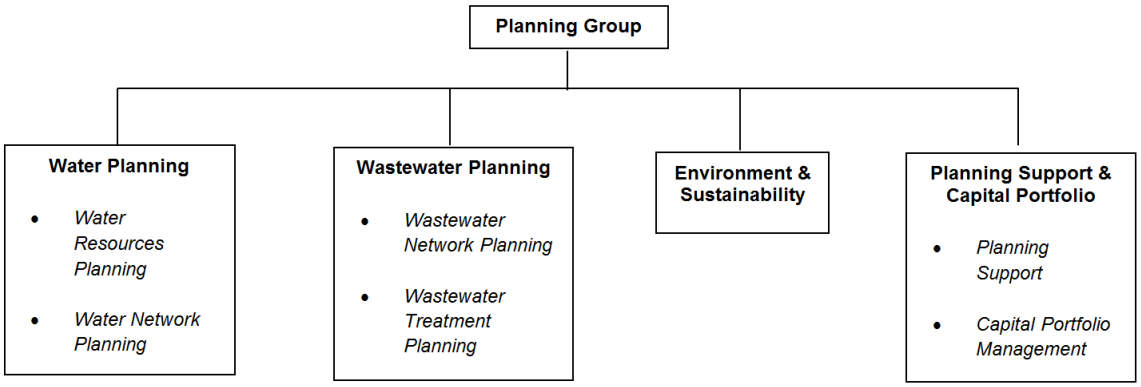


Figure 2.1 : Planning Group Structure

Source: Hunter Water

The planning group monitors information, issues, and risks that influence future investment. This includes, but is not limited to, growth mapping, operational performance, water quality, and technological developments. Regular risk reviews are carried out on the water and wastewater systems to develop and prioritise the required planning actions. When the Planning Group identifies new capital works, the capital works are developed and evaluated using HW's capital investment processes. The core planning processes are summarised conceptually in Figure 2.2.

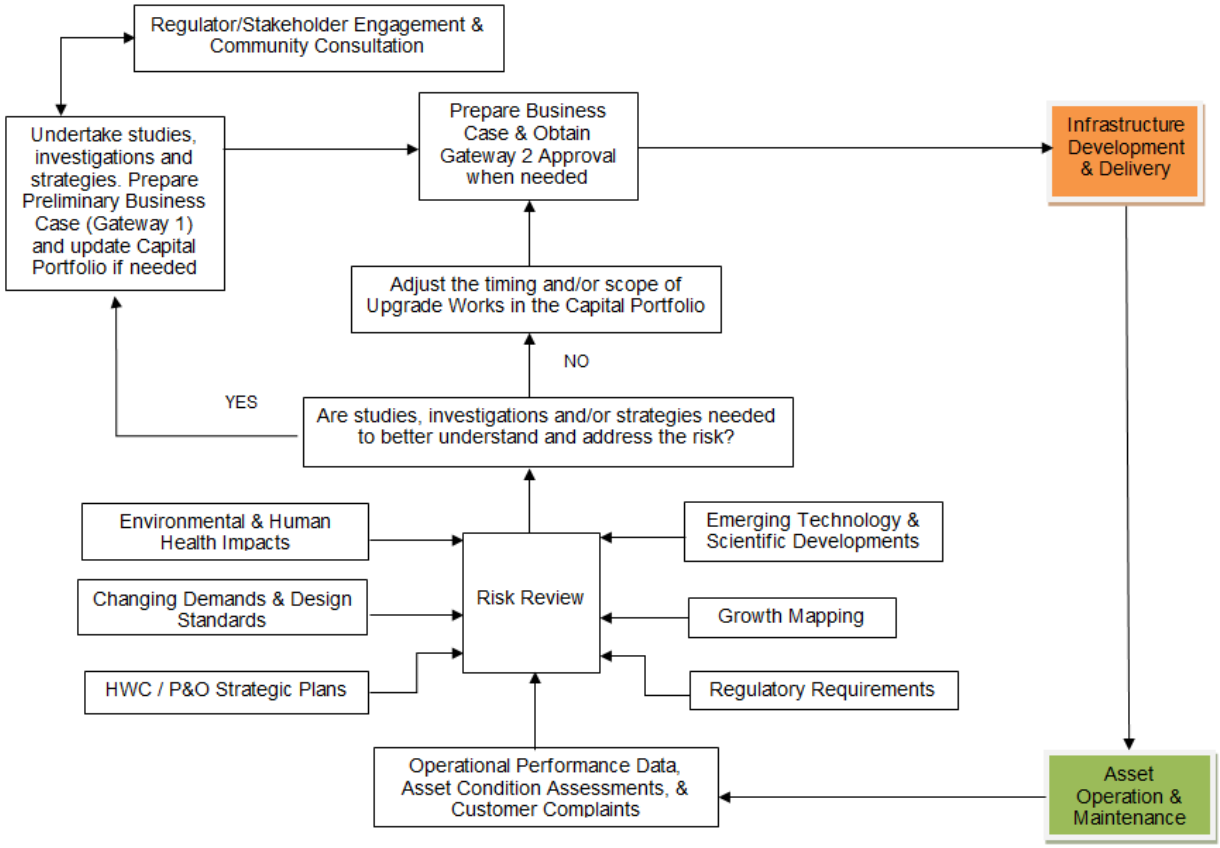


Figure 2.2 : Core planning processes

Source: Planning Group Overview, p.28

HW's investment processes are governed by the ISO 9001:2008 certified Asset Creation Framework (ACF). The system covers the four project stages, of initiation, development, delivery and completion, and aligns with the HW Gateway Approval Process shown in Figure 2.3. The ACF outlines how project managers deliver projects and applies to all water, wastewater, stormwater and recycled water infrastructure.

The Planning Group is responsible for capital investments through to Gate 2 approval. As shown in Figure 2.3, Gate 1 and Gate 2 approvals are required from the Expenditure Review Committee (ERC). The ERC reviews each specific expenditure request for approval.

Since its establishment, in September 2012, the ERC has made decisions on over 528 submissions. The ERC regularly challenges key areas, such as the award of tender to other than the lowest price tenderer and the use of a procurement process other than open tender. If the ERC finds that there is not enough information or justification for a decision, the submission is rejected, pending the provision of additional information.

As part of the development of a business case, HW conducts economic appraisals in line with the Capital Projects Economic Appraisal guideline. For each project option, HW considers the direct financial impacts on HW, non-financial costs and benefits to HW, and costs and benefits incurred by external parties. The tool used to evaluate project options depends on the project. In general, cost-benefit analysis is used primarily for financial investment decisions concerning efficiency or discretionary spending, and cost-effectiveness analysis is used for projects where benefits provided by each option are similar and difficult to measure. Multi-criteria analysis is used to aid in decision making for non-financial costs and benefits. HW also conducts sensitivity analysis to evaluate the impact of various changes to input parameters on each option.

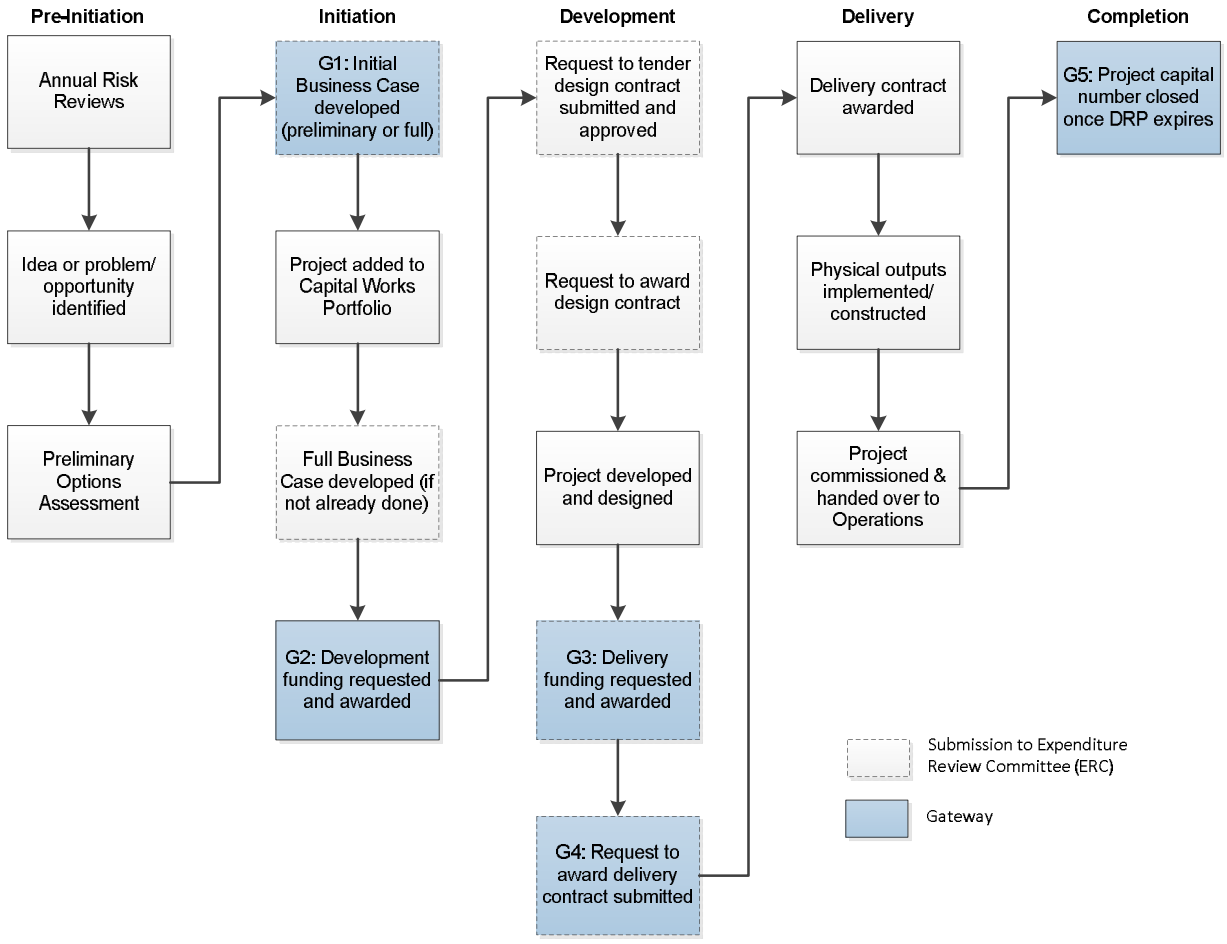


Figure 2.3 : Gateway Process

Source: Hunter Water

In the documentation reviewed, HW advises that the Planning Group maintain 1 year, 5 year, 10 year, and 20 year capital portfolio. These portfolios are updated annually and provided to the Planning Review Committee for review. The 5-year and 10-year plans support various reporting requirements such as inclusion in the annual Statement of Corporate Intent.

HW's capital planning processes are well designed and sufficiently detailed given the size of HW's workforce, its annual capex, and its status as a government owned corporation. Connectivity and visibility is maintained between the corporate strategy and the planning and approvals processes, and suitable reviews are provided.

The planning approach described provides a good basis for efficient capital investment while remaining flexible and allowing HW to adapt to future circumstances. From the documentation viewed, we consider that sufficient reviews and approval processes are in place at a portfolio and project level to drive efficiency. The cost estimation processes in place are, in the main, effective, and are ensuring that there is minimal variation in actual spending relative to the planned funding requirement.

We have some concerns over the selection of the preferred option at early stages of project development; where we have observed examples of weighting given to project options not exhibiting the lowest NPV of the options reviewed, and we address this in Section 2.2.7 below.

We consider that there may be merit in HW updating the Planning Group Overview to include a description of how decisions are made within that group and how unresolved issues are addressed.

2.2.4 Capital development and delivery

The capital development and delivery team take over from the Planning Group after Gate 2 approval in Figure 2.3. Supporting this program are the project delivery teams, each with a program controller, project managers and construction inspectors, managing the design and construction process for each assigned program of works. Four delivery teams are responsible for the delivery of regulatory price path provisions, treatment plants, networks and major projects. A project controls group, environmental and safety representatives and financial accounting support and project communications representatives support the work of these groups.

2.2.5 Whole of lifecycle planning

Whole of lifecycle planning considers the lifetime cost of the project, both capex and opex. The purpose is to identify project options that are lowest cost over the full life. It also drives replacement of economically expired assets, or the deferral of replacement of assets that have reached the end of asset class lives but are still in operable condition (i.e. have not reached the end of their economic lives).

Asset lifecycle management includes the development of processes detailing the management of assets through their lifecycle, including planning, creation, operation, maintenance and renewal. These processes are defined and developed by the functional groups responsible for each activity. Asset lifecycle management details HW's performance objectives, methodology, and implementation for the key asset management processes that ensure the lowest lifecycle service cost requirements.

Asset planning commences with identifying the need for an asset based on regulatory and operating requirements. Projects identified as most appropriate to meet the needs progress through Gate 2 approvals to the delivery phase and are placed in the capital investment program. Commissioned assets are then operated and maintained to meet the required levels of service. Assets are renewed or disposed at an optimum time determined by the operational risk. The asset lifecycle process loop is shown in Figure 2.4.

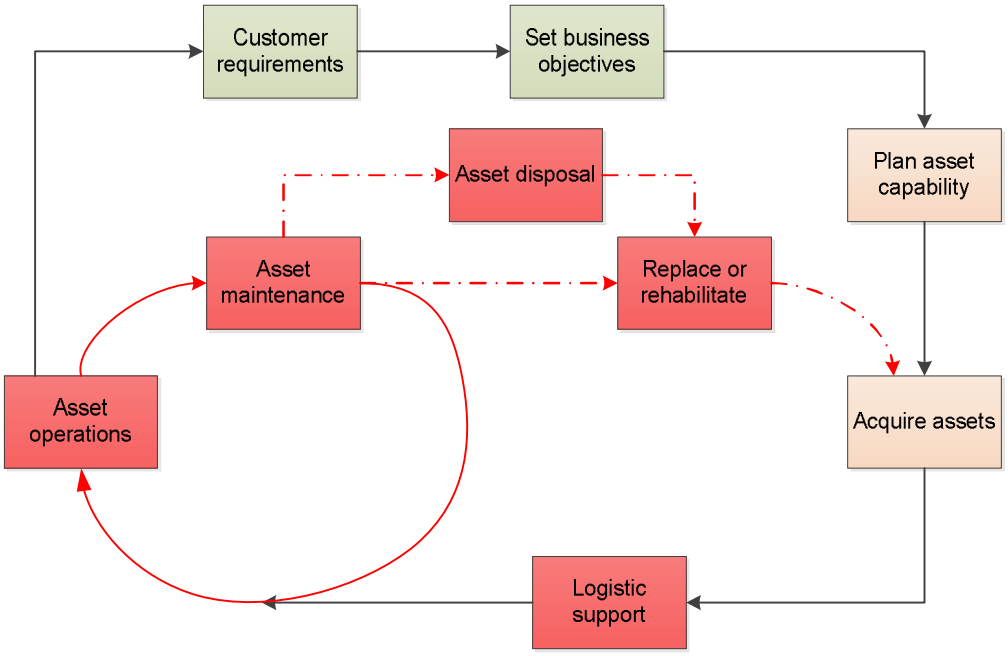


Figure 2.4 : Asset lifecycle process loop

Source: Hunter Water

Business support services support all asset lifecycle functions through corporate processes, data and information systems. These services meet the HW business objectives by considering the range of economic, social, and environmental lifecycle costs.

2.2.6 Capital project works identification business case development

HW adopts IPART's Price Path Provision (PPP) for renewals not large enough to require an individual business case as a separately managed project (e.g. for renewal programmes and or minor works renewals), or are reactive in nature and so cannot be identified prior to its IPART price path submission. The PPP program is a four-year rolling program of works. PPP budgets are developed through reviews of historical performance and expenditure, and forecasting future asset failure performance and renewals.

Asset Management and other relevant stakeholders determine where expenditure is required, and produce a program of provisions for the price path period. A business case must be developed for all new or varied provisions and submitted to the ERC for approval, aligning with the capital gateway approval process. Business cases are reviewed annually by Asset Management and relevant stakeholders for the provision.

2.2.6.1 Asset replacement/refurbishment expenditure

HW advised that it was migrating to a risk and condition based approach to asset replacement/refurbishment expenditure planning but that this was currently an aspiration. In IPART's consultant's report for the 2012 price review, Atkins Cardno noted that HW utilised an asset condition decay curve to determine whether an asset could exceed its standards asset class life or whether replacement needed to be brought forward. We consider such an approach to be in keeping with good practice. However, we have not sighted such a process and, from our discussion with HW staff, we understand that this process is not yet in place.

As such we recommend that HW accelerates its migration to condition and risk based approach to asset replacement/refurbishment planning. In such a process, asset condition is compared with the condition the asset condition decay curve predicts for the current age of the asset. If the asset condition is superior to what the curve predicts, an algorithm determines an extended asset life, thus deferring expenditure. If the condition is inferior, then the algorithm projects a replacement date earlier than the standard asset class life, thus bringing forward replacement. HW then overlay a risk assessment, which uses likelihood and consequence of failure to develop a risk rating.

For those assets achieving a high or medium risk rating, then the condition score at which an asset is replaced is lower than the condition score provided to assets that have failed or are beyond their economic life.

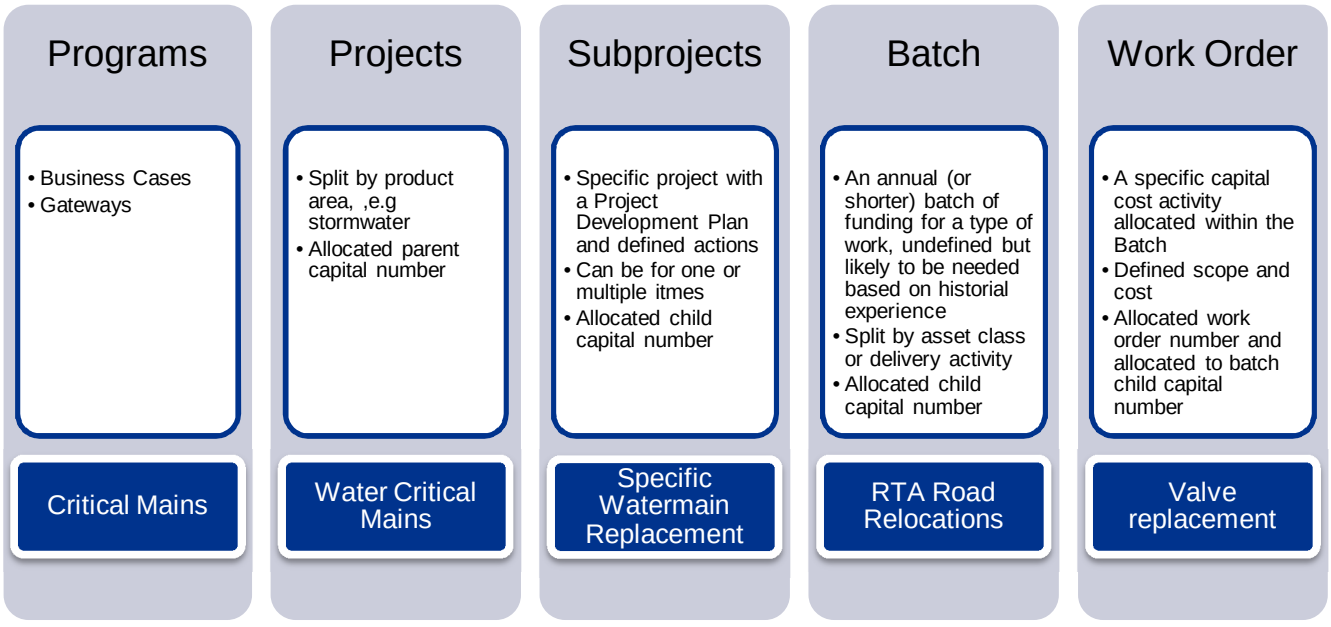


Figure 2.5 : Price Path Provision structure with examples

Source: Hunter Water

The approval process varies with the structure category the funding falls under as well as the value of the funding item (Figure 2.5). Provision programs are submitted to the ERC/Board for funding approval consistent with the gateway approval process for capital works projects. Variations within a program must be approved by the relevant authority. Asset Management tracks and monitors expenditure on a monthly basis and reports to the Provision Steering Committee. The committee meets on a two-monthly basis to critically assess PPPs, ensure financial compliance and approve Provision business cases.

During 2014-15 HW reported high compliance with internal governance processes, and that challenge processes continue to result in high quality business cases.

2.2.7 Cost Estimation

The Capital Project Estimating Guidelines were introduced in 2009 to improve the accuracy of estimated costs for capital projects and are reviewed and updated annually. The performance objectives outlined in the 2015 version of the guideline are as follows:

- Estimates at Gateway 2 to vary from final capital project costs by less than 25%
- At a portfolio level, a 50/50 split of estimates at Gateway 2 below and above the capital project costs is to be achieved
- Estimates at Gateway 4 to vary from final capital costs by less than 10%
- At a portfolio level, a 90/10 split of estimates at Gateway 4 below and above final capital project costs

In the early stages of a project, costs are estimated using a unit rate and/or loading factor based on previous projects. HW has developed a cost estimation tool to assist with this process. The tool produces an estimate of the project capital cost using a bottom-up estimate of individual line items for each asset.

In design stages of the project, costs are estimated using first principles by developing a detailed work breakdown structure for the project.

An external expert estimator is generally required to assist with this process as it requires knowledge of current market conditions. We consider this process to be in keeping with good water industry practice.

Contingency estimates are developed at each stage of the project and are calculated using a percentage basis or probabilistic estimating. At the early stages of a project a control estimate is determined by increasing the development, delivery and HW costs by a percentage. A strategic contingency estimating tool is used to calculate a recommended contingency for preliminary business case and options estimates, based on a series of questions relating to the project definition and complexity.

Cost estimates are prepared, reviewed and approved throughout the life of a project, in alignment with the gateway approval process. The project manager is responsible for the cost estimates, and must seek peer review from an independent reviewer, independent to the project and possibly external to HW.

During 2015 there were 12 variations to capital infrastructure projects approved, at a total net variation of $0.5m or 1.7% below the total authorised budgets. The largest single variation driver was the competitive market conditions, allowing HW to save $1.22m in funding. With this driver excluded, the net variation becomes 2.8% above total authorised budgets. Over the last five years net variations have been within plus or minus 4%.

Atkins Cardno reviewed version 2.3 of the Guidelines as part of their December 2012 review. We have not reviewed that version but can see that the business case estimate (Gateway 2 on the Gateway Approval Process) in version 2.3 of the Guidelines was 25% - 30%[2]. HW has revised the Guidelines since that time with version 4 (February 2015) being current. HW has reduced its business case estimate contingency to 15-25%[3] in version 4 of the Guidelines.

[2] Ibid, Table 5-1, p. 73
[3] HW Capital Project Estimating Guidelines V4, table 4.2, p.19

Atkins Cardno further reported that version 2.3 of the Estimating Guidelines used 10-15% as its contingency at the pre-tender stage (Gateway 3 on the Gateway Approval Process). HW has advised that it is targeting a variance of less than 10%[4] between Gateway 4 estimates and final capital project costs in version 4 of the Guidelines.

We also note from our review of the sample capital projects that HW occasionally selects the project with a higher NPV or capital cost at the early planning stages. We understand that in some cases these include high profile projects that require public announcements as to cost, or commitment to regulators that a service level with be achieved. In such a case, the most achievable and understood option may be chosen. At the business case stage, which includes a detailed options analysis, it is rare that a higher cost option will be chosen.

If this risk adverse approach is consistently applied (i.e. if the highest cost option is always adopted during the initial stages with a lower cost option adopted at later stages of option review and selection) this will result in the overall program costs being over estimated. We consider that there should be consistency in the decision criteria and in the application of these criteria at all stages of the planning process. We note that the capital project estimating guidelines provide for a P50 equivalent estimate at the business case stage, which is in addition to the governance provided by the ERC at the business case stage. HW has advised that it considers that this reduces the likelihood that overall program costs will be overestimated. However, we consider that the cost estimate and project option selection form two different parts of the efficiency test. If an inappropriately high cost option is chosen at the early stage of option selection, then a subsequent focus on cost estimating will not address the fact that, potentially, an inefficient option has been selected.

2.2.8 Value management

Value management (VM) studies are conducted on all projects with an expected total capital cost greater than $0.3m. A VM study is conducted at the options and concept design stages of the project, and is also conducted at the detailed design stage for projects with an expected total capital cost greater than $0.3m. The aim of VM studies is to increase the project value by identifying areas where costs can be reduced at little or no impact to performance objectives, or where function can be improved at little or no additional cost. Projects can also be deferred or scaled back to achieve higher value.

VM studies involve a workshop with a value team comprised of project members as well as members independent of the project. The value team develops a long list of options to achieve project objectives; these options are then screened based on their feasibility and potential to achieve project objectives. At the conclusion of the VM workshop a report is produced with recommended actions to be undertaken prior to the finalisation of the business case. These actions generally involve options/ideas to be further developed and evaluated for possible inclusion in the business case.

2.2.9 Procurement

HW has a centralised procurement group to ensure procurement activities are efficient and competitive. The majority of projects are tendered by the existing panels for engineering services, pipeline construction, and pumping station and treatment plant construction. HW intends for approximately 90% of works to be competitively tendered by the construction contractor panels, with the remainder tendered through alternate methods such as open tender and select tender for specialised construction works. All design and engineering works are competitively tendered by the engineering services panel.

Procurement processes are reviewed by the ERC, in alignment with the gateway processes. The ERC is tasked with driving efficiencies and ensuring that the proposed procurement process for a particular project is well-positioned to deliver the best outcome for HW and the relevant stakeholders.

Until 30 June 2014, operations of HW's treatment plants were contracted to the wholly owned subsidiary of HW Australia (HWA). While this arrangement was cost-effective, the treatment plants have not been fully compliant with license requirements for some years. HW identified the interface between HWA as the treatment operations provider and HW as the mechanical and electrical maintenance provider to be a prominent factor in these

[4] Ibid, p.4

compliance failures. As the contract with HWA was expiring, there was opportunity to competitively market test the contract to achieve the most cost-effective outcome, and to reconsider the scope of the services contracted to HWA, to improve the interface between the operations and maintenance of the treatment plants.

HW utilised an Objectives-based Procurement Assessment (OBPA) process to develop and assess critical success factors for the implementation of the future treatment plant operations. HW considered a range of contracting models, and found that the contract form most likely to deliver a successful outcome based on the identified critical success factors was a long-term service contract. Following a 12-month competitive tender process overseen by independent procurement specialists, the contract was awarded to Veolia Water and represents a saving to HW of $23 million over ten years.

A 5 year whole of portfolio procurement strategy is described in Atkins Cardno's December 2012 report as being "substantially updated each year". HW has advised that the procurement strategy is updated annually[5].

We note that HW has a propensity to make use of panel contracts for much of their procurement needs. We consider this to be in keeping with good practice as it reduces procurement costs in that bidders under the panel don't need to go through an expression of interest stage i.e. capability demonstration process as this will have occurred prior to their appointment to the panel.

2.2.10 Conclusion

The long-term capital investment strategy promotes efficiency through the focus on key capital drivers, strategic priorities, and measures of performance. The strategy is supported by effective processes for the identification, assessment (including whole of life cycle assessment), and capex/opex trade-offs (with a caveat described in Section 2.3.3), approval, and delivery of capital projects. Subject to the limitations on the review of capex/opex trade-offs discussed in these processes, the processes demonstrate good industry practice and are likely to result in prudent and efficient investment decisions.

2.3 Investment drivers (1b)

IPART classifies investment drivers for HW as follows:

- Growth – new customers or increased requirements
- Mandatory standards – both existing and cost of compliance for new standards
- Business efficiency – to drive opex savings
- Asset and service reliability – increase reliability
- Discretionary standards – spending for which the decisions are under HW control and for discretionary purposes
- Government programs – driven by Government requirements

The planning group monitors identified investment drivers and regularly reviews and updates projects in the capital works portfolio to ensure HW responds to changes in parameters. HW operates and upgrades its existing assets to ensure adequate capacity is available to service growing demand for services, while complying with customer and environmental regulatory standards. The planning group develops strategies and adjusts the staging and timing of proposed upgrade works depending on the operational performance of assets, the rate of actual new connections, growth projections and the risk position taken by HW with regards to regulatory compliance.

HW has advised that *"IPART's investment drivers are defined in the definition section of the AIR/SIR. Hunter Water adopts these drivers in the gateway 1 process and these are reviewed at the business case stage. A guideline was developed in 2011 to assist project managers and business case owners in assigning the project*

[5] Submission to IPART

to the correct drivers. The portfolio office reviews the assignment of drivers to assist in consistency of application". However, we have not sighted the guideline mentioned and hence cannot comment further on this.

In the following sections we expand on four of the six capital drivers and provide comments on the reasonableness of the processes and input assumptions used to determine the requirements for each of those drivers. We do not review process or input assumptions for discretionary capex or government program capex in this section as there was insufficient information for that review.

This section does not review the reasonableness of the final budget for the capital drivers. In the capex section of this report we review and comment on the reasonableness of the capital budgets.

2.3.1 Mandatory standards

It is often the case that more than one driver will be associated with major projects. Capital allocated to meeting mandatory standards makes up approximately 44% of the $1 billion capital expenditure plan through 2026 and 57% of the capital plan for 2017. In larger projects related to mandatory standards, a portion of the project capital may also be allocated to growth or asset service and reliability.

Environment

As part of HW's operational license, HW maintains an Environmental Management System (EMS) to provide a framework for developing, implementing, monitoring and reviewing HW's objectives, actions and targets relating to its commitment to the community and environment. An extensive program of works was undertaken in 2014 to enhance HW's EMS and embed new procedures and processes into operational activities. Det Norske Veritas and Germanischer Lloyd (DNVGL) carried out a certification audit of the EMS in 2014 and identified six minor non-conformances. These mainly related to improving evidence of employee training and competence to perform key processes and further implementation of the environmental risk process. HW took action to correct these issues, and closed out the non-conformances in November 2014.

DNVGL also conducted an integrated safety and environmental surveillance audit in December 2014. The audit identified two minor non-compliance issues relating to incident management and environmental records. HW has not advised if actions have been taken to correct these issues. DVNGL will continue to undertake integrated surveillance audits every six months through 2015-17.

HW holds wastewater Environment Protection Licenses (EPLs) issued by the Environment Protection Authority (EPA). These EPLs impose requirements on HW to manage environmental and public health drivers. As part of the process of developing the EPLs with the EPA, HW prepared Upgrade Management Plans for the wastewater network for each catchment to assess the impacts from wastewater overflows and to define long-term overflow containment objectives. These long-term objectives generally focus on minimising the risk of dry-weather overflows due to insufficient capacity and/or asset failure, and reducing the average frequency and volume of wet weather overflows.

The wastewater planning team undertakes annual risk reviews to assess compliance against environmental and planning regulatory requirements. The reviews focus on identifying risks arising from performance requirements, changes in regulatory standards and growth. Day-to-day operational risks and abnormal plant failures are not included in this review. Following the review, upgrade strategies for the wastewater network are developed. Together with the asset management group, the wastewater planning team looks for opportunities to integrate proposed capital solutions with existing asset management strategies. There are a number of potential solutions that can be considered to reduce risk, including:

- Flow reduction through inflow/infiltration management
- Operational optimisation
- Augmentation of conveyance capacity
- Peak flow attenuation through detention storage
- Dedicated wet weather systems

- The use of alternative systems such as pressure sewer
- The use of emergency relief structures to provide a controlled overflow location

Effluent management strategies and treatment plant upgrade strategies are developed based on the findings of the risk review to ensure there is capacity to cater for growth and meet regulatory requirements. Studies are undertaken to evaluate the ability of the receiving waters to assimilate pollution in the effluent discharged from the treatment plants. If the studies find that the impact on the environment is unacceptable, HW assesses and evaluates alternative long-term effluent management options using cost and non-cost criteria aligning with the value management process. Management options considered typically include:

- Effluent reuse – including agricultural, municipal, industrial or residential reuse
- Nutrient trading – offsetting point source nutrients from wastewater treatment works through broader catchment improvement programs
- Improved treatment and continuing to discharge effluent to the receiving environment
- Sewer mining opportunities – removing wastewater flows from the wastewater transport system, instead treating and reusing the wastewater locally
- Diversion of wastewater treatment work flows to other catchments

Effects Based Assessment (EBA) is a science-based approach to assess the real impacts of wet weather wastewater overflows on the environment, including ecological and public amenity impacts. This allows future works to be prioritised to better target areas where investment is most needed. The EBA process is becoming best practice management across many countries and in Australia is in use by Sydney Water. HW is proposing to trial the EBA process in Lake Macquarie and has developed a framework to guide the use of the process.

License requirements

The water planning team is responsible for the planning of the drinking water supply system to ensure HW has the capacity and capability to provide safe drinking water to service growing demand in accordance with regulatory and legislative requirements. HW's operating license imposes limits on the frequency of low water pressure events and sustained water supply interruptions.

Water quality and recycled water must also be managed as part of a Drinking Water Quality Management System and Recycled Water Quality Management System. Water quality is assessed using the Australian Drinking Water Guidelines 2011. The management system provides guiding principles for protecting against pathogenic microorganism risk, and specifies health-based and aesthetic criteria. Preventative measures are in place at all steps in the drinking water system, to ensure that consistently safe drinking water is supplied.

HW extracts water from sources within three Water Sharing Plan (WSP) areas. The WSPs specify HW's volumetric entitlements to water, as well as rules with which the holder of each category of license must comply.

The Lower HW Plan (LHWP), released in April 2014, includes measures to supply, save and substitute water including measures to respond to severe droughts. HW is responsible for operational activities under the LHWP, including:

- Temporary desalination readiness investigations
- Finalising a strategy and business case for the implementation of upgrade works in the water network to allow increased transfer flow from the central coast in drought periods
- Investigation of a potential alluvial groundwater source at Morpeth that could be accessed in the event of a drought
- Developing an improved model for transfers with the central coast, and investigating options to optimise water transfers with a view to enhance the existing transfer agreement
- Implementing new environmental flow rules for Chichester dam and Seaham weir

- Finalising a strategy and business case for implementation of recycled water dual reticulation at Chisholm and Gillieston heights

Average annual water demands are forecast using the integrated supply-demand planning (iSDP) model released by the National Water Commission in 2011. The iSDP model assesses the water efficiency for uses in the home such as showering, toilet flushing and clothes washing. The impacts of improved water efficiency in the residential sector can then be predicted. HW developed its own local parameters and assumptions for the iSDP model and finalised a working model in 2012.

The water planning team undertakes annual risk reviews of HW's water network and resources, to assess risks to meeting compliance with HW's operating license. The review also assesses performance criteria for reservoir performance, pressure and firefighting flows. The capacity and performance of the water network is assessed under various demand conditions using hydraulic computer models. Water pressure must keep within the non-compliance limit set out in the operating license, and sufficient water must be provided in tanks and reservoirs during both normal and emergency conditions to ensure the discontinuity non-compliance limit is not reached.

Upgrade strategies are developed for the water networks to account for customer growth and to meet regulatory requirements. Together with the asset management group, the water planning team looks for opportunities to integrate proposed capital solutions with existing asset management strategies.

To manage the long term protection of drinking water catchments, HW developed a Catchment Improvement Plan 2013-2017 (CIP). Actions being implemented in the CIP include stabilising river banks on HW land and reducing dairy farm runoff. HW is currently on track to implement the required actions in the CIP to reduce water quality risks through:

- Flow reduction through inflow/infiltration management
- Operational optimisation
- Augmentation of conveyance capacity
- Peak flow attenuation through detention storage
- Dedicated wet weather systems
- The use of alternative systems such as pressure sewer
- The use of emergency relief structures to provide a controlled overflow location

HW has developed processes to ensure continued compliance to mandatory requirements in areas including the planning requirement for meeting new or revised requirements. When properly applied, these systems will provide well-considered projects that will efficiently support the mandatory requirements. However, we have some concerns with respect to the mapping, by HW of internal business drivers to regulatory driver and recommend that a formalised and documented mapping process be implemented to ensure capital projects are appropriately supported by regulatory drivers.

2.3.2 Growth

Underlying population growth is the major input to growth capital requirements and accurate forecast of population growth by area is the key to accurate growth related capital expenditure forecast. HW uses an Integrated Supply-Demand Planning (iSDP) model. The Institute for Sustainable Futures[6] recently reviewed HW use of the model and confirmed that the model is being successfully applied.[7]

Along with the iSDP model, HW provides growth mapping to regionalise the forecasts with the latest version being completed in 2014. The growth mapping comprises:

- Liaison with each local council for updates of each development area

[6] The Institute for Sustainable Futures (ISF) is a university research institute that creates change towards sustainable futures by conducting independent project based research for Australian and international clients.
[7] *Review of HW Corporation's Operating and Capital Expenditure*, 2012, Atkins/Cardno, p 68

- Review of developer servicing strategies received of the last year to refine the size and timing of new connection including those from private water utilities
- Review of Section 50 development applications
- Update of spatial layer in ArcGIS to include new development areas
- Update of future development timing[8]

If the growth mapping identifies regional capacity constraints in the existing network, the planning support team undertakes a risk assessment and constructs recommendations for an appropriate response. Recommendations may include adjustments to the timing of future upgrade works, development of a business case to proceed with upgrade works, or limits on development connections until upgrade works are completed.

Growth projects have been driven by average increases in residential connection since 1988 and average population growth over the past 25 to 30 years of 1-1.12% per annum. HW considers the average increase in residential connection since 1998 as an input into its growth mapping model to predict future growth for each HW catchment or sub-catchment. We consider this approach to be reasonable for long term planning purposes. Short term planning will often be driven by 'hot spots' of localised growth.

Figure 2.6 show historical and projected growth in number of dwellings and population in the HW service area.

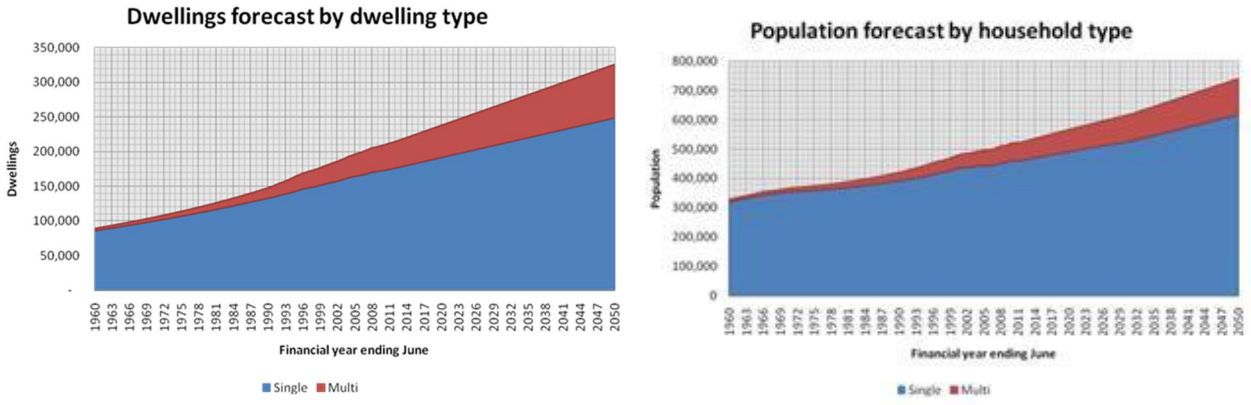


Figure 2.6 : Population and dwelling number growth forecasts

Source: Hunter Water

Demand growth drives one-third of the forecast 10-year capital budget to 2026 and 27% ($30.2m) of the 2017 budget.

The use of Integrated Supply-Demand Planning model represents good industry practices in forecasting growth in water services. The HW approach to growth mapping as described in the supplied documentation is both thorough and current for the review. HW suitably considers and tests the input assumptions for growth projection through the regular reviews of actual growth versus projected growth.

2.3.3 Business efficiency

Business efficiency capex projects are somewhat different than capex in response to growth or mandatory requirements in that these are primarily triggered from internal requirements of HW. Opportunities for business efficiency gains through capital works are in the pre-initiation phase of the Gateway process show in Figure 2.3 in Section 2.2.3.

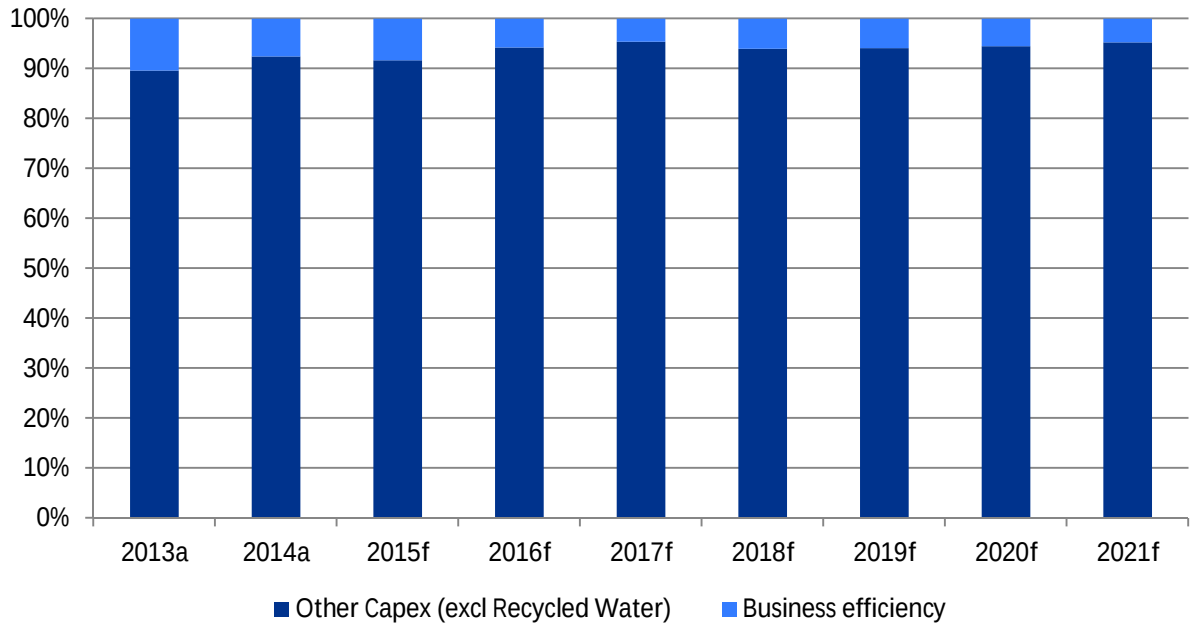
[8] Planning Review Committee Paper, 29 October 2014

It is a requirement of the gateway process that HW reviews options including higher capital cost variation with the potential to reduce long-term O&M costs to a value greater than the additional capital cost. The Gateway process and the core planning process (Figure 2.3 and Figure 2.2 in Section 2.2.3 respectively) establish the requirement on HW to investigate these options for projects identified, based on other capital drivers such as growth projections. We have not seen evidence of a process that looks for these opportunities absent some other driver.

For instance, if a motor needs replacing due to age, the selection process may consider a more expensive motor with a higher efficiency or more flexible operating range as these features may save operating and/or maintenance costs. In this case, the capital cost of the replacement above the lower cost option will be allocated to business efficiency. However, there may be instances where a capital spend can be made on an item that will not be discovered, based on a review of other drivers such as application of new technology. It is not clear from the material reviewed how such opportunities are identified.

For the period from 2013 to 2020, business efficiency capital declines generally from 8-10% of total capital cost in early years, to 5-6% of total capital costs in later years show in Figure 2.7.

Figure 2.7 : Business efficiency as a percentage of capex (financial years)



The planning and approvals processes are reasonable for identifying business efficiency opportunities for projects identified through other drivers. However, these processes may miss business efficiency opportunities not identified through the analysis of other capital drivers. HW should consider a separate process for the identification of business efficiency opportunities as part of the planning process.

2.3.4 Asset and service reliability

Capex requirements related to asset and services reliability are derived primarily through the asset management systems. Section 2.5 includes discussion of these systems and conclusions about their suitability.

HW has developed processes to ensure continued compliance to mandatory requirements in areas including the planning requirement for meeting new or revised requirements. When properly applied, these systems will provide well-considered projects that will efficiently support the mandatory

requirements.

2.4 Five-year program (1c)

2.4.1 Relationship to long-term program

Section 2.2.3 provides background a description of how the capex program is developed. The approach is integrated in that the long-term plan is an extension of the near term plan rather than the product of a separate process. The Gateway process updates the capital works portfolio with newly identified capital works projects.

The planning system provides consistency between the 5-year and 10-year capex programme. However, alignment between one year capital plans and longer term plans is less robust than that between the longer term plans.

2.4.2 Capex/Opex trade-offs

We have not reviewed any process that evaluates business efficiency except in relation to projects identified based on other drivers. Section 2.3.3 includes a discussion on this point. It is not clear, based on the material reviewed, that the opex/capex trade-off is re-evaluated as part of the full business case development prior to Gateway 2 approval. We have not seen a consistent approach to analysing capex-opex trade-off options. HW has advised, however, that it adopts a life cycle least-cost approach to project option selection which should include capex-opex trade-offs.

2.5 Service and performance

2.5.1 Asset management

HW's Enterprise Asset Management Framework document sets out HW's asset management strategy. The strategy incorporates service management, asset lifecycle management and business support services. The outcomes from these three processes are asset class/facility asset management plans to compile the asset management program.

Service management covers the development of planning strategies to provide the required level of service while minimising cost and risk. These strategies define the performance requirements of existing and future assets including capacity, reliability and quality. The development of the optimal level of service is a risk-based process involving the development of preliminary standards, analysis of existing asset performance and standard capability, identification of additional works to meet varied standard requirements, customer acceptance and finalisation of service standards.

Under HW's operating licence, it is required to maintain an asset management system consistent with one of the following:

- CSI PAS 55:2008 (PAS 55) Asset Management standard
- Water Services Association of Australia's Aquamark benchmarking tool
- Another asset management standard agreed to be IPART.

In 2012 HW demonstrated its compliance with this requirement by participation in an International Water Association (IWA) – Water Services Association of Australia (WSAA) asset management performance improvement project with other water utilities. The project uses WSAA's Aquamark benchmarking tool to provide independent assurance that asset management practices are of an appropriate quality, and assists with identifying possible areas of improvement. HW was found to be at a generally mature level in asset management relative to the overall participant group, with room to improve in some areas. Five recommendations for priority improvement initiative areas were made, including:

- People and capability
- Project business case challenging
- Maintenance management
- Critical asset operation/resilience
- Operations and maintenance procedures.

Whilst we note that HW has met its licence obligation by participating in the WSAA Aquamark benchmarking process, we do not consider that this necessarily demonstrates current good industry practice in asset management. We also consider that there will be merit in IPART requiring adherence to or alignment with a recognised international standard for asset management, as opposed to an industry body driven process that may not align to regulatory requirements.

It is understood that HW intends to implement the ISO 55000 standard with an implementation date for ISO 55000 being 1 July 2017. A gap analysis has been completed to support the development of a detailed and targeted implementation plan. HW aims to create an asset management system that meets the objectives of customer service and asset compliance while balancing affordability and financial sustainability. The recommendations from the Aquamark process are expected to be fully implemented by July 2016. A new Aquamark benchmarking exercise will occur in 2016, and will aid HW in identifying areas where improvement is still required.

HW plans to achieve ISO 55000 certification to demonstrate overall good business practices. We consider that achieving such certification, or at least achieving alignment with the ISO 55000 standards[9] and related standards, will assist in overcoming the deficiencies noted above. However, it may not be essential and cost effective to achieve certification. Achieving alignment to ISO 55000 may be sufficient to meet business needs.

2.5.2 Asset information systems

HW utilises several asset management information systems to collate and manage data. HW has implemented an Integrated Quality Management System (IQMS) certified to ISO 9001 in August 2015, indicating it complies with the requirements of the International Quality Management Standard. The IQMS unifies the three certified systems of Work Health and Safety, Environment and Quality. HW's new asset management system will be integrated with the IQMS project, to ensure consistency of management systems across the company.

HW's Enterprise Resource Planning (ERP) software, Ellipse, was upgraded in 2014-15. As part of this upgrade, asset information processes and associated documentation have been improved. All maintenance activities are now included in the ERP system. The ERP system also incorporates data standardisation and the development of a GIS interface. The upgrade of the ERP system has improved links between asset and maintenance information and financial records, supporting enhanced asset renewal management based on the value of the asset and nominal/forecast remaining life.

In the 2012 Aquamark review the lack of such links between asset management systems was identified as a weakness in HW's asset management program, and this upgrade represents an improvement in this area.

HW began using a centralised operational control centre and maintenance dispatch function in 2015. The centralisation of these systems enables consistency in maintenance management processes. It also supports the implementation of appropriate work practices and improvement in maintenance reporting and analysis.

Operational and maintenance work practices have been progressively updated as part of the IQMS. Electrical safety, treatment plant operation protocols, environmental sampling procedures and Chichester Trunk Gravity Main (CTGM) and catchment inspection procedures have all been completed and are incorporated in the IQMS.

[9] ISO 55000 specifies the overview, concepts and terminology in Asset Management, ISO 55001 defines the requirements for a "management system" for Asset Management, and ISO 55002 provides interpretation and implementation guidance for such a management system.

2.5.3 Asset condition and performance

Asset condition is determined through asset reliability performance monitoring and specific condition assessments. Reliability performance reports are prepared on a monthly and annual basis, including measures such as unplanned interruptions, sewer overflows, customer complaints, main breaks, sewer blockages, sewer overflows and mechanical or electrical asset failure.

HW uses a risk-based approach to condition assessment in keeping with modern asset management practices.

HW has completed criticality assessments of water, wastewater and stormwater assets, except to the extent noted above in our recommendations. Assets that may incur a high or extreme consequence should they fail, are identified as critical, and are being proactively managed through the following programs:

- A statutory asset program was developed covering assets subject to statutory safety and environmental compliance obligations.
- Detailed asset risk profiling of asset classes began in 2014-15 and will be fully completed in 2016-17.
- Procedures have been implemented to manage operational change, including approval of asset maintenance and modifications, as well as asset failure, including contingency plans, incident management and incident investigations.
- An engineering change management system is being applied to automation and control systems and will be gradually rolled out across other critical asset groups and processes during 2015-16.
- The ongoing scheduled condition assessment program is developing condition monitoring, implementing preventive maintenance, undertaking asset failure analysis and developing business cases for critical asset improvements. Dams, treatment plants and electrical assets were the focus in 2014-15 and the program will be extended to pump stations and bore fields in 2015-16.

Asset renewals are included in Price Path Provisions (PPPs) and for critical assets are projected based on the forecast asset age profile determined through condition monitoring. For assets with a low consequence of failure, condition is monitored based on asset performance. These assets can be maintained as part of the Maintenance Lifecycle Asset Program, aiming to maintain assets to meet performance requirements at the lowest cost. The assets associated with the lowest risk profiles are typically operated until failure.

2.5.4 Levels of service

From 2012 to 2015 HW has achieved full compliance with standards for water pressure, water continuity and wastewater overflow, as set in the terms of HW's Operating License. An East-Coast Low event in April 2015 resulted in 4,920 properties experiencing a water supply outage longer than five hours, but HW still stayed within the limits set by its operating license. Other performance levels have been relatively consistent for the last few years and display HW's performance against its operating license requirements. The data shows that HW still has significant headroom against its performance targets, and that the reduced capex expenditure in recent years has not yet resulted in a negative impact to performance (refer Figure 2.8 and Figure 2.9 below).

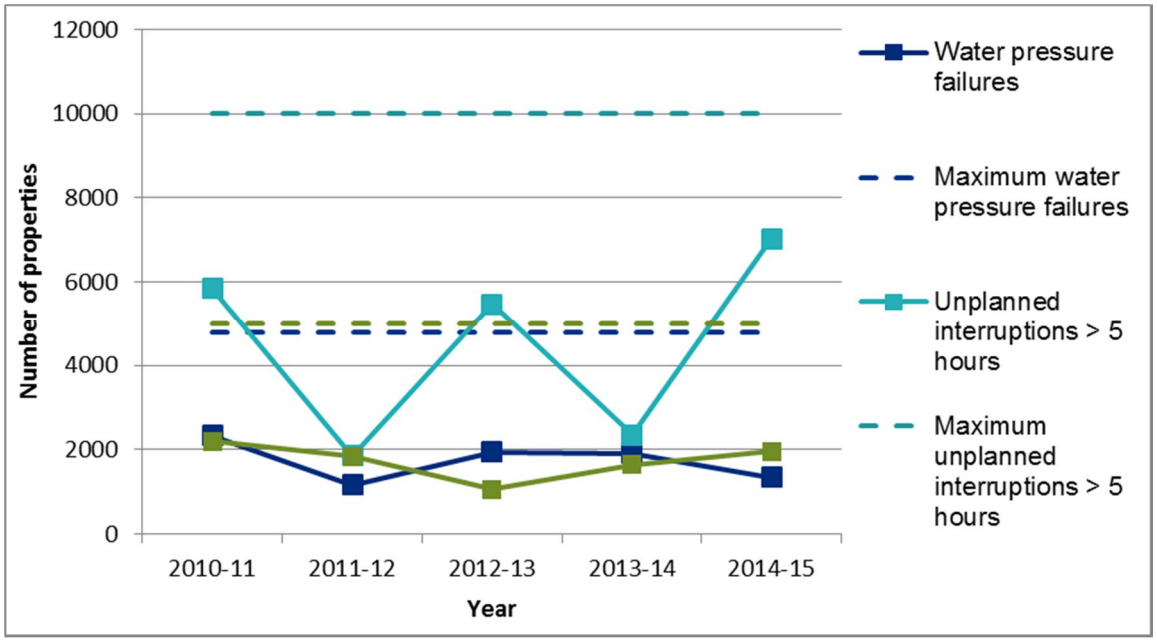


Figure 2.8 : Water system performance

Source: Hunter Water

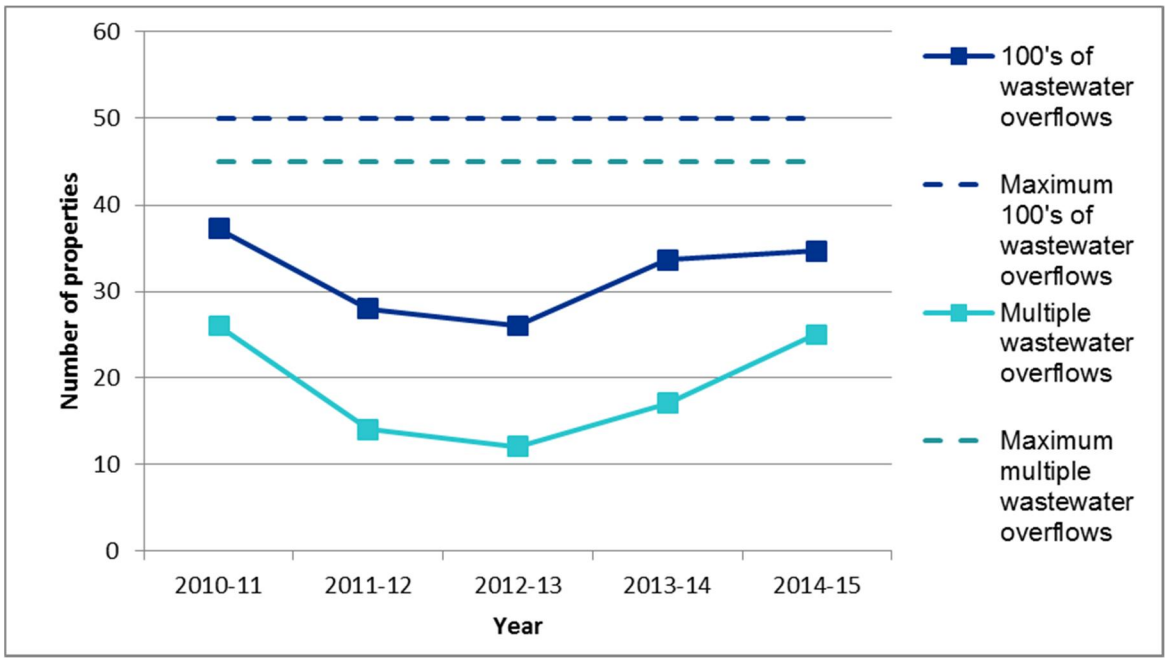


Figure 2.9 : Wastewater system performance

Source: Hunter Water

Systems linking asset management decisions with current and future levels of service and performance requirements are appropriate. As a general comment, whist we accept HW's compliance with the asset management requirements under the operating licence through its use of the Aquamark benchmarking tool, we do not consider that this confirms existence of a suitable asset management system and support work by HW to transition to the ISO 55000 standard.

Asset management plans have been requested for review but not provided and we note that the Atkins Cardno report from 2012 commented "…a number of the Asset Management Plans (including the Asset Management Policy) were still in a final draft stage and require finalisation"[10]. Further, the 2012 Aquamark results show that HW received "… the lowest scores in *process documentation* and *process effectiveness*."[11]

2.6 Risk management including failure and non-performance (1e)

2.6.1 Risk and mitigation

Corporate risks associated with the achievement of the Strategic Business Plan (SBP) are assessed by the General Management Team (GMT) on an annual basis. The Audit and Risk Committee (ARC) reviews and validates the applied process to ensure the outcomes align with the corporate aims and agreed strategic direction. Treatment plans are developed for identified risks with unacceptably high risk ratings and are embedded into the SBP to track completion of the plan. Selected key strategic risks are tracked and reviewed at each ARC meeting. The relevant risk owner contributes to the analysis of these risks and provides recommendations for any changes to risk status. Progress of the treatment action plans are checked every six months through the SBP actions and initiatives.

At a project level, the project manager is responsible for the development of the project risk profile, the quality of the risk data and the management of that risk. Project team members and contractors are expected to fully contribute to risk identification and management under the coordination of the project manager. Project Controllers are responsible for ensuring the Project Risk Management Framework is appropriately applied, and are also noted to be in a position to analyse risk information across projects to identify common issues.

Projects are categorised based on complexity, with each complexity category requiring different levels of risk analysis. At the beginning of each project phase, a risk review is conducted and stored in either Excel spreadsheets or Word documents. For high-complexity projects it is intended that the risk data is stored using the database software Methodware. However, as Deloitte noted in their audit of HW's risk framework, this is currently not being done. HW utilises a common Risk Breakdown Structure (RBS) to set out the areas of potential risk within a project and for each project the RBS is evaluated using a spreadsheet template. Table 2.1 lists the minimum risk management requirements for each complexity category.

[10] Review of Hunter Water Corporation's Operating and Capital Expenditure, December 2012, p. 41
[11] IWA-WSAA 2012 Asset Management Performance Improvement Project – Utility Report P. iv

Table 2.1 : Summary of minimum requirements for risk assessment, treatment and review

High complexity	Medium complexity	Low complexity
Risk identification, analysis and evaluation		
• Risk profile data stored in Methodware • Corporate risk breakdown structure used to categorise risks • Risk assessment workshop to be held at the commencement of each major project phase • Subject matter experts/TAG team/stakeholders actively consulted and involved • Professional/experienced facilitator used for workshop • Incident/Issues log and post completion reviews to be examined for related issues	• Storage of risk profile data in Methodware optional • Use of standard spreadsheet template for risk assessment required; file stored in TRIM • Corporate risk breakdown structure used to categorise risks • Risk assessment to be conducted/reviewed at the commencement of each major project phase • Risk assessment workshop optional • Subject matter experts/TAG team/stakeholders consulted where necessary • Incident/Issues log and post completion reviews to be examined for related issues	• Standard spreadsheet template used for risk profile • File stored in TRIM • Use of Methodware optional • Corporate risk breakdown structure used to categorise risks • Risk assessment to be conducted/reviewed at the commencement of each major project phase • Incident/Issues log and post completion reviews to be examined for related issues
Treatment actions		
• Treatment actions to be considered and agreed for extreme/high controlled risks • Responsible individuals to be assigned and target dates agreed • Treatments to be recorded in Methodware • Use of email alert functionality in Methodware optional	• Treatment actions to be considered and agreed for extreme/high controlled risks • Responsible individuals to be assigned and target dates agreed • Treatments to be recorded in spreadsheet (use of Methodware optional) • Use of email alert functionality in Methodware optional	• Treatment actions to be considered and agreed for extreme/high controlled risks • Responsible individuals to be assigned and target dates agreed • Treatments to be recorded in spreadsheet • Use of Methodware optional
Validation of results		
• Risk profile and treatment plan to be reviewed and validated by next level management	• Risk profile and treatment plan to be reviewed and validated by next level management	• Risk profile and treatment plan to be reviewed and validated by next level management
Monitoring and review		
• Risk profile to be included as standing agenda item for project team meetings • Changes to risks to be noted in Methodware • Treatment plans to be regularly reviewed for completion • Risk profile to be included in Gateway reviews, where specified	• Risk profile to be included as standing agenda item for project team meetings • Changes to risks to be noted in spreadsheet (use of Methodware optional) • Treatment plans to be regularly reviewed for completion • Risk profile to be included in Gateway reviews, where specified	• Risk profile to be included as standing agenda item for project team meetings • Changes to risks to be noted in spreadsheet/Methodware • Treatment plans to be regularly reviewed for completion • Risk profile to be included in Gateway reviews, where specified

Identified risks are treated where required, balancing the direct and indirect costs of additional treatment against the benefits while ensuring that the risk is adequately managed.

Each risk is assigned to a risk owner who is responsible for maintaining a complete understanding of the risk, regularly reviewing the risk status and stewardship of the treatment plan actions. The agenda for project meetings includes discussion of the risk profile as a standing item to ensure it is at the forefront of the project team's minds.

In response to Atkins Cardno's recommendation that further work was required to model the risk profiles of various asset classes, HW has advised that it is revising risk profiles for wastewater pump stations, water mains, wastewater rising mains and wastewater gravity mains. However, we have not sighted documentation supporting and detailing these revisions.

In March 2015 Deloitte undertook a maturity assessment of HW's risk management framework. Deloitte rated HW's risk intelligence maturity as 'Top-Down', finding that while HW has a functional risk management framework and is understood across the organisation to be important, HW also has room to improve in some key areas. The key deficiencies Deloitte identified are:

- There are no documented procedures for the aggregation of the risk drivers and ratings into a single strategic risk and residual risk rating.
- HW's application of its risk management framework is inconsistent across the organisation, and there are not adequate assurance processes to monitor the proper application of the risk assessment process
- A corporate risk management application exists at HW, but is no longer used. Deloitte recommended that the application be upgraded to allow HW to adequately aggregate and report on risk data.

HW has developed action plans to develop and implements responses to Deloitte's findings in line with the recommendations from the report. HW aims to reach a 'Systematic' maturity state in 2017, and has set timelines for the implementation of actions to improve their risk management framework.

Risk and mitigation documentation is an area for improvement.

We consider the action plans HW has put forward to be sensible, and the plans should greatly improve the intelligence of risk management across the organisation.

2.7 Prioritisation (1f)

Projects in the capital portfolio are prioritised by scores developed and reviewed by business case owners and are validated by the portfolio office. Timings of projects are set to achieve compliance in time, based on available information including the forecast demand growth and existing or proposed regulatory and statutory requirements. All projects are governed by the planning framework with projects necessary to achieve compliance rated higher priority than projects to add value or maintain service levels.

Sub portfolio teams review the prioritised portfolio to identify anomalies, confirm the relative order of projects and nominate projects to be considered for elevation where parameters are not adequately covered by the prioritisation scoring process. Following this review, the teams balance projects to ensure asset management programs are adequately represented to maintain minimum service levels and comply with the operating license criteria. The planning and operations management team reviews the draft capital portfolio and recommends a preferred asset management funding scenario, taking into consideration projects that will need to be deferred to allow additional funding.

From the documentation that we have reviewed, we understand that the process prioritising projects is integrated into the core planning process and is completed prior to Gateway 2 approvals. However, HW has advised that "*the process of prioritising projects is continual and is updated for every project at each gateway commencing at Gateway 1 (preliminary business case) and finalising at Gateway 4 award of delivery contract*". Accepting this to be the case, it is not clear to us how prioritisation can occur post procurement unless flexibility is built into contracts around commencement dates and delivery times.

The prioritisation process includes:

- System of scoring for the assets by the business case owner
- Review by sub-portfolio teams which normalises the scoring provided by the business case owner
- Overall review provided by the planning and management team including consideration of portfolio funding.

HW submitted that it operates the Portfolio Prioritisation Tool annually as part of the budget cycle. Project prioritisation scores were updated and validated in mid-2014 to allow the model to be operated August to September 2014. HW's submitted its eighth model run (incl. final prioritisation layering for presentation to executive management), indicating that the process was (at least to some extent) implemented within HW. Our preliminary review indicated that the tool is not easy to understand, but we consider it to be appropriate for HW's business activities.

We consider that HW's design for this process is appropriate for its business activities.

3. Task 2 – Overview

In this section we set out how we will review the prudence and efficiency of HW's past and proposed operating expenditure (opex) and capital expenditure (capex).

- Task 2A is our review of opex.
- Task 2B is our review of capex.

3.1 Our general approach to determining prudence and efficiency

We will review HW's overall processes and practices in comparison to good practice. We will assess whether these processes and practices are followed consistently and completely within the business, for example, when setting opex and capex budgets and determining future expenditure requirements.

In undertaking assessments at a whole of business level and our sample level, we assess whether there are any systemic issues that may bias the development of costs resulting in a propensity by HW to forecast imprudent and or inefficient costs. Systemic issues may impact costs across a particular cost category e.g. pump stations, pipes, FTE levels, or impact cost budgeting more broadly on a business unit or utility wide basis.

By undertaking this analysis we are able to consider whether there are opportunities to extrapolate, from our sample assessment, to other cost items within the same cost category, budgeting team or more broadly within the business (which we have not sampled).

We are cautious about extrapolation generally. Accordingly, we base our recommendations on whether we have identified systemic failure by HW (or not) in the implementation of its own policies and or budgeting. We will only recommend extrapolation where we are confident that our findings justify such an approach.

When reviewing a business, we assess the prudence and efficiency of expenditure (cost) items. Our approach is further set out below.

- Prudence: Is the cost needed to support the delivery of a regulated service and is it supported by a regulatory (customer, economic, technical, financial or environmental) driver?
- Efficiency – Step 1: Has HW selected the right (most efficient) option in keeping with that which a knowledgeable, prudent and efficient operator would have selected?
- Efficiency – Step 2: Are the costs efficient/least-cost, in keeping with market rates, benchmarks and those which a knowledgeable, prudent and efficient operator would have incurred?

There are two approaches to doing this:

- Bottom up review all expenditure
- Top down – Does HW have good water industry processes and practices? If so, does HW follow those processes and practices consistently? If so, the costs should be prudent and efficient.

Our hybrid approach is to do both. That is, sampling (bottom up) and reviewing processes and practices (top-down) and synthesising the outcome of each assessment to provide an overall assessment.

3.2 Drivers of prudence

In the previous cost review, IPART's consultant then noted the following regulatory/prudence drivers:

- Growth
- Customer complaints/dispute handling
- Asset management and infrastructure performance, including adherence to system performance standards, service quality indicators, response times for water main breaks, towns to be serviced under the Priority Sewerage Program

- Water delivery operations: water quality requirements for drinking water, recycled water, stormwater and water conservation requirements, and recycling
- Environmental and environmental licence obligations including discharge consents
- Approved performance indicators
- Drinking water quality reporting.

We will use these tests to assist us in determining the prudence of HW's expenditure.

3.3 Extrapolation

Once we identify cost savings (imprudence or inefficiency), we assess if we can extrapolate our findings. This links back to processes and practices:

- Is there evidence of shortcomings in process or implementation practice?
- Is there any systemic procedural mechanism that might, if not addressed, result in an overall bias towards imprudent or inefficient proposed opex in certain related areas or in a whole of business perspective?
- If so, you can extrapolate to other cost categories or items e.g. by being confident that these shortcomings are likely to be replicated and impact cost items outside our sample?
- If not, we are unlikely to be able to substantiate extrapolation.

In summary, we will seek to identify systemic issues (if any), assess our degree of confidence, and if we are highly confident that our finding is robust and defensible, we will recommend specific percentage extrapolation, in the areas that we consider warrant such an approach.

We outline more about our approach to determining the prudence and efficiency of opex and capex in Task 2A and Task 2B below.

4. Task 2A: Review of past and proposed opex

4.1 Purpose and scope

In this section we review HW's past and proposed operating expenditure (opex) from 2014 to 2020, as specified in Sections 3.3.1 and 3.3.2 of the RFQ scope.

We have used the findings from Task 1 to inform this section (Task 2A).

4.1.1 Prudence and efficiency of actual opex from 2014 to 2015

We have analysed and provided recommendations on the efficiency of past opex (July 2013 to June 2015) by:

a) Reviewing variations in opex, from what was allowed in the 2013 price period and, where assessed as material, comment on reasons for this variation including the extent to which these variations are justified.

b) Assessing the extent to which the opex incurred, since the 2013 determination delivered the service standards on which the expenditure allowance was based.

c) Advising on whether the past opex is directly related to regulated services.

d) Commenting on whether operational savings have been adequately captured in HW's opex proposals to IPART (bearing in mind the need to incentivise HW to continuously improve/make costs efficient).

4.1.2 Prudence and efficiency of proposed opex from 2016 to 2020

We have analysed and provided recommendations on the efficiency of proposed opex July 2015 to June 2020 by:

a) Providing recommendations as to the efficiency of HW's proposed opex for each financial year, 2016 to 2020. We note that as 2016 (now) is when the review takes place, and as such HW's 2016 opex will be a forecast. We will provide annual estimates of the opex required to efficiently supply the regulated monopoly services. We note that under *Hunter Water Act 1991*, the principal functions of HW are to provide, construct, operate, manage and maintain systems and services for supplying water, providing sewerage and drainage services, and disposing of wastewater, subject to its operating licence.

b) Estimating HW's potential for cost reductions and recommending efficiency gains. If proposed operational costs are inadequate, we will specify and quantify recommended additional expenditure.

c) Identifying potential for and recommend efficiency savings for the opex budget from 2017 to 2020, and provide evidence and reasoning to support the recommended savings.

d) Advising on the appropriateness of direct and allocated operating costs that HW has ring fenced from its other operations associated with recycled water services. We note that some recycled water costs can be recovered from water customers as a result of NSW Government s16A directions or where the business is claiming 'avoided costs'.

e) Providing an opinion on the cost effectiveness and efficiency of HW's procurement processes in relation to operation services provided by third parties.

f) Where appropriate, have regard to productivity benchmarking analysis and perceived good water industry practice.

4.2 IPART's definition of efficiency and prudency for opex

We have used the following IPART prudence and efficiency tests for our review:

- **Prudence**: The prudence test assesses whether, *given the circumstances at the time, the decision to invest in an asset is one that HW, acting prudently, would be expected to (reasonably) make*. In assessing prudence, the consultant should assess both how the decision was made, and 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 the information available at the time. In examining forecast costs, the prudence test examines the consistency of this forecast with HW's longer term capex program.

- **Efficiency**: In reviewing expenditure, efficiency tests determine how much of HW's proposed opex (for prices starting 1 July 2016) will contribute to HW's revenue requirement. The efficiency test should examine whether HW's actual and proposed opex represents *the best and most cost effective way of delivering the regulated services*.

We have applied these tests during our assessment of HW's past actual and proposed opex.

4.3 Our approach to determining the prudence and efficiency of opex

The method we have used to review the efficiency of HW's opex is set out below and is consistent with our proposal to IPART. This comprises a review of the actual opex in the current price submission period and then a review of the opex proposed for the next price submission period.

4.3.1 Prudence and efficiency of actual and forecast opex (2014 to 2016)

We have compared actual and forecast opex with what was allowed in the 2013 price determination to establish significant variances. As a part of this analysis we have determined why these variances have occurred, and whether they are efficient, and whether operational efficiencies have occurred and will be ongoing. We have:

- Evaluated the main regulatory drivers underpinning actual opex (e.g. labour, operations and treatment, maintenance, electricity, information technology, consultants, etc.), and compared this against approved 2013 price determination opex.
- Established significant variances and whether they are on-going or one-off, including in relation to treatment, operations and maintenance costs, Head Office lease costs, and Lower Hunter Water Plan (LHWP) costs.
- For those variances which reflect reductions in expenditure, we have established whether they are true efficiencies, one-off reductions, or whether the expenditure has been shifted to other areas of the business.
- Sought further information about the reasons for the significant variances.
- Assessed the efficiency and reasonableness of those variances, including benchmarking against the opex of other water utilities and other factors such as awards and conditions, market rates, the operating environment, staffing levels, assets and their condition, technology, etc.

Using this, we have recommended the efficient actual opex for 2016, which we recommend will form the baseline for assessing proposed opex as it reflects the last full year of actual expenditure (see below).

In reviewing the actual and forecast opex, we have also identified any systemic issues or learnings that we consider will have implications for the efficiency of HW's proposed opex.

In addition, we have considered the opportunity for HW to improve its productivity over time, by considering the application of continuing efficiencies during the price path.

4.3.2 Prudence and efficiency of proposed opex (2017 to 2020)

We have assessed the prudence and efficiency of HW's proposed opex for the next regulatory period by comparing it to the baseline established by the efficient actual opex determined for 2016.

For this comparison we have undertaken a top-down and bottom-up assessment, in doing so we have:

- Evaluated the main regulatory drivers underpinning the actual opex (e.g. labour, operations and treatment, maintenance, electricity, information technology, consultants, etc.), and compared them against the agreed regulatory drivers. We have then advised as to whether the expenditure is underpinned by regulatory drivers and we have assessed the opex against the efficient actual expenditure determined for 2016.
- Identified significant step changes (variances) and determined reasons, where possible, as well as considering whether these changes will form an on-going part of costs, or whether they reflect one-off or

non-routine items. This included assessing labour, electricity, operational activities, chemicals, the LHWP, IT licencing costs, strategies and studies and rates and local council rates.

- Sought further comment from HW about the reasons for the significant variances.
- Assessed the efficiency and reasonableness of those variances, including benchmarking with reference to opex of other water utilities and other factors such as awards and conditions, market rates, the operating environment, staffing levels, assets, technology, etc.
- Established whether HW's customer base is growing and assessed the impact of any growth on the efficient actual opex for 2016.
- Established whether the asset base is growing or declining which will warrant changes in opex over the base year.
- Established whether there are any new initiatives and/or obligations (e.g. policy initiatives by the Government, new compliance requirements driven by regulatory requirements or changing service standards) that will occur over the next price period and if so assessed what efficient annual opex would be incurred further to 2016 expenditure.
- Identified systemic issues/process failings that may impact on opex budgeting and opex in general across asset types, geographic areas or business units, and advised as to whether these systemic issues would support and substantiate extrapolation of findings from our opex sample base to other opex items.
- We have considered the opportunity for HW to improve its productivity over time, by considering the application of continuing efficiencies during the price path.

Using this analysis we have:

- Recommended the total efficient annual opex and that for each regulated service over the financial years 2016 to 2020 and provided recommendations as to the efficiency of HW's proposed opex.
- Recommended potential cost reductions and efficiency gains that could be supported by appropriate justifications and evidence.
- Recommended any areas where increased expenditure is considered efficient and appropriate.

We have also reviewed HW's procurement policies, procedures and processes and its most recent and significant procurement activities for the following cost drivers: operations, maintenance, electricity, information technology and consultants. This has enabled us to provide a view on the effectiveness and efficiency of the procurement processes, and it has informed our above assessment of efficient annual expenditure levels.

Furthermore, we have reviewed HW's opex policies, procedures and systems for developing budgets and the monitoring actual expenditure. This will provide an indication of the governance and rigour that is applied to opex and assist in forming a view as to the efficiency of expenditure.

4.3.3 Comparison against IPART's 2012 consultant's approach

We have compared our method to IPART's 2012 consultant's[12] method in the last review and consider that it is consistent. IPART's 2012 consultant reviewed the opex in what was then the current price submission period, and specifically for the 2013 base year, and assessed what it termed 'continuing' and 'catch-up' efficiency:

- 'Catch-up' efficiency reflects improvements required from a business' current position to that of the benchmark utility or Frontier Company.
- 'Continuing' efficiency is scope to improve productivity/ongoing efficiency reflecting the efficiencies being gained across major sectors through innovation and new technologies.

IPART's 2012 consultant applied a continuing efficiency of 0.25% p.a. on controllable costs in base opex to reflect a variety of opportunities it considered, were possible.

[12] Atkins - Cardno

We adopt a similar approach, recommending a continuing efficiency of 0.14% p.a. of opex, based on our application of productivity gains to HW's controllable opex for each business stream, as set out in Section 7.

In keeping with IPART's consultant's previous approach to ensure consistency between price periods, we have also reviewed the base year (2016) and established the efficient opex with reference to efficient benchmarks.

4.4 Data we considered for this task

Non-confidential data and documents that we reviewed and used to write this section (e.g. presentations by HW, interviews of HW, and responses to our data requests including all files/documents) are referenced in footnotes in this section.

4.5 Our approach

We have reviewed the opex items which have material variances, compared to the IPART determined opex amounts for 2014, 2015 and 2016; and over the forward years compared to the efficient opex established for 2016. This included:

- Labour
- Electricity
- Operations and treatment
- Maintenance
- Chemicals
- Head office costs
- LHWP costs including payments to the MWD (MWD) associated with preparing the LHWP and ongoing investigations
- Strategies and studies.

In undertaking this comparison for total opex, and each regulated service (water, wastewater and drainage) and corporate services, we have undertaken both a top-down and bottom-up assessment.

4.6 Procurement and opex budgeting policies and procedures

We have also examined opex procurement. We note HW's Procurement Policy which governs its obligations to ensure consistent procurement practices across the organisation and defines its approach to procurement.[13] The overarching purpose of the policy is to deliver excellence in procurement outcomes for HW's customers and stakeholders and it applies to the procurement of all goods and services, including construction and goods either purchased or leased. The policy is to be applied through the following principles:

- Achieving value for money
- Ensuring probity and accountability for outcomes
- Purchasing appropriate goods and services to satisfy HW's requirements in the current year and the future
- To integrate (where possible) sustainability principles and practices into procurement processes.

Supporting the Procurement Policy are the following:

- Tendering Procedure - which describes the processes to be followed and outlines the roles and responsibilities of those involved in tendering activities which will ultimately lead to award of contract[14]

[13] Procurement Policy, Hunter Water, effective December 2013
[14] Tendering Procedure, Hunter Water, effective July 2015

- Tender Assessment and Award of Contract Procedure – which describes the processes to be followed and outlines the roles and responsibilities of those involved in tender assessments and evaluation activities and award of contracts[15]
- Delegated Authorities Manual
- Purchasing Procedure – which sets out HW's three methods for purchasing goods and services and the basis for determining which is appropriate for expenditure greater than $2,000 requiring a purchase order.[16]

The Expenditure Review Committee has been established to provide oversight of, and make decisions on, all major financial commitments and undertakings with a view to protecting and improving the financial viability of HW. To fulfil its objectives, the Expenditure Review Committee:

- Reviews annual capex and opex cost budgets and associated expenditure priorities and business risk
- Monitors capex and opex performance against budgets with a focus on trends and drivers, and identifies emerging issues
- In relation to opex, approves the issuing of tenders and the award of contracts for opex contracts of $50,000 or more
- Monitors procurement activities and modifies relevant business practice as need be, to optimise return on investment.[17]

In addition to Expenditure Review Committee approval some tenders are also subject to Board approval.

We consider that these policies and procedures are appropriate and that they provide a disciplined approach to procurement of goods and services and, as a result, efficient opex. This process has been demonstrated to us via several Board paper and Expenditure Review Committee approvals that we have viewed.[18]

HW also has ten panels in place for a variety of activities from wastewater treatment consultancy services, to civil maintenance and construction services, to pump maintenance and repair services and general mechanical maintenance services to legal services.[19] In general these panels all have three or more providers on them and run for at least three years, with options to extend. Five panels have recently been formed, commencing operation in 2015. We consider these panels provide HW with an effective and efficient way in which to deliver business outcomes and continue to test the market and receive competitive prices for these services.

Further to HW's procurement policies and procedures we also sought to understand its annual opex budgeting processes and procedures, with particular reference to the bottom up and top down processes referred to in its price submission. We were provided with a high level budgeting process and timetable[20] that sets out the key steps in the process used to establish 2016 budgets and the forward four years. This included HW's processes for ensuring alignment with approved strategic themes as well as savings targets for the price submission.

There is evidence of a budgeting process. However, it is unclear what guidance was provided to staff in the formulation of opex budgets on how they were to build bottom-up budgets. We have not sighted specific guidance to staff to enable them to take into account service requirements or obligations, relevant inputs (e.g. required quantities and prices of goods or services) and assumptions (e.g. around demand estimates, inflation, labour inputs) and how any top down savings requirements were to applied and trade-offs made. We understand that the Finance team has Business Unit Advisors sitting within teams in the business and working directly with the business. However, annual guidance of this nature, that is documented and readily available for reference by staff will assist in bringing greater rigour to the development of opex forecasts. It will also assist both Finance, including the Business Unit Advisors, and the staff involved in preparing budget forecasts. We recommend that that such guidance be issued as a standard part of the annual opex budgeting process, setting out relevant inputs and assumptions updated as required as well as the process and timelines.

[15] Tender Assessment and Award of Contract Procedures, Hunter Water, July 2015
[16] Purchasing Procedure, Hunter Water, effective July 2015
[17] Expenditure Review Committee Charter, Hunter Water,
[18] CS0404 Board Paper – Approval to Award, CS0275 Board Paper – Sewer main jetting and CCTV v3, board paper 11 1 3 Bill Printing Accounts Miscellaneous Mailing Services-round 1, ERC Paper – Recommend to Award CS0422
[19] JO2_76 Hunter Water Panels (as at 29-09-15) REPLACEMENT
[20] J02_01 Budgeting Process Project and Timetable

4.7 Previous IPART and consultant recommendations

In December 2012, IPART's consultant published its review of HW's operating and capital expenditure for the 2012 IPART price review. IPART's consultant's made a number of recommendations that impact on opex. In its submission to IPART, and confirmed to us during out discussions, HW has made some changes to address the opex recommendations included IPART's consultant's report. These are set out in Table 4.1.

Table 4.1 : Cardno/Atkins recommendation and HW's response

Recommendation in Atkins/Cardno Review	HW Response
Use a more rigorous approach to, and greater penetration of, activity based costing drive further efficiencies.	A new Chart of Accounts (CoA) has been implemented by HW to better allocate direct and overhead costs to operational activities. Under the old CoA an allocation rate of 50/50 direct costs and overhead costs respectively was achieved. This has now been improved to 70/30 direct costs to overhead costs. The greater visibility of direct costs allows HW to better understand what is driving increased cost categories by product.
Further develop assessment of capex and opex trade-offs as part of medium and long term planning.	An economic decision making guide has been developed and implemented. A governance manual has been adopted for minor asset renewals, rehabilitations and improvements.
Further develop, trial and continually refine contingency plans (with a focus on high consequence asset failures).	HW has progressed in its development of the business resilience framework. This consists of three integrated functions: Incident & Emergency Management; Organisational Security and Business Continuity Management. Each of these is supported by policies, plans and standards with the focus on the high consequence assets.
Increase asset condition coverage of critical valves as part of the risk mitigation measures for interruptions to customers (currently 10%). Increase asset condition coverage of both water (20%) and wastewater (10%) pumping stations and treatment works (30%).	Asset condition program revised based on critical asset assessment.
Model likely risk profiles of various asset classes based on investment level (e.g. water mains, pumping stations).	HW is revising risk profiles for wastewater pump stations, water mains, wastewater rising mains and wastewater gravity mains.
Identify an environmentally acceptable, least cost solution to WTP sludge management and disposal (e.g. thickening prior to disposal).	Disposal of water treatment residuals across all WTPs has been market tested as part of the treatment operations contract. The contract includes cost efficiency incentives.
Identify cost effective and sustainable options for sludge (biosolids) disposal.	The Burwood Beach Stage 3 Upgrade Strategy completed in July 2014, determined that the most sustainable and cost effective option for disposal of biosolids is to continue the current practice of discharging to ocean. This accounts for about 40 per cent of HW's biosolids. The EPA agreed to this strategy in March 2015. Biosolids disposal across all other WWTPs has been market tested as part of the treatment operations contract. Veolia is investigating options for long-term biosolids reuse. Upgrades to some WWTP are planned so that biosolids are suitable for reuse (rather than landfill. (E.g. Dora Creek, Edgeworth)
Seek further efficiencies through a focus on the procurement strategy and implementation.	The Expenditure Review Committee (ERC) now has oversight of the procurement process tasked with driving efficiencies through HW's operational and capital expenditure, aligning this expenditure with its strategic initiatives and ensuring a transparent governance framework is maintained.
Transparently allocate capitalised labour costs.	Two layers of review in processing the allocation of HW's capitalised labour. Finance will also review the outcomes against expectations in the budget.
Improve allocation of corporate costs across products.	A new Chart of Accounts (CoA) has been rolled out within the business to better allocate HW's direct and overhead costs. Corporate costs are allocated based on a proportion of

Recommendation in Atkins/Cardno Review	HW Response
	the total direct costs. Given that HW's allocation of total direct costs has improved (from 50% to 70%) the proportion allocation of corporate costs has also improved as a result.
Identify minimum total cost solutions for spoil management.	Initial testing indicated that spoil is classified as general solid waste and therefore continues to need to be disposed of at a licenced waste facility. Recent regulatory changes will necessitate an upgrade of North Lambton Depot to achieve a transfer site licence.
Market-test WWT operations costs.	A competitive, multi-stage procurement process, overseen by independent procurement specialists, was undertaken in 2014. The contract with successful tenderer, Veolia Water Australia, commenced in October 2014.
Implement a more balanced approach to planned and reactive maintenance.	HW will implement the Civil Assets & Mobility Project in November 2015. This is expected to provide centralised allocation of maintenance jobs with real-time job updates in the field via mobile devices. This project will be supported by the upgrade of Ellipse business system.
Consider optimisation of water treatment processes to address the new turbidity standard before any major expenditure.	The capability of each water treatment plant to meet the turbidity requirements of the revised Australian Drinking Water Guidelines has been assessed. NSW Health has been advised of the outcome.
Implement upgraded business systems, such as Ellipse.	Completed and ongoing works include: • Upgrade of desktop fleet Windows SOE from XP to 8 • Ellipse upgrade from v5.3 to 8.4 • Decommissioning of AOMS and migration to Ellipse • Implementation of Centre Pay • Telemetry upgrades • CIS billing upgrades • Meter management system implementation • Digitisation of hard copy records • Reporting platform upgrade • Upgrade of Trim to HP records manager, and • Data centre renewal.

4.8 HW opex for 2014, 2015 and 2016

Between 2014 and 2016, HW's total actual and forecast opex allocated to water, wastewater, stormwater and recycled water amounted to a total of $381.4 million as shown in Table 4.2.

Table 4.2 : HW actual and projected opex ($2016 million)[21]

Regulated service and corporate	2014	2015	2016	Total
Corporate	37.7	39.4	37.9[22]	115.0
Water	37.2	43.9	43.7	124.8
Wastewater	46.0	47.3	44.3	137.6
Stormwater	0.7	1.2	1.3	3.2
Recycled	0.5	0.2	0.1	0.8
Total	**122.1**	**132.0**	**127.3**	**381.4**

[21] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx

[22] *Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx* provides for $37.9 million for 2016 corporate opex while additional data provided to us for our analysis *SIR 201516 opex reconciliation to 2012-13 determination.pdf* provides $38.3 million for corporate opex for the same year.

In reviewing the efficiency of proposed opex we generally use the last full year of actual costs as the base from which to assess any changes. Whilst this would normally suggest using 2015 as the base year for assessing HW's proposed opex there were a number of significant one off changes in 2015 which impact HW's opex, including:

- The decision to dispose of Hunter Water Australia (HWA) as a subsidiary (see Section 4.10.2)
- The decision to market test the costs of operations, treatment and maintenance at the water and wastewater treatment plants through a tendering process and the subsequent awarding of the contract to Veolia for services previously provided by HWA
- A significant one storm event known as the East Coast Low.

We have taken the above into account and in Section 4.9 we have used HW's forecast opex in 2016 as the base for assessing proposed opex for the period 2017 to 2020. We consider this provides a more accurate reflection of the opex required by HW in the current submission period and from which to assess any changes proposed for the next price submission period.

Given the significance of the operations, treatment and maintenance costs at the water and wastewater treatment plants we have examined the tendering and contracting process which HW used to establish its forecast and proposed costs for 2016 to 2020. As we explain below, we consider that these processes are robust and have led to efficient opex forecasts which are lower than that determined efficient in IPART's 2013 price determination.

Tendering process – operations, treatment and maintenance at the treatment plants

HW's contract with HWA for operations of its water and wastewater treatment plants expired on 30 June 2014. In the lead up to 30 June 2104 HW:

- Developed a sourcing strategy in 2013 which used an Objectives-based Procurement Assessment process and Critical Success Factors to optimise the procurement model. A long term service contract was established through this process as being the appropriate model[23]
- Commenced a tender process in December 2013.

This reflected management's view that there was an opportunity to achieve efficiencies both by testing the market and including operations and maintenance of the treatment plants in the scope of the contract (previously only operations was undertaken by HWA and maintenance by HW) as well as improved accountability and performance. It also acted on a recommendation from the 2012 Price Review that market testing of the cost effectiveness of the treatment costs should occur.[24]

The expression of interest and tender process shortlisted four contractors (from eight), including HWA. The process was run by a Tender Evaluation Panel, comprising an independent chair and key senior management, and was overseen by a Board sub-Committee and an independent probity adviser. The evaluation of tenders weighted price and non-price (safety, key personnel, technical capacity, readiness) criteria equally (i.e. at 50 per cent each) and assessed a variety of information, including tenderer's submissions, site visits, interviews, assessment tasks and referee checks.

We have reviewed the tender selection process and conclude that it was robust and in keeping with Hunter Water's procurement policies and good water industry practice.

The new contract with Veolia incorporated a profit margin and commenced on 1 October 2014, running for a year and nine months in the current price submission period, with the first full year of operations 2016.

[23] Treatment operations sourcing strategy, Hunter Water, May 2013.
[24] Treatment operations contract presentation, Hunter Water, 15 September 2015.

The contract for operations, treatment and maintenance at the treatment plants

The contract with Veolia covers the operations and maintenance of HW's 6 water treatment plants and 19 wastewater plants as well as biosolids and water treatment residual management, chemical supply, facilities maintenance, minor capital works delivery and technical support for planning and asset management. Veolia is responsible for complying with the relevant drinking water standards and Environment Protection Licences as well as all preventive, reactive and corrective maintenance.

The contract with Veolia is governed by an Executive Leadership Group and a Contract Management Group which both meet monthly. There is also associated monthly Board reporting.

Savings associated with the new contract

HW's price submission states that in the current price submission period the new operations and maintenance contract with Veolia will result in $1.3 million of opex savings over the year and nine months that it will run when compared to the operation costs allowed in the current price submission period through the 2012 price determination. HW has demonstrated cost savings of $1.1 million, reflecting the removal of recycled water costs incorrectly included in its initial calculations. Around $1 million of savings occur in 2016. HW has also noted the estimate is conservative because there were around $0.5 million of transition costs associated with mobilising the contract (which are not ongoing costs). Further, the risk allocations have changed under the new contract such that the contractor bears more risk.[25]

In terms of actual costs, the above changes mean that in order to compare at a high level, the actual opex between 2014, 2015 and 2016, it is necessary to examine both the operations costs and those classified as payments to associated unregulated business (i.e. those payments to HWA for operations, consultancies and laboratory testing - which exclude the profit margin - on average were around $2.5 million pa) in the Annual Information Return (AIR).[26] When this comparison is undertaken, there is a business wide increase in costs between 2014 and 2015, largely as a result of the East Coast Low storm event and ensuing maintenance and clean-up costs. Post 2015 there is then a reduction back to almost 2014 levels in 2016 in the first full year of operation of the Veolia contract.

Laboratory analysis costs

When HWA was sold, ALS acquired HWA's laboratory business. HW advised that, as a part of this transaction, in addition to the 17% reduction in the price of services that had been negotiated with HWA in 2015[27]. This was not tested with the market but HW considered that ALS's costs were at or near the margin given that, on average HWA, had been making on average an 18% margin and a discount of around 17% had been incorporated into its 2015 prices.

Assessment

From our review we consider that the tender and evaluation process run by HW was comprehensive and robust in seeking to test and establish a market price and other non-price terms and conditions.

Further, given the 2016 operations costs are consistent with the 2014 operations costs (both around $21.1 million) but the 2016 costs incorporate a market tested profit margin for Veolia, while the 2014 costs excluded the HWA profit margin of around $2.5 million p.a.; we conclude that they are efficient.

4.9 Efficient opex for 2016

HW's forecast regulated opex in 2016 is $127.2 million. Table 4.3 demonstrates that this is $3.8 million below the level of expenditure determined by IPART as efficient in its 2013 price determination.[28] HW notes savings in

[25] Email response to question 75, Hunter Water, 30 September 2015
[26] AIR&SIR 2015 – Updated for 201415 Actuals – Final to IPART , Hunter Water, September 2015
[27] JO2_106_1 Labs Price Proposal 100614 JK
[28] HW's submission indicates that regulated expenditure is $5 million below the IPART determined allowance (page 38) while the AIR/SIR indicates that the variance is $3.8 million in real $2016.

the costs of electricity, salaries and wages, carbon tax and treatment contract are partially offset by Head Office lease costs ($2.4 million), operational costs driven by new capital expenditure ($1.0 million), managing future compliance risks ($0.8 million), new strategic initiatives ($0.7 million) and contractual obligations ($0.3 million).[29]

The greatest reduction in costs has occurred in HW's wastewater business due to the benefits that have arisen from lower electricity expenditure and the elimination of the carbon tax. Whilst water expenditure was reduced by lower electricity and carbon expenditure, these savings have been offset by higher costs due to the implementation of the LHWP including additional investigations and studies.

Table 4.3 : IPART 2013 determination and HW forecast opex for 2016 ($2013 and $2016 million)[30]

2016 base year	2013 IPART determination		HW forecast	Variance
	$2013	$2016	$2016	
Corporate	35.5	38.0	37.9[31]	0.2
Water	37.0	39.7	43.7	-4.0
Wastewater	48.8	52.3	44.3	8.0
Stormwater	0.9	1.0	1.3	-0.4
Total	**122.2**	**131.0**	**127.2**	**3.8**

We set out our considerations and recommendations in relation to the efficient 2016 opex for water, wastewater, stormwater and corporate services in the following sections.

4.9.1 Water

IPART's 2013 price determination set the efficient water opex for 2016 at $39.7 million. HW forecasts that opex in 2016 will exceed this by $4 million, to be $43.7 million.

One of the largest increases is as a result of the water treatment contract with Veolia which has led to a net forecast increase in water treatment cost. According to HW, this contract has resulted in a $1.93 million increase in operating costs and a $258,000 increase in maintenance costs.[32] We note the information provided to us by HW is significantly different from that provided initially to IPART in the AIR/SIR.[33] In the SIR the treatment contract was said to have led to a savings of $427,000. As noted above, in the latest information provided to us, a net increase in water opex cost of $2.2 million ($1.93 million plus $0.258 million) is now shown. This is consistent with additional information provided by HW explaining the Veolia treatment contract savings.[34]

A further increase in expenditure is due to an additional $1.0 million to be incurred in implementing the LHWP, including costs of $435,000 to be paid to MWD to monitor and review the implementation of the LHWP. Some preparatory work is also expected to be done by MWD for the development of the next LHWP due in 2020. We have reviewed the work to be delivered by MWD for the LHWP that HW funds and have formed the view that it is appropriate for HW to fund these MWD activities (see Section 4.12.3). Costs incurred by HW to implement the LHWP are expected to amount to about $600,000.

Another major cost increase relates to an additional $1 million arising from a series of new initiatives above those approved in IPART's 2013 price determination. These relate to operational activities (e.g. preventative electrical and mechanical maintenance) as well as customer service and billing activities. HW has provided details for these activities as set out in Table 4.4.[35]

[29] Hunter Water, Submission to IPART, On prices to apply from 1 July 2016, page 38
[30] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx
[31] *Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx* provides for $37.9 million for 2016 corporate opex while additional data provided to us for our analysis *SIR 201516 opex reconciliation to 201213 determination.pdf* provides $38.3 million for corporate opex for the same year.
[32] SIR 201516 opex reconciliation to 201213 determination.pdf
[33] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx
[34] J02_75 TO savings.pdf
[35] SIR 201516 opex reconciliation to 201213 determination new initiatives.pdf

Table 4.4 : HW new initiatives in water in 2016 ($2016 '000)

New initiative	Cost
Additional Preventative Maintenance on Borefields - Surveillance, inspections and corrective maintenance previously not undertaken	180.0
Compliance - Cranes Inspections	40.0
Compliance - Pressure Vessels Safety & Relief Valves	20.0
Condition Monitoring on critical pumps Reduction in breakdowns and capital replacements	100.0
Earthing and Cathodic Protection	8.0
Electricity Protection Relay replacement - protection technician's required	80.0
Fire Protection	8.0
Clearing of the High Voltage power lines	150.0
High Voltage - Preventative Maintenance requirement for new/upgraded assets	150.0
Lightning Protection	8.0
Low Voltage - Borefield Preventative Maintenance - Electrical servicing of Electrical Panel	20.0
System/Business Process Reviews - Document and review end-to-end business and billing system processes for re-engineering in advance of a new or upgraded billing system.	50.0
Multiple Occupancy AMI/AMR Meter Reading Solutions. - In 2016 investigate ability to leverage Sydney Water's AMR/AMI multi-occupancy solution and utilise their data management system	10.0
Personalised Customer Service - Complete customer segmentation defined around core HW objectives to know its customers better and ensure for communication, programs and service delivery	100.0
Customer Service Focus - to develop a Customer Focus training program for all employees. Assume training delivery will then be done in-house. Consultancy costs in 2015-16 only.	25.0
Increase customer service coverage - Expand office opening hours in all three locations to match council opening hours.	32.6
Pop Up Customer Centre - Develop the capability for full-service "pop-up" customer centres for targeted community activities by Year 2 of the Strategic Plan	30.0
Total new initiatives	**1,011.6**

HW advised us that it had investigated the ability to leverage Sydney Water's AMR/AMI multi-occupancy solution and utilise their data management system. The Multiple Occupancy AMI/AMR (automated) Meter Reading Solutions initiative involves billing of individual units in high rise developments (strata unit complexes). HW advised that this initiative has various stages beyond 2016, such as an initial investigation, business case development and full roll-out on a fee for service basis. HW has also proposed ongoing $10,000 p.a. of expenditure for the next regulatory period.

We note that the Customer Focus training program initiative costing $25,000 applies only to 2016. Accordingly, the costs associated with this initiative should not be included in the base year going forward as it will not be incurred in the 2017 to 2020 period. As a result of removing this item, from costs of HW's base year new initiatives, we recommend that $987,000 of new initiatives be included in the base year cost.

We also note that, while these new initiatives have been allocated to water costs:

- We are unclear whether the preventative electrical and mechanical maintenance items are all related to water given that, in other information HW provided detailing additional future increases, some of these activities are described for water and wastewater services (e.g. crane inspections and critical pumps)[36]
- Many of the customer service and billing activities could be allocated to water and wastewater services as they relate to the provision of both services.

[36] Explanation of increased electrical and mechanical maintenance items.doc

However, without further information we are not able to reallocate these new initiatives and have assumed they are all water related.

Other identified opex increases for water include:

- $210,000 for increase in water transferred from Wyong to Gosford to ensure that the water security pipeline between the two regions remain in good operating condition (which is offset by revenue)
- Previously when HWA undertook the operations and maintenance of HW's treatment plants $1.2 million of profit earned by HWA was reduced from HW's operating expenditure as HWA was seen as a related party With Veolia taking over the operating and maintenance contract, this elimination of HW's contractor's profit is no longer appropriate
- The previous policy was not to use meter restrictions and thus no budget was set aside for such a purpose. With the implementation of meter restrictions, an additional cost of $631,000 has been incurred
- A series of additional civil maintenance costs as follows:
    - The cost of bulk materials for water main breaks is forecast to be $108,000 higher, than that assumed in the 2013 price determination.
    - The cost of plant hire and external contractors to repair aboveground water main breaks is forecast to be $202,000 more, than estimated in the 2013 price determination.
    - The cost of plant hire, road and path restoration and traffic control to repair underground water services is forecast to be $186,000 more, than estimated in the 2013 price determination.
    - HW provided evidence that an additional $158,000 is required for hydrant maintenance, and that the 2013 price determination made no allowance for road and path restorations related to hydrant maintenance.
    - Higher utilisation of external contractors and road and path restoration has resulted in a forecast increase of $68,000 in the cost of valve maintenance. The 2013 price determination assumed a continuation of the previous level of gravel road maintenance by providing $43,000 p.a. for all HW unsealed roads. Due to safety concerns and an increased deterioration of surfaces (in particular in areas requiring regular maintenance such as the CTGM and bore fields) additional expenditure of $92,000 is required to ensure the safety of these roads.
    - $137,000 for higher spoil disposal costs due to a higher level of testing and monitoring being required, in addition to higher disposal costs, than originally allowed for in the 2013 price determination.
    - Additional focus has been placed on ensuring that equipment is safe to operate and that personal protective equipment is available and used by all employees undertaking work or inspections in the field. This has led to a forecast increase of $155,000 for safety equipment and tool repairs.
    - HW indicated that general civil maintenance cost is forecast to increase by a total of $308,000 for contractors, consumables and plant hire, of which $231,000 has been allocated to water. In the data explaining this increase only $289,000 was detailed and explained and we therefore find this to be the efficient opex and recommend that $221,000 be allocated to water.
    - Motor vehicle leasing cost is forecast to increase by $168,000 due to the higher number of vehicles in the field and the leasing of vehicles previously owned by HW.
    - No allowance was previously made for regular scheduled maintenance of major plant and trailers. Due to the increased safety focus, an additional cost of $221,000 is forecast to ensure that all plant is safe to operate and transport is forecast. Some of this cost is also due to additional maintenance due to the aging of equipment.
- A series of additional electrical and mechanical maintenance costs as follows:
    - $97,000 forecast increase of maintenance in the SCADA and telemetry network, due to the higher utilisation of external contractors and higher material costs.
    - $95,000 for water resources. This relates to additional electrical and mechanical maintenance for preventative maintenance on borefields, to ensure a reliable capacity of 60 ML/day. In addition to this

program, the renewal program for the borefields (discussed in Section 4.12.4.1), which is currently being developed, will bring the reliable capacity up to 110 ML/day.

- $185,000 for HVC (water network) to maintain the assets delivered through the High Voltage Major Upgrade Project. The increased costs for the high voltage network additional electrical and mechanical maintenance will be incurred to maintain the assets delivered through the High Voltage Major Upgrade Project. The defects liability period has been completed in 2016, resulting in a part year of additional maintenance costs, which will be ongoing from 2017.
- The cost of needing to hire generators to meet the needs of the water infrastructure and plant during power failures has been estimated at $48,000. These are additional costs incurred to ensure continuity of services during planned power outages by HW's Distribution Network Service Provider (DNSP) (predominantly hire of generators). There has been a significant increase in planned shutdowns in recent years.
- General maintenance driven by higher contractor labour, external contracts, repairs and maintenance on motor vehicles is forecast to increase by $134,000.

- Chlorine dosing requirements and associated cost is forecast to increase by $88,000
- Higher water extraction licence fees has increased costs by $215,000

We have not received any information about the $56,000 of unexplained increases identified by HW.

Offsetting these cost increases are a number of cost reductions. These include:

- $2.8 million reduction in the cost of electricity
- $440,000 reduction due to the elimination of the carbon tax
- $373,000 reduction due to the lower routine laboratory monitoring schedules and lower cost of laboratory services initially achieved with HWA and continued under the new contract with ALS
- $268,000 lower cost of compliance with new Australian Drinking Water Guidelines for filters turbidity
- $84,000 lower maintenance cost for HW's dams and catchments
- $165,000 savings from replacement of external contracts with in-house labour freed up with the implementation of the water treatment contract with Veolia
- $630,000 reduction in defined benefit superannuation contribution. From our discussions with HW we understand that whilst contributions to the defined benefit superannuation were expected to increase (across the business) to $2.8 million during the 2012 price submission period, such an increase did not occur. As a result, contributions to the defined benefit superannuation scheme were lower than allowed in the 2013 price determination. For the 2017 period onwards HW has provided details in the form of correspondence between SAS Trustee Corporation (the superannuation scheme administrator) and NSW Treasury, indicating that future contributions for the defined benefit superannuation scheme should increase to $2.2 million p.a. Given that an increase to $2.8 million p.a. was factored into the 2016 base expenditure in the 2013 price determination, the current expected increase to $2.2 million p.a. means that the base expenditure should be lowered by $600,000. Based on the ratio of variances provided by HW[37] a reduction of $135,000 to the water base expenditure in 2016 is required
- HW has also identified savings from not requiring PAC dosing treatment in 2016 but this treatment continues to be needed every other year. These include $150,000 at Dungog and $89,000 at Grahamstown. We therefore do not recommend removing these costs from the base year calculations.

In total, HW has provided us explanations and details of $7.8 million of water cost increases that are related to operating its business and are therefore considered prudent. As HW's procurement procedures and activities have been found to be efficient, we are of the opinion that the costs incurred in undertaking these initiatives and other expenditure are also efficient. Savings of $4.2 million are also explained and considered appropriate. On this basis we recommend that an opex base of $43.2 million for 2016 be adopted for determining HW's future water costs.

[37] SIR 201516 opex reconciliation to 201213 determination.pdf

4.9.2 Wastewater

IPART's 2013 price determination set the efficient level of wastewater opex for 2016 at $52.3 million. HW forecasts that wastewater opex in 2016 will be $8 million less than the level deemed efficient by IPART at $44.3 million.

Much of this saving is due to forecast lower electricity costs ($4.9 million) and the elimination of the carbon tax ($1.3 million) given the energy intensive nature of wastewater treatment. A significant contribution to the lower cost is also made by the treatment contract with Veolia for the operations and maintenance of HW's wastewater treatment plants (forecast to be $3.2 million). We note that in the SIR submitted by HW, the savings expected from the treatment contract with Veolia was expected to be $426,000.

Reduced contributions from the defined benefits superannuation scheme also resulted in $630,000 reduction in opex for wastewater. As discussed above in relation to water, during this price submission period contributions to the defined benefit superannuation scheme were lower than IPART allowed for in the 2013 price determination, as a result of an expected increase not occurring. From 2017 onwards, a portion of this increase is expected which will somewhat offset the reduction. Based on the ratio of variances provided by HW[38], a reduction of $135,000 to the wastewater base expenditure in 2016 is required.

HW also forecast the following ongoing savings as follows:

- Lower usage of external contracts due to the utilisation of in-house labour, as a consequence of Veolia contract for the wastewater treatment plants, resulting in forecast savings of $352,000
- Lower cost of $506,000 are forecast for odour control driven by new contract rates for chemicals and reduced plant hire costs with the purchase of machinery for chemical dosing
- Lower routine laboratory monitoring schedules and lower unit costing offered by HWA and continued through new contract with ALS resulting in a forecast reduction of treatment laboratory cost of $321,000.

HW has also identified several opex increases for wastewater including[39]:

- Previously when HWA undertook the operations and maintenance of HW's treatment plants $1.3 million of profit earned by HWA was reduced from HW's wastewater operating expenditure as HWA was seen as a related party. With Veolia taking over the operating and maintenance contract for HW's wastewater plants, this elimination of profit is no longer appropriate.
- A series of additional civil maintenance costs as follows:
    - $46,000 is forecast for higher spoil disposal costs due to a higher level of testing and monitoring being required in addition to higher disposal costs than originally allowed for in the 2013 price determination.
    - Additional focus has been placed on ensuring that equipment is safe to operate and that personal protective equipment is available and used by all employees undertaking work or inspections in the field. This has led to a forecast increase of $52,000 for safety equipment and tool repairs.
    - HW indicated that general civil maintenance cost is forecast to increase by a total of $308,000. Of this $77,000 has been allocated to wastewater. In the data explaining this increase, only $289,000 was detailed and explained and we therefore find this to be the efficient opex and recommend that $74,000 be allocated to wastewater.
    - Motor vehicle leasing costs are forecast to increase by $56,000, due to the higher number of vehicles in the field and the leasing of vehicles previously owned by HW.
    - No allowance was previously made for regular scheduled maintenance of major plant and trailers. Due to the increased safety focus, a forecast increase of $74,000 is required to ensure that all plant is safe to operate and transport has been budgeted. Some of this cost is also due to additional maintenance due to the aging of equipment.
- A series of additional electrical and mechanical maintenance costs as follows:

[38] SIR 201516 opex reconciliation to 201213 determination.pdf
[39] SIR 201516 opex reconciliation to 201213 determination.pdf

- $97,000 forecast increase maintenance in the SCADA and telemetry network due to the higher utilisation of external contractors and higher material costs.
- General maintenance driven by higher contractor labour, external contracts, repairs and maintenance on motor vehicles is forecast to increase by $134,000.

- The higher cost of EPA reporting of laboratory results is forecast to increase wastewater costs by $55,000.
- A forecast increase of $96,000 for the administrative Environmental Licence Fees from the EPA due to the EPA implementing risk-based licencing.
- $44,000 higher operating costs due to the Farley Wastewater Treatment Works (WWTW) upgrade which was not included in the 2013 price determination.

HW has also provided details of $879,000 of new initiatives in wastewater which are forecast to increase costs. These are shown in Table 4.5.[40]

Table 4.5 : HW new initiatives for wastewater operational activities in 2016 ($2016 '000)

New initiative	Cost
Aberglassyn Stage 2	6.1
Belmont WWTW Inlet Structure - Remediation over 20 years.	11.3
Farley WWTW Interim Upgrades	23.6
Karuah WWTW UV Disinfection Upgrade	9.2
Shortland Sludge Management Upgrade	769.0
Treatment Plant Earthing Inspections	59.5
Total new initiatives	**878.7**

Whilst we have been provided with explanations for most of these new initiatives, we have not been provided with an explanation for Aberglassyn Stage 2. We have removed this item from the new initiatives to be allowed and recommend an increase of $873,000.

HW indicated that other maintenance, operations and regulatory expenses for the wastewater network has increased by $277,000. HW advised that the key driver is the need to increase sampling and analysis for overflows. The EPA has instituted new requirements for environmental sampling analysis every time a dry weather overflow occurs. The EPA is also taking a more active role in response to pollution incidents, which has resulted in higher rehabilitation and clean-up costs.

From our analysis we consider that HW has provided to us explanations and details of some $3.2 million of base year cost increases which we consider are prudent and efficient. It has also identified and explained savings of $10.7 million that we consider appropriate. On this basis we recommend that an opex base of $44.8 million for 2016 be adopted for determining HW's future wastewater costs.

4.9.3 Stormwater

Relative to water and wastewater, HW's opex for stormwater is minor. IPART's 2013 price determination allowed for stormwater operating cost was $965,000. HW forecast opex of $1.3 million in 2016, a difference of $358,000.

The main cause of the higher opex is an increase of $312,000 due to an increase in stormwater operating costs due to increasing expectations of customers and the community for higher maintenance of the stormwater assets (mowing, rubbish removal and clearing of trash racks) as well as additional identification of resources working directly on stormwater activities.

[40] SIR 201516 opex reconciliation to 201213 determination new initiatives.pdf

The other reason for the increase is the elimination of profit margin due to the sale of HWA of $52,000. We therefore recommend that for the efficient 2016 base year expenditure be set at $1.3 million.

4.9.4 Corporate

IPART's 2013 price determination set the efficient level of corporate opex for 2016 at $38 million. HW's most recent corporate opex forecast is $38.3 million,[41] which is higher than its forecast of $37.9 million in its AIR/SIR as updated for 2015 actuals[42] and $0.3 million higher than the 2013 price determination.

Head Office accommodation is forecast to be an ongoing addition to opex, as a result of the sale and lease back of the Head Office. Further analysis of the asset recycling of the HW Head Office is provided in Section 4.10.1 where we have estimated an efficient cost at $1.7 million for 2016, $419,000 less than HW proposed. This is based on the avoided cost benefits of the Head Office sale and takes into account a variety of factors including a saving offset of $226,000 which HW indicates has been achieved from reduced land rates.

HW has also forecast an increase in corporate opex of $664,000 in 2016 as a result of additional new initiatives as outlined in Table 4.6.

Table 4.6 : HW new initiatives for corporate in 2016 ($2016 '000)

New initiative	Cost
Digitisation Project - To digitise difficult to access paper copies of old documents including manuals, strategies and studies in the HW's current technical library	256.2
Strategies & Studies	200.0
McAfee Security (previously capitalised)	36.7
Data link costs for call centre	15.4
ISO Audits (previously capitalised)	19.2
HP Test Director maintenance & support – cloud option	16.2
Computer Software Support, Computer Software Licences Contract Management Software	45.3
Outplacements – Redundancy Assistance Outplacement agency spend.	7.5
Recruitment Agency Fees – assume up to 5 sourced recruitments with 15% placement fee.	67.5
Total new initiatives	**664.0**

The largest of these expenditures is for the digitisation project. All Reports and Manuals in the Head Office Compactus were digitised as part of the Digitisation Pilot Project undertaken to meet statutory requirements.[43] HW expects to spend a further $1.3 million in the next regulatory period to enable the digitisation of all files stored in the Head Office Records Room (see Section 4.12.4.2 for further detail). HW also plans to digitise all records located in the Burwood Beach Records Room in the subsequent price period (commencing 2021). Documents located in Grace Records storage will be reviewed towards the end of the next price period (2017 to 2020) for possible digitisation in the subsequent price period (commencing 2021) if required. As a result of the one-off nature of this pilot project, we have not included this increase in the 2016 base.

Of the additional new initiatives, expenditure in corporate strategy and studies relates to information and communication technology (ICT) investigations of an identified business need that may result in a build or buy decision. HW previously capitalised some of the cost of these ICT studies, however it has formed the view that a more appropriate accounting treatment of this type of project initiation expenditure is to treat it as opex.

We also understand that in the 2013 price determination recruitment agency fees were not approved. HW has indicated that recruitment agency fees have been paid in the current regulatory period, with the cost of

[41] SIR 201516 opex reconciliation to 201213 determination.pdf
[42] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx
[43] These include the State Records Act 1998, NSW Premier memoranda and circulars relating to protecting the archival heritage of the state and efficient and cost effective management of records and NSW Records Management requirements

recruitment fees using budgets for other items, or by using part of budgets such as training. HW indicated that certain roles (particularly IT) have been difficult to recruit for and usually require specialist services canvassing capital cities. We recommend removing the $200,000 sought for corporate strategies and studies given that the information we received from HW indicated that these expenditures while justified are once off and will not be recurring. This is supported by the non-inclusion of any of these programs in the proposed list of strategies and studies for 2017 to 2020 for the corporate area. We recommend allowing the recruitment agency fee to be recovered by HW given the explanation provided and that this cost item will continue to be incurred into the future.

Offsetting these increases are lower electricity cost forecasts of $122,000, and the major forecast cost change is due to a $1.5 million reduction in defined superannuation benefit contribution. As discussed above, contributions to the defined benefit superannuation scheme were lower than in the 2013 price determination due to an expected increase not occurring. From 2017 onwards, a portion of this increase is expected which will somewhat offset the reduction. Based on the ratio of variances provided by HW[44] a reduction of $330,000 to the corporate base expenditure is considered appropriate.

Another saving achieved by HW has been the return to HW of the Asset Mapping team at the beginning of 2014-15 (i.e. six months prior to the sale of HWA). This has led to a reduction of $442,000.

In total, we recommend that HW's additional base year expenditure increase by $1 million, taking into account that we have found that the additional $2.4 million sought for Head Office accommodation in 2016 (which our analysis substantiated as $2.1 million, following review of HW's supporting documentation) is inefficient. We have reduced this expenditure to $1.7 million.

New initiatives of $208,000 have also been found to be efficient. This increase is offset by savings of $893,000 (based on the explanations and details provided by HW). We therefore recommend a cost base of $39 million for 2016 corporate costs be adopted for determining HW's corporate opex forecast.

4.10 Asset recycling

In the following sections we examine the various asset recycling actions that HW has undertaken, or proposes to undertake. We assess for each of the following transactions the proposed impact on opex and the Regulatory Asset Base (RAB), as well as providing a view of what would be the most efficient outcome:

- Head Office
- HWA
- Tillegra properties
- Non-operational land
- The Kooragang Industrial Water Scheme (KIWS)

4.10.1 Sale of HW's Head Office

HW's Head Office in Newcastle was sold in 2015 for $25.8 million. The sale was initiated to improve HW's financial position with respect to debt burden as part of its asset recycling program. Revenue generated from the sale was used to pay down borrowings or fund new investment in capital works. On 16 July 2014, a 10-year operating lease for the Head Office building commenced. HW has allocated the cost of this lease, $2.4 million in 2016 (which we have substantiated as $2.1 million, following review of HW's supporting documentation), to corporate opex.

4.10.1.1 Sale process

At its meeting on 28 November 2013, the Board resolved: "The listing of Head Office for sale be approved". In March 2014, HW appointed the commercial real estate agency Knight Frank Newcastle (Knight Frank) as exclusive marketing agent. The Head Office was listed for sale by expression of interest on 2 April 2014 with a

[44] SIR 201516 opex reconciliation to 201213 determination.pdf

closing date of 15 May 2014. Twenty three individual submissions were received with some submissions containing multiple offers based on various conditions. A second round of submissions was invited with common queries clarified including non-negotiable elements of the lease including a 10+5+5 years lease term.

The lease commenced on 16 July 2014 based on typical commercial property lease terms.

These leasing terms and conditions were established by taking into consideration the advice of the commercial real estate agency Knight Frank's advice who indicated that "*a range of $295 / m^2 to $395 / m^2 net + GST and car parking spaces. The lower end was to anchor a newly refurbished commercial office building in the CBD, while the higher end was a shorter term lease to an existing tenant in a quality office location. Evidence in the Honeysuckle area shows $334 / m^2 to $340 /$m^2$ net + GST and car parking spaces*" and that Knight Frank believes "*that the rental for the Property should be within the range of $340 / m^2 to $345 / m^2 plus car parking and storage*."[45]

4.10.1.2 Assessment of prudence and efficiency of sale and lease back arrangement

HW decided to sell its Head Office building to free up capital and contribute to improving its credit rating.

The NSW government's commercial policy framework was (and still is) that all Government Businesses be "investment grade"[46]. Investment grade enterprises hold credit ratings of Baa3 or better. Therefore, even after the downgrade, HW's credit rating still met the minimum requirement of the NSW Government's commercial policy framework albeit at the minimum level.

Another driver to improve its credit rating was the desire for HW to avoid the penalty of having to borrow at a higher cost than assumed by IPART, which, when assessing the appropriate weighted cost of capital for HW in 2013, was on the basis of a business holding a portfolio of debt with credit ratings of BBB+ and BBB[47].

After the sale of the Head Office (and other assets under HW's asset recycling program), and the use of the freed up capital to pay off debt and to fund ongoing capital expenditure thus requiring it to borrow less, Moody's Investors Services returned HW's credit rating to Baa2 in February 2015.[48] This upgrade is significant from a business perspective, in that, based on HW's new borrowing and refinancing requirements over the next price submission period to 2020, the interest cost differential (levied by the NSW Treasury via the Government Guarantee Fee to ensure competitive neutrality between Government businesses and their private sector counterparts) between BBB and BBB- ratings would have increased from over $500,000 in 2017 to almost $1.7 million in 2020, had HW not returned to a Baa2 rating. In NPV terms over the next four years from 2017 to 2020, on the basis of a 4.6% discount rate, HW will save $4.1 million as a result of this revised credit rating. The interest differential leading to this net present value saving of $4.1 million is shown in Table 4.7.

Table 4.7 : Saving impact of a BBB credit rating on HW's interest payment ($2016 million)

Year	2017	2018	2019	2020
Interest differential between BBB and BBB-	0.51	1.07	1.41	1.68

Whilst the lease back of the Head Office building has increased corporate opex by approximately $2.0 million p.a.[49] this expense is offset by the removal of $22.9 million from the regulatory asset base (RAB). It also means future capital expenditure on the building is avoided. Opex associated with land tax is also avoided. We have estimated the net impact on the revenue requirement of the opex and capex changes from a regulatory pricing perspective as shown in Table 4.8.

[45] Letter from Matt Kearney, Associate Director, Knight Frank, to Fiona Cushing/Mark Hickey HW, *Rental Appraisal – 36 Honeysuckle Drive, Newcastle (the Property)* dated 5 March 2014
[46] NSW Treasury, Office of Financial Management, *Commercial Policy Framework, Capital Structure Policy For Government Businesses, Policy and Guidelines Paper*, September 2002, page 2,
[47] IPART, *Hunter Water Corporation's water, sewerage, stormwater drainage and other services*, June 2013, page 191
[48] HO9 Interviews – Moody's Hunter Water report 6Mar2015.pdf Confidential
[49] Hunter Water, Submission to IPART, On prices to apply from 1 July 2016, Box 5.4, page 38

Table 4.8 : Head Office sale and lease back – impact on HW revenue requirement ($2016 '000)

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Lease costs	2,048	2,068	2,089	2,110	2,131	2,152	2,174	2,196	2,218	2,240
RAB value	22,900	23,612	23,275	23,392	23,050	22,708	23,513	23,159	22,804	22,450
Avoided Capex	1,050		460			1,160				
Weighted Average Cost of Capital @4.6%	1,102	1,086	1,092	1,076	1,060	1,098	1,082	1,065	1,049	1,033
Depreciation	338	338	342	342	342	355	355	355	355	355
Reduction in land tax	226	226	226	226	226	226	226	226	226	226
Total avoided cost	1,665	1,650	1,660	1,644	1,629	1,679	1,662	1,646	1,630	1,613
Impact on revenue requirement	383	419	429	466	502	474	512	550	588	626

In our opinion, the sale of the HW Head Office building may be seen as prudent from a business perspective in that it seeks to (in combination with other asset sales) return HW to a credit rating consistent with IPART's weighted average cost of capital assumptions even though the lower credit rating was still consistent with the NSW Treasury's policy of maintaining at least an investment grade credit rating.

However, from an efficiency perspective, the sale and lease back increases HW's opex in excess of any savings from the reduction, in the return of and from capital in HW's revenue requirement, after taking into consideration additional forecast capex and lower opex. The differential between these two revenue requirements (lease costs verses avoided costs (the return of and from capital and lower opex as a result of the reduction in land tax)) is expected to increase over time as depreciation reduces the RAB while lease costs increase. We therefore recommend that the amount that HW is allowed to recover for its lease be limited to the avoided costs of owning Head Office building (i.e. around $1.7 million p.a.).

We note that in allowing HW to recover the avoided costs of owning the Head Office building, we recommend that this cost be reassessed at each price review when changes in the WACC are implemented. This will ensure the same pricing outcome for customers as if the Head Office continued to be treated as capex.

4.10.2 HWA

HW established its subsidiary company HWA in 1998. HWA provided a variety of services, including:

- Treatment operations
- Process engineering
- Electrical and SCADA engineering
- Planning, assets and environmental services
- Design and project services
- Laboratory analysis.[50]

HW previously acquired services from HWA, for example treatment operations services for its water and wastewater treatment plants and laboratory services for water quality testing. The payments for these services were separately recognised by HW as opex, although separated noting Group operating costs were been used in the past to eliminate any profit margin.

In December 2014 HWA was sold. The engineering consultancy was sold to a management buy-out (with Hunter H2O being formed) and the laboratory business to ALS. [51]

[50] Asset recycling – discussion paper, Hunter Water, pg. 2, 3.
[51] Asset recycling contract presentation, Hunter Water, 15 September 2015.

We do not consider the sale of HWA needs to be assessed in terms of prudence and efficiency as the sale itself does not impact directly on HW's opex or the RAB. Rather, we examine in Section 4.8 the efficiency of the costs HW faces associated with acquiring the services which were previously acquired from HWA (i.e. treatment and operations of the treatment plants and laboratory services) and which from 2016 are acquired from Veolia, and ALS. Further, no corporate costs are allocated to non-regulated businesses in the AIR.[52]

4.10.3 Tillegra properties

Since the 1980's, HW has acquired a number of properties as part of its plans for the construction of Tillegra Dam[53]. In 2010, following a Part 3A application to the NSW Government for the dam, the Minister for Planning determined that the dam proposal should not proceed. As a consequence, HW has reviewed all landholdings acquired in the valley and in June 2015 following an expression of interest process the Board approved contracts to be exchanged to complete the sale of land. Most contracts are expected to be complete in 2015.[54]

In its 2013 price determination, reflecting the above decision and NSW Government's discontinuation of the Tillegra Dam project, IPART did not include any costs related to Tillegra Dam in HW's prices, either opex or capex and specifically removed the costs included in the 2009 price determination.[55]

Given this, we do not consider that the sale of the Tillegra properties needs to be assessed in terms of prudence and efficiency as the sale itself does not directly impact on HW's opex or the RAB.

4.10.4 Non-operational land

HW is currently considering the disposal of some small land parcels that were acquired, through various means, many decades ago. The total value of these asset sales, should they occur, is in the order of a few million dollars.[56] We understand this is surplus land which was owned pre-2000 and does not have an identifiable value in the current RAB.[57]

In its Issues Paper for the Review of Prices for HW from 1 July 2016, IPART proposes that for significant assets, where the regulatory value of the asset as it entered the RAB is unknown, and this asset entered the RAB before the 2000 'line-in-the-sand', the regulatory value will be estimated based on:

- The ratio of the RAB to the depreciated replacement cost (DRC) of the utility's assets at the time the RAB was established multiplied by
- The sale value of the asset.[58]

A significant asset is defined as those that incur capital gains tax (therefore this includes all land sales), or (b) those where the receipts from sale of the asset or class of assets accounts for more than 0.5% of the opening value of the RAB in the year in which the asset is sold.

We have insufficient information from HW to form a conclusion about the impact on opex and the RAB as a result of any planned sales of non-operational land. To do this we require:

- Planned sales of non-operational land, with details of the timing of the sale and sale value of the land.
- Whether there will be any reduction in operating costs e.g.in relation to the maintenance, as a result of the sale of the land.

[52] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx
[53] Asset recycling – discussion paper, Hunter Water, pg. 2.
[54] Asset recycling contract presentation, Hunter Water, 15 September 2015.
[55] Hunter Water's Corporation's water, sewerage, stormwater drainage and other services, Review of prices from 1 July 2013 to 30 June 2017 , Water — Final Report, IPART, June 2013 pg. 5, 27, 36, 37, 38.
[56] Hunter Water's response to IPART's Issues Paper, 2015, Hunter Water, 6 October, pg. 5.
[57] Asset recycling – discussion paper, Hunter Water, pg. 2, 4.
[58] Review of Prices for Hunter Water Corporation from 1 July 2016, Water – Issues Paper, September 2015, pg. 125

4.10.5 Kooragang Industrial Water Scheme (KIWS)

KIWS provides high quality recycled water to industrial users on Kooragang Island, saving up to 3.3 billion litres of potable water p.a. HW is in negotiations to sell KIWS and the sale is expected to be completed during 2016. The disposal of KIWS will have no direct effect on recovery of opex as HW has ring-fenced all recycled water operating costs from regulated revenue calculations.

HW stated in its submission that "*the sale will indirectly affect operating costs through the allocation of corporate overheads*".[59] HW has subsequently advised us that

> "*the allocation of corporate costs is impacted by the sale of KIWS. The magnitude of this impact is $0.8 million per annum. Based on our allocation methodology (from the ABC model), the size of the Recycled Water cost base will be reduced by the sale of KIWS and therefore reduce the cost base that determines the size of the allocation of corporate costs across all of our products (regulated and unregulated).*"[60]

Our recommendation on the treatment of corporate costs allocated to KIWS after its sale in 2016 is found in Section 4.12.8.

4.11 HW opex proposal for 2017 to 2020

Between 2017 and 2020, HW's proposed total regulated opex (excluding HW's proposed cost savings) allocated to water, wastewater, stormwater and recycled water amounts to a total of $537.4 million.

Table 4.9 : HW proposed opex ($2016 million)[61]

Area of Expenditure	2017	2018	2019	2020	Total
Corporate	39.5	40.2	41.2	41.5	162.4
Water	43.8	44.3	45.1	45.7	178.9
Wastewater	44.2	47.1	47.1	48.2	186.6
Stormwater	1.4	1.3	1.4	1.4	5.5
Recycled	0.6	0.6	1.2	1.7	4.1
Total	129.5	133.5	136.0	138.5	537.4

Over the upcoming regulatory period, HW estimates its opex will on average be $6.9 million p.a. more than the base year 2016.[62] In its price submission, HW states that over the next price submission period this is comprised of an additional:

- $6.1 million for labour on salaries and wages
- $5.2 million on electricity
- $4.2 million on the LHWP and MWD
- $3.6 million on operational activities
- $3.5 million on chemicals
- $1.8 million on software licences
- $1.7 million on strategies and studies
- $1.4 million on new initiatives and
- $1.1 million on rates and land taxes.

[59] Hunter Water, Submission to IPART, On prices to apply from 1 July 2016, Box 5.4, page 13
[60] Email from Ardie Morris, dated 1 Nov 2015
[61] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx
[62] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx

These new expenses are partially offset by improved efficiencies amounting to $4.9 million. The additions and savings from HW's proposed base year opex are illustrated in the **Figure 4.1**.

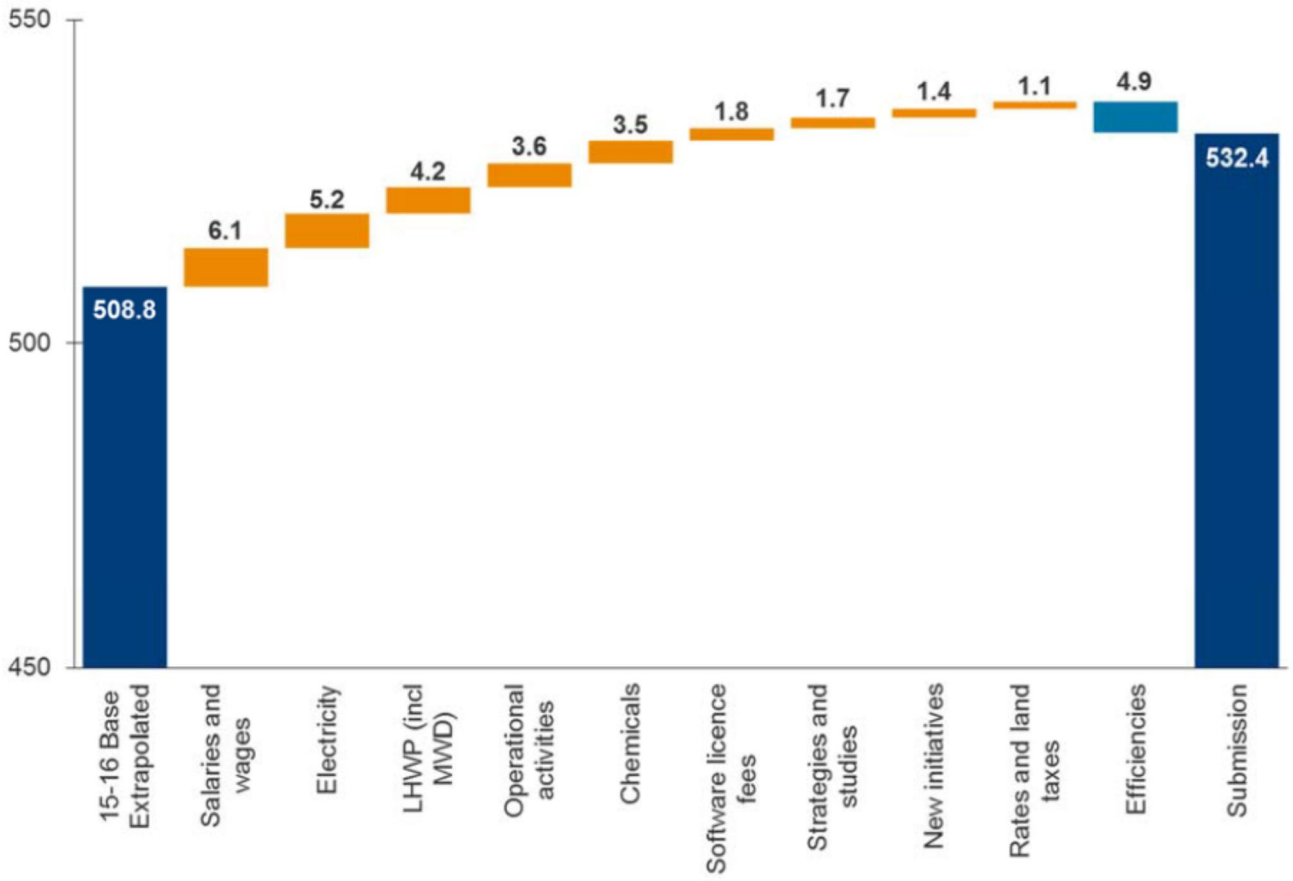


Figure 4.1 : HW proposed base year (2016) and opex movements ($ million)[63]

Minor amendments by HW in supporting documents resulted in total (corrected) HW proposed opex for the 2017-2020 period of about $533.3 (consistent with HW's proposed opex in this report's Executive Summary and other sections).

4.12 Our analysis and recommendations for 2017 to 2020

4.12.1 Labour

Labour costs are made up of salaries and labour related on-costs including most significantly superannuation, annual leave, long-service leave and payroll tax. On-costs account for approximately 31% of HW's annual labour costs. The average salary for HW is:

- $94,000 p.a. without on-costs
- $123,000 p.a. with on-costs.

HW advised us that its payroll system automatically calculates each employee's entitlement for leave. A percentage is then applied to cover estimated payroll tax, superannuation and workers compensation liabilities. This percentage is calculated dependent upon the type of employee, for example superannuation for accumulation schemes is applied directly at the superannuation guarantee levy but defined benefit superannuation employer contributions are calculated based on the actuarial advice in terms of total value of

[63] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx and HW Submission to IPART, on prices to apply from 1 July 2016, p 41.

contributions required. Twice a year, employee provisions are reconciled and any required adjustment for under or over provision is processed prior to the financial year accounts being finalised in line with relevant accounting standards. The reconciliation is done on an employee by employee basis and the output is compared to the amount provided automatically by the system.[64]

Actual and forecast labour costs are set out in Table 4.10. Corporate labour costs accounts for just under half of HW's total labour costs while the remaining labour costs are incurred in water and wastewater. Together stormwater and recycled water account for about 1% of HW's labour cost.

Actual and forecast full time equivalent (FTE) staff is set out in Table 4.11.

Table 4.10 : HW labour costs 2013 – 2020 ($2016 million)[65]

Area of expenditure	2013	2014	2015	2016	2017	2018	2019	2020
Corporate	27.69	24.44	27.04	24.75	25.39	25.44	25.94	25.72
Water	13.98	15.34	15.60	16.49	16.44	16.44	16.44	16.71
Wastewater	13.84	16.10	13.39	14.02	14.06	14.06	14.06	14.29
Stormwater	0.20	0.10	0.30	0.36	0.36	0.36	0.36	0.37
Recycled water	0.33	0.28	0.01	0.01	0.35	0.35	0.35	0.36
Total Gross Labour	56.04	56.26	56.34	55.62	56.60	56.64	57.15	57.46
Resources to capital	-10.44	-12.31	-11.35	-9.86	-9.88	-9.85	-9.85	-9.84
Total Net Labour	45.61	43.95	44.99	45.76	46.73	46.80	47.30	47.61
Annual % change		-3.6%	2.4%	1.7%	2.1%	0.2%	1.1%	0.7%

Table 4.11 : HW FTEs 2013 – 2020 [66]

Area of expenditure	2013	2014	2015	2016	2017	2018	2019	2020
Water	192	186	199	228	227	221	222	220
Wastewater	241	228	219	228	226	232	228	228
Stormwater	4	3	5	7	7	7	7	7
Recycled water	3	4	7	5	3	3	6	8
Unregulated (excluding recycled water)	174	164	-	-	-	-	-	-
Total	614	585	430	468	463	463	463	463

4.12.1.1 2014 - 2016 price submission period

The HW Employees Enterprise Agreement that applied from 2012 to 2015 provided for annual wage increases of 3.5% p.a.[67] HW's labour cost over the same period increased by around 3% p.a. (see Table 4.10). Over the same period, the Australian Bureau of Statistics reported that average full time earnings (adults) in New South Wales increased by 3.4% p.a. and ordinary time earnings increased by 3.7% p.a. Australia-wide, the equivalent earnings increased by 2.9% and 3.2% respectively.[68]

In the first half of the current price submission period, HW employed approximately 600 staff including in its unregulated business (HWA). In 2014 HWA's assets and business was disposed of and the business ceased trading with it no longer having any employees.

[64] Email from Emma Turner, *Opex RFI#2 Qu19, 58, SH_6*, 30 September 2015
[65] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx
[66] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx
[67] Hunter Water, *Hunter Water Corporation, Employees Enterprise Agreement*, 2012 page 74
[68] ABS, 6302.0 Average Weekly Earnings, Australia

Further, in 2014, labour costs associated with operations and treatment activities were reduced as any remaining HW employee involved in treatment plant operations were either transferred to Veolia (with the commencement of the new contract) or accepted redundancies. The reduction in FTEs was offset in part by the transfer of the GIS (SWIMS) team from HWA to HW.

At the end of 2015, HW employed 430 FTE staff. This reflected a vacancy rate of 8.3% based on an FTE requirement of 468 which is the number of FTEs budgeted for in 2016. Labour costs for 2016 (and all subsequent years) have assumed a vacancy rate of 5% based on HW's historical experience.

A number of significant changes in labour costs in the current price submission period reflect the recent restructuring of HW and sale of HWA. The 11% (real) increase in corporate labour cost in 2015 relates to the GIS function being brought in-house with the disposal of HWA. The GIS is HW's asset register for linear assets and is fundamental to its core business (e.g. repairing burst mains). Related employees were transferred from HWA to HW.[69]

Similarly, the 16% real increase in wastewater labour cost in 2014 and the subsequent 17% reduction in 2015 is the result of the transfer of the operations and treatment contract from HWA to Veolia. When HWA was responsible for operations and treatment, all water treatment operators were transferred across to be employed by HWA. However, the wastewater treatment operators did not get transferred across to HWA, but remained employees of HW. With the award of the contract to Veolia in 2014, wastewater labour costs included a full year of salaries for the HW employed operators plus estimated redundancy costs based on an assumed number of operators taking redundancy. In 2015, as the contract was fully outsourced from the beginning of October 2014, the labour costs for wastewater are lower than in the previous year as all labour costs related to that contract now rest with Veolia.[70]

4.12.1.2 2017 to 2020 price submission period

HW has provided details on its proposed labour costs for the next price submission period and how they were determined (see Table 4.12) with a total of $227.9 million, including gross salaries and wages, overtime and contract labour costs.[71] [72] Of this total labour cost, HW is projecting that $39.4 million is to be allocated to capital projects. Net labour cost is projected to be $188.4 million.

Table 4.12 : HW forecast labour costs 2016 – 2020 ($2016 '000)

Labour costs	2016	2017	2018	2019	2020
Gross Salaries and Wages (excluding overtime)	53,493	53,761	54,098	54,408	54,718
Overtime	1,234	1,234	1,234	1,234	1,234
Contract labour	1,279	1,607	1,310	1,507	1,507
Total Gross Labour	56,006	56,602	56,642	57,149	57,459
Less resource to capex	-9,857	-9,877	-9,846	-9,845	-9,845
Net labour	46,149	46,725	46,796	47,304	47,614

From 2017, HW proposes to employ 464 FTEs, 4 less than in 2016. HW expects to reduce 5 FTEs in its customer service and information technology areas to reflect improvements in productivity and better focus of resources. HW will also employ an additional FTE. Gross salaries and wages (excluding overtime) proposed for 2017 through to 2020 are 0.5 to 0.6% p.a. higher in real terms. In 2017, HW expects that it will need to fund an additional superannuation contribution for its defined benefits scheme. This additional contribution of $0.5 million p.a. has been included in its submission. However, we note that in the 2013 price determination this increase was also expected to be introduced during the current period but did not occur. Adjustments have

[69] Email from Emma Turner, *Opex RFI#2 Qu 17, 18, 33 (licences, corporate labour costs, stormwater costs)*, 29 September 2015
[70] Email from Emma Turner, *Opex RFI#2 28 wastewater labour,* 1 October 2015.
[71] L3 - AIR Labour Dissection
[72] A note in the information provided indicated that "when undertaking analysis of base data, it appears an input error was made in the AIR for resources to capital in 2020 and the salaries line was also impacted - that is, net labour was correct in the AIR when reconciled back to source data but both the gross labour and resources to capital were incorrectly entered into the AIR" for 2020. The correct projected expenditure of $63.423 million was provided instead of $62.373 in the AIR.

been made to the base year costs to take into consideration the higher expected contribution rates and no adjustment is made to costs in the next price submission period.

A new Enterprise Agreement (agreed in August 2015) provides for a nominal 2.5% p.a. wage increase to apply as at 1 June 2016 and 1 June 2017[73]. Thus there will be no real increases in gross salaries and wages. HW has indicated that this Enterprise Agreement complies with the NSW Public Sector Wages Policy (2011) requiring any wages growth above 2.5% p.a. be offset by productivity savings.

Over the next price submission period of approximately $56 million of annual gross salaries and wages, just under $10 million of labour cost is allocated to capital works. These costs are capitalised rather than treated as opex. In addition, around $1.5 million is incurred in contract labour. Contract labour is used to back fill short and long term vacancies where necessary e.g. long service leave and maternity leave. Over the forecast period, contract labour is expected to increase in 2017 during planned billing system upgrade (to backfill for the Customer Services area) and in 2020 as the resourcing and backfill for the LHWP review is required.

For 2016 gross salaries and wages are approximately $53.5 million, overtime is estimated at $1.2 million and contract labour $1.3 million. This estimate is based on 468 FTE. From 2017 onwards, HW is forecasting 464 FTEs. The reduction of 5 FTEs is expected to lower wage costs by $395,000 (all lower level positions with salaries between $70,000 and $85,000 including on cost). The additional work health and safety advisor is budgeted at $125,000. As the Enterprise Agreement stipulates a 2.5% p.a. increase in nominal wages and thus overtime and other on-cost, real wages including on-costs are expected to remain constant over the period. Applying the planned reduction in FTEs results in a net savings of $270,000 (less $395,000 add $125,000) to the gross salaries and wages (excluding overtime) in 2017, and accepting the level of overtime and contract labour[74] we have estimated labour cost for the price submission period shown in Table 4.13.

Table 4.13 : Recommended labour costs ($2016 '000)

Labour costs	2016	2017	2018	2019	2020
Gross Salaries and Wages (excluding overtime)	53,493	53,223	53,223	53,223	53,223
Overtime	1,234	1,234	1,234	1,234	1,234
Contract labour	1,279	1,607	1,310	1,507	1,507
Total Gross Labour	56,006	56,064	55,767	55,964	55,964
Less resource to capex	-9,857	-9,877	-9,846	-9,845	-9,845
Net labour	46,149	46,187	45,921	46,119	46,119

We estimate that the efficient level of total gross labour expenditure for 2020 is just under $56 million, a saving of about $42,000 compared to the base year (2016). This saving is largely driven by the initial reduction in FTEs in 2017 (when HW estimates that it will require 4 less FTEs, (from 468 to 464)). The reduction in gross salaries and wages (excluding overtime) due to the reduction in FTE count is somewhat offset by the higher expenditure required to fund contract labour due to increased LHWP workload ($228,000) in 2020 compared to the base year.

Over the price submission period (2017 to 2020), we estimate that the efficient level of gross labour expenditure is (in real $2016) $223.8 million. This is $4.1 million less than HW's proposed expenditure on gross labour.

We note that while HW has reduced its FTE count by the reduction of lower paid FTEs, and has budgeted for the addition of one FTE at a cost more than its average, the general level of skill and pay of its workforce will be higher. We also note that HW's average cost of wages and salaries (including on-costs) are higher (this could be due to various justifiable reasons including differences in outsourced engineering and/or project management and other expertise and level of defined benefit superannuation) than other water supply authorities we have reviewed. We thus expect that with a higher skilled workforce, greater efficiencies will be able to be generated within the business.

[73] Hunter Water, *Hunter Water Corporation, Employees Enterprise Agreement*, 2015 page 77
[74] Further discussion on contract labour is found in Section 4.12.9 as part of the discussion on efficiency.

4.12.2 Electricity

Over 60% of HW's energy cost is for the treatment of wastewater while over 30% is used in the treatment of water. Energy costs for recycled water treatment is incurred in the later part of the next price submission period as HW's recycled water plants come on-stream. Given the necessity of using electricity as part of HW's water and wastewater transport and treatment, we find that his expenditure is prudent.

Electricity accounts for the majority of energy costs. Energy costs also include costs for fuel, oil and gas although these costs are relatively minor. Total energy costs are shown in Table 4.14.

Table 4.14 : HW energy cost ($2016 million)[75]

Area of expenditure	2013	2014	2015	2016	2017	2018	2019	2020
Corporate	0.35	0.26	0.23	0.21	0.22	0.22	0.22	0.23
Water	4.78	4.08	3.95	3.85	3.83	3.94	4.10	4.28
Wastewater	10.95	9.46	8.16	6.88	6.99	7.83	7.79	8.14
Stormwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recycled[76]	0.00	0.00	0.24	0.12	0.00	0.00	0.56	1.12
Total	16.09	13.80	12.39	11.07	11.04	11.99	12.67	13.76
Annual % change		-14.2%	-8.8%	-12.0%	-0.3%	8.6%	5.7%	8.6%

4.12.2.1 2013 to 2016 price submission period

In the current price submission period HW energy costs fell from over $16 million in 2013 to $11 million in 2016. These savings have been achieved due to the implementation of demand management activities, reductions in electricity costs due to the repeal of the Carbon Tax on 17 July 2014 and savings from procuring electricity through competitive tendering during a period of suppressed wholesale electricity market prices in April 2014.[77]

HW employed a number of energy efficiency measures to reduce the quantity of electricity used including:[78]

- Installing more energy efficient electrical and mechanical hardware, such as control systems, blowers and pump drives
- Improved operational practices, such as switching off equipment when not in use
- Renewable energy generation of around 0.5 GWh p.a. has been achieved from solar panels on Head Office, cogeneration using biogas at Cessnock wastewater treatment plant and hydro power turbines at Dungog water treatment plant and Chichester Dam

Other saving initiatives include:

- Procuring electricity through competitive tendering during a period of suppressed wholesale electricity market prices in April 2014
- Identifying further opportunities to take advantage of lower off-peak tariffs
- Capacity charge reductions

Actual electricity costs in 2014 amounted to just under $13.2 million. Total electricity consumed was 75.4 GWh, with an average cost of electricity approximately 17.5 c/kWh[79]. In 2015, electricity consumption increased to 78.7 GWh costing $12.4 million. Average cost of electricity in 2015 was approximately 15.7 c/kWh[80].

[75] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx, Opex by item Tab inflation adjusted
[76] Hunter Water AIR&SIR 2015 - Updated for 201415 Actuals - FINAL TO IPART.xlsx, RW Mand-Vol TOTAL + RW 16A - KI TOTAL Tabs inflation adjusted
[77] Hunter Water, Submission to IPART, On prices to apply from 1 July 2016, page 36
[78] Hunter Water, Submission to IPART, On prices to apply from 1 July 2016, Box 5.4, page 36
[79] Summary Electricity Working Papers Current PP and future PP – note that cost comparisons are in nominal dollars.
[80] Summary Electricity Working Papers Current PP and future PP – note that cost comparisons are in nominal dollars.

Actual electricity consumption and costs for both 2014 and 2015 fell below HW's budgeted costs. In 2014 HW budgeted for a consumption of 82.7 GWh with an expenditure of $16.7 million at an average cost of 20.3 c/kWh.[79] In 2015, the budgeted consumption was 87.5 GWh with an expenditure of $18.1 million at an average cost of 20.7 c/kWh.[80] For the final year of the current price submission period, HW had budgeted for a consumption of 89.4 GWh with an expenditure of just over $18.9 million and an average cost of 21.2 c/kWh.[81] We note that during the IPART 2012 price determination process the expected cost of electricity prices were higher than HW is experiencing now leading to these budgeted expenditure and prices.

4.12.2.2 2017 to 2020 price submission period

HW submits that electricity costs are forecast to increase over the next price submission period reflecting anticipated real price increases as well as from the impacts of connection growth and wastewater treatment plant upgrades on electricity consumption. HW's contract for purchase of electricity is due to expire in December 2017. HW submits that its electricity cost projections "*have been validated by external energy consultants that provided site-based forecasts for six years from 2014-15*"[82] and has provided a report from Energy and Management Services (EMS) to support its projections. In the report EMS states that

> *Removal of the carbon tax provides a significant lowering of total price and continuing soft Retail energy prices also contributes to a benign price track.*
>
> *…… some reduction in (environmental) cost, but no elimination of any scheme over the next 6 years.*
>
> *After some years of higher network prices in particular, there has been some reductions especially for larger sites and there are now expectations that a period of relative price stability should commence.*
>
> *The energy market remains soft and this is reflected in the ERM contract already in place until the end of 2017 although the off peak rates are a little high. After that we have introduced nominal annual increases of 5% (small real price increases if CPI remains about 3%)*.[83]

The resulting retail prices EMS sees as applicable to HW are shown in Table 4.15.

Table 4.15 : EMS forecast electricity prices, c/kWh

Sites	2015	2016	2017	2018	2019	2020
Large Sites	14.0	14.2	14.4	14.6	15.0	15.4
% annual increase		1.4%	1.4%	1.4%	2.7%	2.7%
Mass Market Sites	28.4	29.0	29.6	30.7	31.8	33.0
% annual increase		2.1%	2.1%	3.7%	3.6%	3.8%

In addition to the electricity price increases over the next four years of the next price submission period, HW has planned for the "installation of energy intensive treatment technologies such as ultraviolet disinfection at Burwood Beach wastewater treatment plant"[84], and the Farley (Gillieston Heights) and Morpeth recycled water facility scheduled to come on-stream from 2017, as reasons for the increase in electricity expenditure.

HW provided energy consumption and expenditure forecast for contract and tariff[85] sites as we set out in Table 4.16.[86]

[81] Summary Electricity Working Papers Current PP and future PP – note that cost comparisons are in nominal dollars.
[82] Hunter Water, *Submission to IPART, On prices to apply from 1 July 2016*, page 41
[83] Energy and Management Services, *Hunter Water Corporation, Electricity Cost Forecast*, 10 September 2014, page 9
[84] Hunter Water, *Submission to IPART, On prices to apply from 1 July 2016*, page 29
[85] Including Williamtown 1 WWPS which had a "?" under its contract/tariff classification in *Detailed Electricity Report - 1617 to 1921.xlsx*– numbers assumed to be $2016 real
[86] *Detailed Electricity Report - 1617 to 1921.xlsx* – numbers assumed to be $2016 real

Table 4.16 : Electricity consumption (MWh) expenditure forecast ($2016 '000) and prices (c/Kwh)

Year	Parameters	Contract sites	Tariff sites	Total
2016	MWh	66,328	12,327	78,655
	$'000	8,453	2,576	11,029
	c/kWh	12.74	20.9	14.02
2017	MWh	75,762	6,834	82,596
	$'000	9,074	1,922	10,995
	c/kWh	11.98	28.12	13.31
2018	MWh	78,859	6,935	85,794
	$'000	9,941	2,003	11,944
	c/kWh	12.61	28.89	13.92
2019	MWh	79,654	7,126	86,780
	$'000	10,518	2,110	12,628
	c/kWh	13.20	29.60	14.55
2020	MWh	80,741	7,143	87,885
	$'000	11,437	2,280	13,718
	c/kWh	14.17	31.92	15.61

HW has forecast electricity expenditure increases based on approximately a 5% higher consumption in 2017 but with prices falling by about 0.77 c/kWh for contract sites and about 7 c/kWh for tariff sites. HW assumes electricity prices below those recommended by EMS.[87] In 2018, consumption increases over 2017 by about 3.9% and then increases by about 1.2% p.a. till 2020. The increase in electricity consumption assumed by HW is reasonable given the expectations that the UV treatment at Burwood Beach will come on line in 2017. Other consumption increases are in line with water demand increases requiring additional transportation and treatment. On this basis we find that HW's proposed electricity expenditure is efficient.

In the data provided by HW, in 2016 the fuel, oil and gas budget was $44,580. HW applied this value for fuel, oil and gas for all subsequent years of the regulatory period. Based on the data provided by HW, we accept that the proposed HW energy expenditure for the next regulatory period is efficient and our recommended energy expenditure is shown in Table 4.17.

Table 4.17 : Recommended electricity and other energy costs ($2016 '000)

Energy-related costs	2016	2017	2018	2019	2020
Electricity	11,029.4	10,995.1	11,944.3	12,627.7	13,717.7
Other energy costs	44.6	44.6	44.6	44.6	44.6
Total energy cost	11,073.9	11,039.7	11,988.9	12,672.3	13,762.3

4.12.3 LHWP and the MWD costs

HW's price submission states that there is a proposed increase in opex over the next price submission period of $4.2 million associated with:

- Funding the costs of its work to implement the current LHWP (released in April 2014) and to assist with the development of the next LHWP (to be finalised in 2020)
- Funding the costs of the MWD's efficient costs for implementing, monitoring, evaluating and reviewing the current plan as well as well as development of the next Plan.

[87] This may be explained by the prices recommended by EMS being in nominal terms while HW has forecast their costs in real $2016.

We have been provided with details of the opex that HW will incur, both in relation to its own costs and those of the MWD. These are set out in Table 4.18 which also details the variance (above 2016 costs) for the next price submission period. As can be seen there are increases in some expenditures and decreases in others, which will be anticipated as one plan is implemented and another enters the preparation and review phase. This reflects the cyclical nature of the LHWP water resource planning process which currently occurs every five years. In total there is an explained increase in costs over the next price submission period, relative to 2016 costs of $2.34 million if current HW activities are taken into account and $4.2 million if they are not.

Table 4.18 : Proposed opex for LHWP and MWD costs ($2016 million)

Item	2016	2017	2018	2019	2020	HW submission variance vs. 2015/16[#]
HW						
Temporary desalination readiness	0.300	0.050	-	-	-	-1.150
Other additional Plan LHWP tasks	0.300	0.100	0.323	-	-	-0.777
LHWP - 5 yearly review	-	-	0.145	1.153	1.123	2.421
MWD[*]						
Staff	0.323	0.323	0.432	0.639	0.724	0.827
Office	0.037	0.037	0.068	0.070	0.070	0.096
Community engagement	-	-	0.090	0.160	0.090	0.340
MWD review and analysis	0.075	0.09	0.221	0.291	0.281	0.583
Total	**1.035**	**0.600**	**1.280**	**2.313**	**2.288**	**2.340**

[#] Calculated for the purposes of this table assuming that 2016 costs are efficient and will continue for the next price submission period

[*] Revised costs reflecting correct costing basis ($2016)

HW has proposed opex costs for the next five yearly review of the LHWP of $0.145 million in 2018 and over $1.1 million in 2019 and 2020. We consider these costs to be prudent as they will be required to enable HW to meet the requirements specified in the Roles and Responsibilities Protocol.[88]

HW has also demonstrated that actual costs to prepare the last LHWP were $3.4 million, which is higher than the costs forecast for the next LHWP, despite the increased complexity anticipated, with the need to examine the next supply augmentation option for the region.[89]

HW has also provided some high level information about the activities it will undertake over this period and their costs. These are based on the actual costs of activities for the last LHWP, a significant proportion (55-60%) of which was market tested, either via separate tender processes or use of panels (which were established via tender processes). The exception to this is the cost associated with the surface water option investigations (around 20% of the total costs) which was undertaken via Public Works given the commercially sensitive nature of the investigations and its background in these matters. The forecast costs also reflect HW's assessment of the extent to which the same costs will be required for the next LHWP. For example, while 100% of the source model refinement costs have been assumed, reflecting previous work that can be built on only 50% of the costs have been assumed for loss minimisation and water efficiency investigations. There is also alignment between the activities being undertaken by HW and by the MWD.

Given the proposed opex is about $1 million less than was spent in developing the current LHWP, is based on actual costs from the last plan, of which a significant proportion were market tested, that it reflects only the work required to build on work from the last LHWP (i.e. not the full budget from last time) and supports many MWD activities, we consider it to be efficient.

[88] Lower Hunter Water Plan Roles and Responsibilities Protocol, Hunter Water and Department of Primary Industries

[89] Working Paper – Cost Estimate for HWC's input to next LHWP ($2 42M) (28

We also examined the MWD costs. The MWD costs were provided to us by HW and were provided to HW by MWD. MWD provided a relatively detailed budget, which HW incorporated in full, making no adjustments to the forecasts proposed by MWD. We reviewed the MWD costs and as part of our review interviewed MWD to understand and interrogate the basis for those costs.

We consider these to be prudent and efficient. This reflects that the costs are:

- For tasks that would be undertaken by a water business, or a secretariat within a water business, such as HW in implementing and preparing future water resource plans. That is, they do not relate to activities which are associated with the development of water policy.
- Consistent with the Roles and Responsibilities Protocol setting out the activities of the MWD and HW in relation to the LHWP and specifically project planning activities including peer reviews, analytical frameworks, technical and environmental investigations and community and stakeholder engagement.[90]
- Consistent with the costs associated with preparing the previous Lower Hunter Water Plan[91], including costs that were market tested by the MWD in that context (e.g. seeking quotes for demand modelling, Hunter estuary modelling and socio-economic research including choice modelling), taking into account the increased complexity that will be associated with the next LHWP, which will examine the next supply augmentation option for the region (additional analysis and community engagement will be required)
- Consistent with a preliminary planning timeline for the next LHWP.[92]

In relation to the MWD labour costs; these are relatively high compared to HW with an average of around $151,000 per FTE, including on-costs. We consider given the nature of the work being undertaken by the MWD as compared to many of HW's staff who are working in the field this difference is reasonable and the labour costs are appropriate.

HW has advised that an incorrect costing basis was used for the MWD costs (nominal instead of real dollars). As a result, total proposed expenditure over the next price submission period is $0.165 million lower and was incorporated into Table 4.18. The annual adjustments included in Table 4.18 were $3,120 in 2017, $16,566 in 2018, $59,793 in 2019 and $85,052 in 2020.

To address the cyclical nature of this expenditure (both by HW and MWD), we propose that the opex in the base year (2016) is reduced by the forecast amount and that proposed increases for the next price submission period are then included, allowing for the correction of the MWD costing basis, as set out in Table 4.19. This means that no expenditure is incorporated into the base year and only the prudent and efficient expenditure forecast for the next regulatory period is incorporated. This enables the cyclical and lumpy nature of expenditure to be taken into account but without double counting the expenditure that would otherwise be in the 2016 base.

Table 4.19 : Recommended opex for LHWP and MWD ($2016 million)

Item	2016	2017	2018	2019	2020
HW and MWD expenditure in the current regulatory period	-1.035*	-	-	-	-
HW expenditure required to implement and review the LHWP in the next price submission period	-	0.150	0.468	1.153	1.123
MWD expenditure required to implement and review the LHWP in the next price submission period	-	0.453	0.828	1.220	1.250
MWD costing basis	-	-0.003	-0.017	-0.06	-0.085
Total	**-1.035**	**0.600**	**1.280**	**2.313**	**2.228**

* Removed from the 2016 base and proposed expenditure added for each year of the next price submission period

[90] Lower Hunter Water Plan Roles and Responsibilities Protocol, Hunter Water and Department of Primary Industries
[91] MWD LHWP Reconciliation to 30 June 2014, Hunter Water.
[92] LHWP Planning Ahead, Metropolitan Water Directorate.

4.12.4 Operational activities

HW's price submission states that operational activities (excluding electricity) are driving a $3.6 million increase in expenditure over the next price submission period and that the cost increases are primarily driven by servicing growth and higher quality treatment attributable to recent wastewater treatment plant upgrades to meet EPA licence requirements and pollution reduction programs.

HW subsequently advised during our review that this is more correctly characterised as being driven by:

- Electrical and mechanical preventative maintenance, particularly for high value assets ($2.3 million). This has not been a focus of the business previously despite statutory maintenance requirements, but given assessed compliance and risk issues is now seen to be necessary. HW noted that this increase is offset by the planned efficiencies through utilisation of in-house resources to reduce mechanical and electrical contractor costs ($2.4 million) see Section 4.12.9.
- An increase in costs for the digitisation project ($1.3 million) which is required to scan and categorise historical information such as operations and maintenance manuals and strategies, and studies.[93]

4.12.4.1 Preventative electrical and mechanical maintenance

HW itemised electrical and mechanical preventative maintenance opex required over the price submission period (as detailed in Table 4.4 in Section 4.9.1 for 2016) including the following significant items:

- Preventive maintenance on borefields – surveillance, inspections and corrective maintenance ($0.468 million)
- Cranes – compliance inspections ($0.120 million)
- Condition monitoring on critical pumps – enabling a reduction in breakdowns and capital replacements ($0.4 million)
- Electricity protection – replay replacement with protection technicians required ($0.240 million)
- High voltage – clearing of power lines, including for new and upgraded assets ($0.9 million).[94]

We consider that such maintenance activities are prudent, particularly to the extent that they are required to meet LHWP and statutory requirements and minimise known and potential risks.

The information provided by HW about these costs showed that HW has undertaken an assessment of the activity that is required over the price submission period and the associated cost to ensure that the relevant requirements are met.[95] Combined with our view that HW's procurement practices lead to efficient costs, we recommend that this expenditure is efficient. We note that the information provided clarified that this is total opex for the period and not incremental opex (relative to the 2016 base and does not therefore explain the full $2.3 million of the increase via operational activities). Therefore, while we recommend that this expenditure is efficient it will result in a lower opex than in 2016 as is shown in Table 4.20.

4.12.4.2 Digitisation project

HW provided us with a summary of the digitisation project as follows[96]:

- Existing hardcopy files stored at HW locations currently expose the organisation to the risk of information being lost due to mishandling, misplacement or natural disaster including fire, flood and pest
- Such loss carries significant legal and statutory implications
- A Back Capture Digitisation Pilot Project was proposed to confirm future scope, delivery phases, costs and benefits for an entire Back Capture Digitisation project

[93] JO2_57 Efficiencies next PPP v 1, Hunter Water.
[94] JO2_57 Efficiencies next PPP v 1, Hunter Water.
[95] Explanation of increased electrical and mechanical maintenance items
[96] Response to Opex Digitisation Project – Request 112

- The Expenditure Review Committee approved the business case for the pilot project on 12 August 2014 and the pilot was completed in June 2015. Early indications from the pilot are positive with users reporting that information is easier and quicker to access
- A full business case for the entire Back Capture Digitisation project will be developed this financial year
- The pilot costings and expected economies of scale have established an estimate of $2.7 million to digitise all hardcopy files stored within Head Office basement and the Burwood Beach Wastewater Treatment Plant over approximately 5 years. While $2 million ($0.5 million pa) was included over the 4 years of next price submission period the Executive Management Team subsequently revised this allocation down to $1.3 million following further prioritisation of initiatives to fit within the overall corporate opex budget envelope. The implication of this reduction will be that approximately 50% of the most important documents will be digitised over the next price submission period with a reassessment of the digitisation of the remaining records for the following price submission period.

We consider that this project is prudent given the statutory requirements around records management, that it will reduce the risk of lost information and provide benefits to staff in terms of being able to better access information. Following the pilot, a subsequent business case has not been developed to confirm future scope, delivery phases, costs and benefits. However, we have been provided with additional workings that set out the basis for the revised allocation of $1.3 million.[97]

This estimate includes a contingency of 15% and internal labour costs, which reflect the utilisation of an existing staff member, at a combined cost of around $0.19 million. Given that a pilot has been undertaken to inform this project and that procurement practices will be applied to achieve a market price we do not consider the contingency costs are efficient. Further, the internal labour costs reflect part of a person's time and do not appear to be related to a new staff member and we recommend they be removed. The recommend total project cost is therefore $1.1 million as set out in Table 4.20 (noting we have assumed an equal spread of these costs over the four years of the next price submission period).

Table 4.20 : Recommended opex for additional operational activities ($2016 million)

Item	2016	2017	2018	2019	2020
Preventative electrical and mechanical maintenance	0.764	0.575	0.575	0.575	0.575
Digitisation project - Head Office (additional to pilot project)	-	0.279	0.279	0.279	0.279
Total	**0.764**	**0.854**	**0.854**	**0.854**	**0.854**

4.12.5 Chemicals

Chemical cost increases proposed by HW are mainly driven by changing regulatory requirements (licence conditions and pollution reduction programs) which require more technically advanced processes at wastewater treatment plants (e.g. implementing ultraviolet disinfection at Burwood Beach wastewater treatment plant). Health regulations often require treatment with more chemicals like chlorine to ensure higher levels of residual chlorine depending on the quality of water input. New wastewater pumping stations and capital upgrades to a number of wastewater treatment plants to meet demand growth necessitate additional chemical use for odour control. Wastewater odour control is required to comply with environment protection licence conditions and to meet community expectations.

We consider chemical expenditure to be prudent on the basis of health requirements and compliance with the Australian Drinking Water Guidelines 2011 which forms part of HW's licence conditions as well as compliance with EPA requirements to treat wastewater.

HW has assumed chemicals prices will remain at current levels for the next price submission period. Based on past experience HW does not expect the change in volume to drive changes in cost. HW's procurement procedures ensure that value for money is achieved when it retenders contracts for provision of chemicals. Similar requirements are included in the Veolia contract.

[97] HW2013-893 3 008 Data – Digitisation Opex Budget Planner

The cost of chemicals is forecast to increase due to higher quantities required for drinking water quality management and wastewater odour management. NSW Health has endorsed HW's disinfection optimisation strategy that aims to improve disinfection residuals throughout the water network to control microbiological water quality. This requires an increase in chlorine usage. The Australian Drinking Water Guidelines 2011 require a multi-barrier approach to water quality protection including maintaining disinfection residual of at least 0.2 mg/L of free chlorine within the distribution system.

NSW Health had requested that HW improves the presence of free chlorine to protect against potential bacterial ingress. The Disinfection Optimisation Strategy was completed in 2014 with the objective of improving the persistence of a disinfection residual (free chlorine) within the distribution system.

As a result of increased chlorine dosing, HW expects customer complaints to increase. A communications strategy is being developed to advise customers of the changes and the changes will be implemented gradually with the opportunity to adjust the planned dosing schedule to respond to (or minimise) customer impacts.

A risk assessment of the Grahamstown Dam catchment has recommended increasing chemical dosing at the Grahamstown WTP to increase the robustness of the treatment process and to reduce risk by maintaining the currently high drinking water quality from the WTP through this increase in chemical dosing. We consider this approach to be prudent and in line with good water industry practice.

The cost increases associated with disinfection optimisation strategy and Shortland WWTP sludge management relate to complying with regulatory requirements in a manner that satisfies the regulators (NSW Health and EPA respectively).

We consider HW has used a rigorous process to identify and quantify the increased budget for chemical costs over the next price submission period. They have provided to us information that indicates NSW Health endorsement of their plans for the Burwood Beach Wastewater Treatment Plant as well as minutes of meeting with NSW Health detailing action plans for other water and wastewater treatment plants. Details of the disinfection optimisation strategy and the Grahamstown Dam and treatment plant health-based targets assessment have also been provided detailing actions required and budget implications. We therefore accept that HW's proposed chemical costs for the next prices submission period, as shown in Table 4.21, are efficient.

Table 4.21 : Chemical costs 2017 – 2020 ($2016 million)

Initiative	Details of Initiative	Price Period Total	2017	2018	2019	2020
Chemicals						
Disinfection Optimisation Strategy - Stage 1	Health - manage water quality risk - improved chlorine residual	0.48	0.12	0.12	0.12	0.12
Disinfection Optimisation Strategy - Stage 2	Health - manage water quality risk - improved chlorine residual	0.24			0.12	0.12
Grahamstown water treatment plant - Enhanced Coagulation	Health - manage water quality risk	1.28	0.32	0.32	0.32	0.32
Morpeth wastewater treatment plant Interim Upgrade	Dosing to meet N & P load limits	0.09			0.05	0.05
O&M other than chemicals						
Burwood UV	Maintenance costs for Burwood UV	0.43	0.11	0.11	0.11	0.11
Paxton wastewater treatment plant effluent management strategy	catchment improvement works, monitoring post implementation	0.23		0.075	0.075	0.075
Both chemicals and other						

Initiative	Details of Initiative	Price Period Total	2017	2018	2019	2020
Shortland Sludge Management Upgrade	Incremental chemicals and maintenance costs	0.72	0.178	0.179	0.181	0.182
			0.73	0.80	0.97	0.97
Total Chemical Costs		3.47				
Allocated to water		2.09	0.44	0.44	0.61	0.61
Allocated to wastewater		1.38	0.29	0.36	0.36	0.37

We do, however, have an issue with the way HW has characterised "chemical cost" as this includes some cost which would be better allocated to operations and/or maintenance. Specifically, HW has included the maintenance costs for Burwood UV and catchment improvement works and monitoring costs at Paxton wastewater treatment plant as part of chemical cost. We recommend that HW considers the proper identification of chemical costs as cost related to the use (volume) and price of chemicals and separately identifies related maintenance and operations cost and allocate these to the respective categories.

4.12.6 Strategies and studies

Strategy and study opex, funds studies by external consultants in specialty areas that HW does not have the internal expertise to conduct. HW has proposed a total of $16.3 million expenditure for strategies and studies over the next price submission period compared to $13.9 million in the current price submission period (on the basis of multiplying the 2016 budget by 4). After removing consultancies related to the LHWP (considered separately in 4.12.3) and energy management (included in electricity) the comparison is $12.5 million in the next price submission period, to $10.9 million in the current price submission period, an increase of $1.6 million (14.9%). This is illustrated in Table 4.22 and was used by HW in its price submission as the basis for providing an overview of the drivers of cost increases in the next price submission period.[98]

Table 4.22 : HW proposed budget for strategies and studies ($2016 '000)

Item	2016	2016 x 4	2017	2018	2019	2020	Total PP20	Variance Total PP to 2016 x 4
Planning support	90.0	360.0	57 .9	130.9	75.4	75.4	**339.5**	-20.5
Environment & Sustainability	379.7	1,518.8	335.3	320.0	320.0	320.0	**1,295.3**	-223.6
Water Planning	1,629.2	6,516.7	1,361.6	1,503.4	2,132.5	2,098.1	**7,095.6**	578.9
Wastewater Planning	740.7	2,962.8	342.5	1,030.0	1,030.0	1,030.0	**3,432.5**	469.7
Asset Management	482.8	1,931.4	493.6	995.6	874.5	874.5	**3,238.2**	1,306.8
Energy Management	154.0	615.8	158.7	246.0	246.0	246.0	**896.7**	280.9
Less LHWP (HW costs included in Water Planning above)	-600.0	-2,400.0	-150.0	-468.4	-1,152.5	-1,123.1	**-2,894.0**	-494.0
Less Energy Management (included in electricity)	-154.0	-615.8	-158.7	-246.0	-246.0	-246.0	**-896.7**	-280.9
Total Budget for Strategies and Studies	**2,722.4**	**10,889.6**					**12,507.0**	**1,617.4**

HW indicates strategy and study expenditures are aimed at developing proactive asset maintenance strategies reflecting an increased focus on asset management and servicing studies to ensure the efficient utilisation of

[98] Hunter Water, *Submission to IPART, On prices to apply from 1 July 2016*, page 41-42

upgraded assets and to inform an efficient capital prioritisation process. Wastewater treatment strategy expenditure is projected to increase, to meet EPA expectations such as mandatory pollution reduction programs and the new effects-based assessment approach to developing wastewater network strategies to manage wet weather. These studies are existing commitments and do not relate to changes to regulatory requirements or increases in mandatory performance requirements.

We accept that, given the highly regulated environment that HW operates in and with customers, regulators and government demanding continuing improvements in the planning, management and efficient operations of its water and wastewater infrastructure, HW is required to undertake studies into how best to achieve such objectives. We therefore find that expenditure in this area is prudent.

HW has provided details of strategies and studies that it proposes to undertake in the next period to us. We have reviewed these and consider them to be reasonable. We therefore recommend that IPART accepts the proposed budget for water and wastewater planning as set out in Table 4.23.

Table 4.23 : Recommended opex for water and wastewater planning strategies and studies ($2016)

Reason/Need	2016	2017	2018	2019	2020
Servicing Strategies	28,538	60,000	30,000	30,000	20,000
Data collection for planning purposes	10,000	10,000	10,000	10,000	10,000
Low Pressure Annual Forecast	40,000	0	40,000	0	40,000
Review of water modelling software	0	0	0	35,000	0
Design Demand Review	0	0	35,000	0	0
Grahamstown Adaptive Management Strategy (GAMS)	160,229	281,614	260,000	130,000	130,000
Chichester Dam Management & Ecological Studies (CHIMES)	5,000	25,000	25,000	50,000	50,000
Sustainable Groundwater Extraction Strategy (SGES) - Baseline Monitoring Program	35,000	70,000	70,000	70,000	50,000
Sustainable Groundwater Extraction Strategy (SGES) - Water Stress Monitoring Program	40,000	40,000	40,000	40,000	40,000
Catchment Improvement Program	489,950	550,000	380,000	470,000	490,000
Water Treatment Strategy Studies & Upgrade Options Analysis	41,999	160,000	130,000	130,000	130,000
Australian Drinking Water Guidelines - Compliance assessment	15,000	15,000	15,000	15,000	15,000
Chichester Dam Sediment Source Study	115,000	0	0	0	0
Irrawang Swamp Ecological Study	48,460	0	0	0	0
Total Water	**1,029,176**	**1,211,614**	**1,035,000**	**980,000**	**975,000**
Effects Based Assessment Strategy	103,000	100,000	120,000	120,000	120,000
Servicing Strategies/System Performance	90,000	99,650	120,000	120,000	120,000
Flow Gauging	42,694	0	60,000	60,000	60,000
Model calibrations	90,000	32,000	80,000	80,000	80,000
Environmental Studies to support licence variations (e.g. Morpeth, Belmont, Lake Macquarie)	150,000	50,000	150,000	150,000	150,000
Capacity Reviews	100,000	10,854	200,000	200,000	200,000
Upgrade Strategies/Effluent Management Strategies (EMS)	164,997	50,000	300,000	300,000	300,000
Total Wastewater	**740,691**	**342,504**	**1,030,000**	**1,030,000**	**1,030,000**

HW has also provided its proposed opex for Asset Management strategies and studies as in **Table 4.24**.[99]

Table 4.24 : HW proposed opex for Asset Management strategies and studies ($2016)

Item	2014 Actual	2015 Actual	2016	2017	2018	2019	2020
WSAA Asset Management Projects	37,000	9,272	30,000	40,000	40,000	40,000	40,000
Asset Revaluations	61,000	24,600	35,000	35,000	35,000	35,000	35,000
Asset Standard Revisions & Improvements	8,788	65,000	50,000	80,000	80,000	80,000	80,000
Dam Safety Investigations & strategies	44,249	9,000	50,000	100,000	100,000	100,000	100,000
Electrical Compliance Investigations & strategies	23,289	0	0	75,000	75,000	75,000	75,000
Asset Risk Profile							
Raw Water Risk Profile	0	0	100,000	0	0	50,000	0
Water main Risk Profile	0	0	0	0	0	0	100,000
Sewer main Risk Profile	0	0		0	100,000	0	0
Treatment Risk Profile Revision	0	0	0	0	0	150,000	0
Water Pump Station & Reservoir Risk Profile	15,000	124,000	0	0	100,000	0	0
Asset Class Management Plans							
Electrical Asset Management Plans	149,636	0	0	70,000	0	70,000	0
Mechanical Asset Management Plans	0	80,000	80,000	0	30,000	0	30,000
Dam & Structural Asset Management Plans	29,500	45,123	0	0	50,000	0	50,000
Water mains Asset Management Plan	0	120,000	0	50,000	0	0	50,000
Wastewater Mains Management Plan	0	36,000	50,000	0	100,000	0	0
Pump Station Management Plan	0	0	0	0	50,000	0	0
Treatment plant Asset Management Plans	0	0	0	0	0	0	50,000
Asset Reliability/Maintenance Strategies							
Critical Main Reliability Strategies	0	89,555	50,000	0	0	100,000	100,000
Critical Facilities Reliability Strategies	58,650	35,000	0	0	100,000	0	100,000
Asset Maintenance Strategies	0	0	50,000	0	60,000	60,000	60,000
Water Loss Strategies	0	0	0	0	0	60,000	0
Inflow-Infiltration Improvement Strategies	0	0	0	50,000	0	50,000	0
Customer Hot Spot Strategies	0	0	0	0	60,000	0	0
Total Asset Management[100]	**427,112**	**637,550**	**495,000**	**500,000**	**980,000**	**870,000**	**870,000**

HW has provided details of the increases proposed for asset management strategies and studies. These are summarised below.

- Asset Standard Revisions and Improvements - HW informed us that it is constructing approximately $80 million worth of assets each year, while Developers are constructing approximately $20 million worth of assets on behalf of HW. Currently, HW has a single Asset Standards Engineer and small operational budget (i.e. $50,000 per year). This relates to a combined annual budget of approximately $200,000 per year which represents a 0.2% of total annual capital asset investment.

  HW has proposed an increase in the Asset Management Strategies and Studies budget from $50,000 to $80,000 per year for management of asset standards, which is still considered low but will allow both the

[99] J02_53_1 – Strategies summary (15-16 by 4 comp to PP20)
[100] We note that the details provided by HW of its proposed budget for asset management strategies and studies shown in Table 4.24 do not exactly match HW's proposed strategies and studies budget shown in Table 4.22.

participation in the review of national conformance and the revision and update of high risk Standard Technical Specifications (some have not been updated since 2002). This work will minimise the risk of designing and constructing either non-compliant or inefficient assets which will more than offset the proposed increase in proposed budget.

- Dam Safety Revisions and Improvements - The proposed budget for Dam Safety has increased from the 2015-16 of $50,000 to $100,000 per year over the next 4 years to meet the mandatory compliance requirements of the Dam safety Committee specified in the recently completed 5 yearly Dam Surveillance Report.
- Electrical Compliance Investigations and Strategies - To maintain an adequate and compliant electrical management system, HW proposes to increase from $25,000 to $75,000 per year over the next 4 years (i.e. an increase of $200,000) to obtain specialist input and assist in the delivery of the following activities:
  - Review and update all of the electrical asset class management plans on a rolling 4 year program
  - Undertake technical reviews of standards and facility compliance
  - Update the electrical safety management system documentation
  - Undertake asset improvement strategies (e.g. High voltage, earthing, protection systems, etc.)
- Wastewater Mains Management Plans - The increase in budget ($50,000) is to manage the revision and update of the Wastewater Mains Management Plans, which includes the bulk transfer mains (Interceptor and Oviform), critical sewer mains, non-critical sewer mains, rising mains, main fittings (i.e. maintenance holes, emergency overflow structures, air valves, reflux valves and scour valves), critical crossings, treatment effluent mains and treatment outfalls. HW has committed to implement the ISO 55000 Asset Management System, and the creation of asset management plans will be a compliance requirement of this system. HW are proposing to use both the internal resources and the Asset Management System budget to develop new asset Management Plans, while the proposed budget will be used to revise and update the existing developed plans.
- Asset Reliability/Maintenance Strategies including Critical Mains Reliability Strategies, Critical Facilities Reliability Strategies and Asset Maintenance Reliability Strategies - the proposed budget increase is to proactively manage HW's critical assets or optimise the maintenance and performance costs of non-critical assets. HW indicates that the budget increase for critical asset reliability strategies is needed to achieve the asset reliability and compliance requirements, and has been proposed as a supplement to internal labour for specialist services. Similarly, for non-critical assets, the proposed increase is required to assess current requirements and performance and to develop strategies to achieve the optimum asset maintenance requirements and implement the commitments associated with managing the assets. The proposed Asset Management Strategies and Studies will supplement internal labour, and be focussed on analytics and strategies and specialist services for preventive maintenance. The delivery of these strategies will be through a competitive tender via Hunter Water's Engineering Services Panel.

Given these explanations, we are satisfied that HW's proposed budget for asset management and strategies are efficient and the recommended opex for asset management strategies and studies as set out in **Table 4.25**. We consider that HW will be able to implement the recommendations we have made in Task 1 and Task 3 about putting in place a risk and condition based approach to asset replacement/refurbishment expenditure.

Table 4.25 : Recommended opex for Asset Management strategies and studies ($2016)

Item	2016	2017	2018	2019	2020	Allocate to:
WSAA Asset Management Projects	30,000	40,000	40,000	40,000	40,000	Water & Wastewater
Asset Revaluations	35,000	35,000	35,000	35,000	35,000	Water & Wastewater
Asset Standard Revisions & Improvements	50,000	80,000	80,000	80,000	80,000	Water & Wastewater
Dam Safety Investigations & strategies	50,000	100,000	100,000	100,000	100,000	Water
Electrical Compliance Investigations & strategies	0	75,000	75,000	75,000	75,000	Water & Wastewater

Item	2016	2017	2018	2019	2020	Allocate to:
Asset Risk Profile						
Raw Water Risk Profile	100,000	0	0	50,000		Water
Water main Risk Profile	0	0	0	0	100,000	Water
Sewer main Risk Profile	0	0	100,000	0	0	Wastewater
Treatment Risk Profile Revision	0	0	0	150,000	0	Water & Wastewater
Water Pump Station & Reservoir Risk Profile	0	0	100,000	0	0	Water
Asset Class Management Plan						
Electrical Asset Management Plans	0	70,000	0	70,000	0	Water & Wastewater
Mechanical Asset Management Plans	80,000	0	30,000	0	30,000	Water & Wastewater
Dam & Structural Asset Management Plans	0	0	50,000	0	50,000	Water
Water mains Asset Management Plan	0	50,000	0	0	50,000	Water
Wastewater Mains Management Plan	50,000	0	100,000	0	0	Wastewater
Pump Station Management Plan	0	0	50,000	0	0	Water & Wastewater
Treatment plant Asset Management Plans	0	0	0	0	50,000	Water & Wastewater
Critical Main Reliability Strategies	50,000	0	0	100,000	100,000	Water & Wastewater
Critical Facilities Reliability Strategies	0	0	100,000	0	100,000	Water & Wastewater
Asset Maintenance Strategies	50,000	0	60,000	60,000	60,000	Water & Wastewater
Water loss Strategies	0	0	0	60,000	0	Water
Inflow-Infiltration Improvement Strategies	0	50,000	0	50,000	0	Stormwater
Customer Hot Spot Strategies	0	0	60,000	0	0	Corp
Total Asset Management	**495,000**	**500,000**	**980,000**	**870,000**	**870,000**	

HW has also proposed approximately $1.6 million for strategies and studies in planning support and environment and sustainability. While details of these strategies and studies provided by HW are limited, the level of proposed expenditure is consistent with the levels expended in the current period which had been found to be efficient. We thus recommend that the proposed expenditure for strategies and studies for planning support and environment and sustainability be accepted.

HW had not advised us as to how opex for the asset management strategies and studies is to be allocated to its products. As a result, we have undertaken our own assessment and where the allocation is divided between water and wastewater we have split it equally between the two products. We have also equally allocated the proposed expenditure for planning support and environment and sustainability equally between water and wastewater. The resulting recommended allocation of total strategies and studies expenditure is in Table 4.26.

Table 4.26 : Recommended opex for strategies and studies by product ($2016)[101]

Allocated to:	2016	2017	2018	2019	2020
Water	1,561,526	1,708,166	1,745,462	1,692,692	1,757,692
Wastewater	1,173,041	689,056	1,690,462	1,532,692	1,512,692
Stormwater	-	50,000	-	50,000	-
Corporate	-	-	60,000	-	-
Total	**2,734,567**	**2,447,222**	**3,495,925**	**3,275,384**	**3,270,384**

4.12.7 New initiatives

Figure 5.6 on page 41 of HW's submission shows additional expenditure of $1.4 million over the next price period for new initiatives. New initiatives relate to the outcomes of capital expenditure projects, strategic initiatives, expedient management of future compliance risks and contractual obligations. Regulatory compliance requirements, contractual obligations and future compliance risks were prioritised over operating costs driven by new capital projects and over other strategic initiatives. Examples of new initiatives include improved waste storage, customer service initiatives such as increasing customer service coverage and personalised customer service.

HW provided the details in Table 4.27 about their new initiatives for the period 2017 to 2020.

Table 4.27 : Proposed new initiatives for 2017 to 2020 ($2016 '000)[102]

New initiative	2017	2018	2019	2020	Total 2017 to 2020
Biosolids Storage	100.0	100.0	100.0	100.0	400.0
Treatment Plant Earthing Inspections	43.5	43.5	43.5	43.5	174.0
ISO Audits (previously capitalised)	25.0	25.0	25.0	25.0	100.0
Computer Software Support, Computer Software, Licences - Contract Management Software	45.3	45.3	45.3	45.3	181.0
Recruitment - Agency Fees Establishment recruitment panel list - assume up to 5 sourced recruitments with 15% placement fee	67.5	67.5	67.5	67.5	270.0
Multiple Occupancy AMI/AMR (automated) Meter Reading Solutions In 2016 investigate ability to leverage SWC AMR/AMI multi-occupancy solution and utilise their data management system.	10.0	10.0	10.0	10.0	40.0
Pop Up Customer Centre Develop the capability for full-service "pop-up" customer centres for targeted community activities by Year 2 of the Strategic Plan	50.2	50.2	50.2	50.2	201.0
Total new initiatives	**341.5**	**341.5**	**341.5**	**341.5**	**1,366.0**

We note that other than the new initiative of biosolids storage, ISO audits and pop-up centre the other initiatives have already been accounted for in the 2016 base year (see Section 4.9). In our view, these are not new initiatives in the 2017 to 2020 period but are rather a continuation of the programs introduced in 2016.

For example, HW has included Multiple Occupancy AMI/AMR (automated) Meter Reading Solutions in 2016 base. As noted in Section 4.9, this project is to investigate metering solutions for multi-occupancy residential

[101] Table 4.26 does not reconcile exactly with Table 4.22 due to differences in the details provided by HW for its proposed Asset Management Strategies and Studies from its overall proposed Strategies and Studies budget.
[102] JO2_54 New initatives.pdf

customers and aims to be able to bill individual units in high rise developments (strata unit complexes) via automated meter reading solutions. Given that this project is a continuation of the initiative started in 2016, and increases in expenditure are not expected, the additional expenditure proposed for the next regulatory period is not appropriate.

For the proposed higher biosolids storage costs, HW advised us during our discussions that they are currently not fully compliant with EPA requirements for the storage of biosolids before disposal. As a result they expect to be required to upgrade their storage facility and processes.

The cost of ISO audits to maintain certification is forecast to increase form the current level of $20,000 p.a. to $25,000 p.a. from 2016-17 as HW achieves certification of its asset management systems. From 2016-17 onwards the compliance audits to maintain ISO certification will cover work health and safety, environmental management systems, quality and asset management. An additional expenditure of $5,000 p.a. is thus expected.

The pop-up customer centre initiative for the next regulatory period is budgeted at $50,000 p.a. An allowance for $30,000 has been included in the base year cost. HW has provided explanation for the extra $20,000 p.a. to be spent in 2017 to 2020 period.

We therefore recommend the additional opex for biosolids storage of $100,000 p.a., to be allocated to wastewater services, additional $5,000 p.a. for ISO Audits (allocated to corporate) and $20,000 p.a. for additional cost of the pop up customer centre initiative (allocated to water) in the next price period.

4.12.8 Other costs

HW has also proposed that some other minor costs increases be included from 2017 as shown in Table 4.28.

Table 4.28 : HW's proposed other expenditure for 2017 to 2020 ($2016 '000)

Other cost items	2017	2018	2019	2020
Rates and Land Tax	106.7	110.2	113.9	117.7
Computer Software- Licences	282.8	249.9	7.5	0.0
Printing and Postage	7.3	7.4	7.5	7.6
Surveys	4.9	-39.1	136.7	-117.2
Property Management and Leasing	34.9	40.9	41.6	42.3
Total	**436.6**	**369.4**	**307.2**	**50.4**

HW provided to us details of two of the largest cost items - rates and land taxes and computer software licences. The proposed opex for rates and land taxes for the next price submission period incorporated an average increase in council rates of 4.4% across all council areas in which HW's assets are located and is based on IPART's council rate decisions. Computer software licence fees are payable on the software that HW uses to manage its operations and assets. This software includes its GIS, drawings management system, SCADA system and upgrades, maintenance workflows and customer support and billing systems.

HW conducts a survey of its customers to canvass their views to inform HW's operations and priorities. Over the period there are annual variations to how much HW spends but over the whole period the expected expenditure increase is minor. HW also expects some minor increase in printing costs and postage.

HW has also increased costs for property management and leasing amounting to about $40,000 p.a. We are of the opinion that a little over half of this cost is not prudent, given our assessment of the impact of the asset recycling of HW's Head Office, in that $23,000 p.a. relates to the real increases in the lease costs for Head Office. We accept that the $18,000 budgeted for the real increase in property, third party and public liability insurance given the claims lodged by HW for bushfires in October 2013 and the April 2015 East Coast Low storm event.

In the AIR, for 2016, HW has directly allocated $60,000 of corporate cost to KIWS. A further $360,000 was also allocated as KIWS's share of general corporate overheads in accordance with HW's overhead allocation methodology. With the proposed sale of KIWS, the $60,000 direct cost will be removed from HW's operating expenditure while the $360,000 pa[103] overhead allocation will be re-distributed to other products. HW has indicated that there are "*no harvestable efficiency in corporate overhead for disposing of KIWS*" and that "*customers had "enjoyed the benefit" of having a disproportionate amount of corporate overhead applied to recycled water and therefore not across the broader customer base*."

We accept HW's explanation that the overhead allocation of $360,000 will not be substantially changed with the sale of KIWS. We however note that the allocation of general overheads to KIWS and recycled water in the past may have breached HW's ring-fencing arrangement for recycled water where only expenditure directly related to recycled water should be allocated to the product.

We recommend that the costs in Table 4.29 be included in the opex for 2017 to 2020, allocated to corporate expenditure. Total addition expenditure for these other cost items amount to about $1 million over the next price submission period.

Table 4.29 : Recommended other expenditure for 2017 to 2020 ($2016 '000)

Other cost items	2017	2018	2019	2020
Rates and Land Tax	106.7	110.2	113.9	117.7
Computer Software- Licences	282.8	249.9	7.5	0.0
Printing and Postage	7.3	7.4	7.5	7.6
Surveys	4.9	-39.1	136.7	-117.2
Property Management and Leasing	18	18	18	18
Total	**419.7**	**346.4**	**283.6**	**26.1**

4.12.9 Efficiencies

HW's price submission states that it will achieve an additional $4.9 million of efficiencies in the next price submission period compared to 2016 via the initiatives set out in Table 4.30.

Table 4.30 : HW's expected efficiencies 2017 – 2020 ($2016 million)

Items	2017	2018	2019	2020	Total
Maintenance contractors (in-house resource utilisation)	0.50	0.60	0.60	0.70	2.40
Workforce planning and preventive maintenance	0.40	0.40	0.40	0.50	1.70
Civil maintenance workforce rostering	0.20	0.20	0.20	0.20	0.80
Total	**1.10**	**1.20**	**1.20**	**1.40**	**4.90**

4.12.9.1 In-house resource utilisation

Putting in place the contract with Veolia for the operations and maintenance of the water and wastewater plants has meant that the in-house workforce previously undertaking maintenance activities at the treatment plants has been freed up to perform other duties. As a result, HW is proposing to utilise some of these in-house resources to undertake a proportion of the mechanical and electrical maintenance in the network previously done by contractors. It has challenged itself to reduce its expenditure on mechanical and electrical contractors by 25% in 2017, 28% in 2018, 30% in 2019 and 33% in 2020.[104] HW also states in its price submission that an increased emphasis on condition-based maintenance scheduling will improve productivity by identifying underperforming equipment and scheduling planned work before breakdowns occur, reducing inefficiencies and overtime costs.

[103] Or $800,000 as indicated by an email from Ardie Morris of HW dated 2 Nov 2015.
[104] JO2_57 Efficiencies next PPP v 1, Hunter Water.

HW has advised that the freed up labour has been absorbed in the current price submission period by reducing contractor use (that is, no net increase in labour costs). The above savings will be achieved by using the existing internal labour workforce more efficiently and hence further reduce contractor spend. Further, HW has advised that the electrical and mechanical labour cost (hourly charge rate) is favourable or equal to its panel contractors that have been competitively tendered.[105]

We consider these efficiency improvements to be reasonable and we recommend they be included in the opex for the next price submission period:

This is set out in Table 4.31 in Section 4.12.9.3.

4.12.9.2 Workforce planning

HW's price submission also states that further efficiencies will be achieved via a central dispatch team that will be tasked with improving the scheduling and monitoring of (civil) maintenance activities. This will involve allocating resources to both reactive and preventative maintenance activities, so that there is a balance between cost prevention and attending to the expected increase in water main leaks and repairs due to the age profile of HW's assets. We were also advised that the focus on improvements in planning and scheduling will continue to see a reduction in contractor spend as more work is completed internally. For example a high proportion of water service repairs are undertaken by contractors and with the new scheduler these jobs can be held and current workload considered before deciding to send the job to internal crews or contractors.[106]

HW has modelled these efficiencies by estimating a reduction in the average cost per job across various civil maintenance jobs, e.g. water main breaks and leaks, hydrants and valves, sewer main blockages and shafts and branches. Cumulative productivity improvements have been incorporated, starting with a 2.5% improvement in 2017 and further increases of 0.95% in 2018 and 0.2% in 2019 and 0.2% in 2020.[107]

We consider these efficiency improvements to be reasonable given:

- The limited flexibility that HW has with its in-house workforce under the Enterprise Bargaining Agreement which govern the number of employees on call at any one time and the frequency of rosters
- That many civil maintenance activities are contracted out, particularly where there are competitive markets e.g. for traffic control, mowing and pruning and /or where there is specialist skills or equipment, e.g. excavator hire, or jetting trucks and CCTV equipment for undertaking condition assessments of the sewer mains following repeat chokes. In addition, these contracts are regularly market tested and re-tendered where better value can be achieved.[108] [109]

4.12.9.3 Workforce rostering

We note that the civil maintenance workforce rostering savings will not be possible as a result of the Enterprise Bargaining Agreement renegotiations which did not support this initiative. HW has noted its commitment to continuing to seek these efficiencies via alternative efficiencies during the price submission period.

We consider it reasonable that HW seeks to achieve these savings over the next price submission period. We have considered the efficiencies proposed by HW and consider them to be appropriate. We recommend that they be incorporated into the forward view of opex for the next price submission period.

[105] Task 2A – Opex – Hunter Water consolidated comments for issue
[106] P1_T3_1 Civil Maintenance Roster and FTEs REPLACEMENT
[107] JO2_57 Efficiencies next PPP v 1, Hunter Water.
[108] P1_T3_1 Civil Maintenance Roster and FTEs REPLACEMENT
[109] CS0275 Board Paper – Sewer main jetting and CCTV v3 and ERC Paper – Recommend to Award CS0422

Table 4.31 : Recommended efficiencies 2017 – 2020 ($2016 million)

Items	2017	2018	2019	2020	Total
Maintenance contractors (in-house resource utilisation)	0.50	0.60	0.60	0.70	2.40
Workforce planning and preventive maintenance	0.40	0.40	0.40	0.50	1.70
Civil maintenance workforce rostering	0.20	0.20	0.20	0.20	0.80
Total	**1.10**	**1.20**	**1.20**	**1.40**	**4.90**

We have also considered whether there are any other savings which could be realised, in addition to those recommended in the above sections examining specific cost drivers and initiatives. As examined in Task 2B, HW is proposing a significant capital program related to Information, Communication and Technology (ICT). HW states that 'preliminary program planning will identify significant anticipated changes to operating expenditure arising from each program (if any). These impacts are then incorporated into forward ICT operating budgets which are then moderated to fit within corporate operational expenditure boundaries. Where increases are identified, it is anticipated that equivalent savings should be achieved within the same or other ICT programs to minimise overall operational expenditure as per the guidance from Corporate Finance'.

We have examined the business cases for the Client Computing Program and the Customer Service Platform Refresh Program. There are no associated opex impacts included in the Client Computing Program and increased opex requirements in the Customer Service Platform Refresh Program. We have not observed any consideration of efficiencies in these business cases, despite both projects having the potential to realise them given their nature, objectives and scope:

- The Client Computing Program business case notes in relation to its objectives, the continuing ability of field staff and others to work remotely and access information in real time, the ongoing use of smart phones to enable access to email and communications while outside the office and the focus on optimising the workforce efficiency with the theme 'anywhere, any device'. These all suggest that the possibility of additional efficiency savings, particularly in relation to labour costs, should be considered[110]
- The Customer Service Platform Refresh Program notes in terms of the options analysis and what is proposed to be implemented at least electronic billing, on-line self service capabilities, IVR integration and mobile applications (for option 2). Again these suggest the possibility of efficiencies should be considered in the development of the business case, particularly in relation to printing and postage costs for bills and customer service staff. [111]

We expect that ICT projects give full consideration to the potential for efficiencies and that these are incorporated into opex budgets. While this is not the case for the two business cases examined, we have not reviewed a sufficient sample of ICT business cases to make a broader finding. We do, however, recommend that in all future ICT business case the consideration of additional opex and possible efficiencies is a mandatory part of the business case sign off.

From an overall perspective we have also considered how well HW benchmarks in terms of operating cost per property against other comparable water entities. HW notes in its submission that for 2013-14 it had the lowest opex per property amongst it cohort (major utilities) and was 39% lower than the median for large utilities. This is based on the National Performance Report benchmarking. When the operating cost per property data from this benchmarking is analysed it can be seen that this result is driven by HW's relatively lower operating cost per property for water where it had the lowest cost across the major utility category. In contrast, it does not have this cost advantage in relation to wastewater where in 2014 HW had the fifth highest operating cost per property and was 5% higher than the median cost.

Given this we have carefully examined HW's proposed wastewater operating expenditure and as set out in Table 4.32 and Table 4.33 only allowed prudent and efficient changes to determine the efficient base for 2016 and then the prudent and efficient changes for 2017 to 2020. This has resulted in some reductions in wastewater opex, e.g. as a result of savings from the Veolia contract and reduced electricity costs.

[110] Business Case – IPART PP16 – Capital Program Summary – ICT Client Computing Program
[111] Business Case – CS Platform Refresh – ERC Business Case Summary v1

As discussed in Section 7, we have also applied a continuing efficiency factor across water and sewerage for 2017 to 2020.

4.13 Allocation of costs between regulated and non-regulated services

HW's cost allocation methodology directly allocates direct cost to individual products including recycled water. Where corporate costs can be directly allocated to the products this occurs. Of the remaining costs that have no direct link with products, the costs are allocated on the basis of the proportion of direct costs allocated. In particular, IPART requires that HW separately identifies recycled water related transactions from the regulated water, wastewater and stormwater activities. From our discussions with HW we understand that they have made some improvements to their cost allocation process (which they call Activity Based Costing) and are continuing to refine the process to directly allocate as much opex as possible.

With the sale of HWA, HW operates no non-regulated services besides recycled water. As set out in Section 5.3, we have assessed the approach, processes and business rules that HW applies to allocate costs between regulated and non-regulated (recycled water) services. We consider in general these are appropriate in ring fencing recycled water costs and allocating indirect costs.

4.14 Our summary of costs for 2016 to 2020

From our analysis we recommend the opex set out in Table 4.32 (a summarised version of our findings) and Table 4.33 (the detail behind of our findings) for 2016 and the next price submission period.

We estimate an efficient opex of $128.4 million in 2016, which is $1.2 million or 1% more than forecast by HW. It is also $2.6 million or 2.0% less than determined efficient by IPART in the 2013 price determination. Our prudent and efficient estimates exclude our recommended continuing efficiencies. For our total recommended opex (including our continuing efficiencies) refer below to Section 7.

Our base year difference to HW's base year is due to a difference in the treatment of an expected increase in defined benefit superannuation contribution. During the 2013 price determination, HW and IPART had expected an increase in the level of defined benefits superannuation contribution (of $2.8 million). This increase had not eventuated in 2014 or 2015 and HW has removed this item from its base year budget. However, most of the increase ($2.2 million) is still expected to occur in 2016 subject to the NSW Treasurer's agreement.[112]

As most of this cost increase is still expected to occur we have included $2.2 million in the base year as well as the following years. The base year opex is therefore higher than that proposed by HW but the adjustments in the next regulatory period are lower.

Using this efficient base for 2016 we have reviewed HW's proposed opex for the regulatory period. We estimated total efficient opex of $525.7 million for the period 2017 to 2020 (excl. our continuing efficiency savings). Over the period this is $7.67 million or 1.44% less than proposed by HW.

Our opex savings, in total over the four years, are comprised of:

- Lower labour costs than proposed by HW by $4.09 million
- Lower costs for Head Office than proposed by HW by $1.96 million, reflecting costs associated with owning the building rather than leasing
- Increased costs for new initiatives but at lower levels than proposed by HW by $0.87 million
- Lower costs for the MWD to undertake LHWP activities (reflecting an incorrect costing basis used originally) by $0.17 million
- Lower costs for the digitisation project by $0.19 million

[112] JO1_10_1 STC letter to Treasury re HW super contributions.pdf

- A series of changes in the 2015/16 base year which have either been removed or added to reflect ongoing costs, with a total impact of $0.36 million (e.g. removal of corporate strategy and study costs, removal of various increase not explained and removal of an ongoing reduction in water treatment savings which will not be realised).

We summarise our additional continuing efficiency savings in Section 7 below.

Table 4.32 : Summary of recommended opex for 2016 and the next price submission period ($2016 '000)

Expenditure area	2016	2017	2018	2019	2020
HW proposal					
Water	43,673	43,805	44,259	45,130	45,706
Wastewater	44,303	44,195	47,115	47,080	48,169
Stormwater	1,322	1,366	1,333	1,393	1,369
Corporate	37,871	39,512	40,167	41,230	41,510
Total	**127,168**	**128,878**	**132,874**	**134,833**	**136,753**
IPART 2013 price determination approved 2016 base year opex					
Water	39,653				
Wastewater	52,299				
Stormwater	965				
Corporate	38,045				
Total	**130,962**				
Our adjustments to 2016 base year and ongoing adjustment					
Water	3,591	155	1,055	2,355	2,859
Wastewater	-7,485	-887	658	858	1,587
Stormwater	364	48	-4	44	-2
Corporate	964	948	825	1,061	525
Total adjustments	**-2,565**	**264**	**2,534**	**4,318**	**4,969**
Our recommended efficient opex (excl. continuing efficiencies)					
Water	43,244	43,400	44,299	45,600	46,103
Wastewater	44,814	43,927	45,472	45,672	46,401
Stormwater	1,328	1,377	1,324	1,373	1,327
Corporate	39,010	39,958	39,835	40,071	39,535
Total	**128,397**	**128,661**	**130,931**	**132,715**	**133,366**

Table 4.33 : Proposed opex for 2016 and the next price submission period ($2016 '000)

Expenditure area	2015	2016	2017	2018	2019	2020	Total 2017 to 2020
HW actual/proposed opex							
Water	43,275	43,673	43,805	44,259	45,130	45,706	178,900
Wastewater	46,596	44,303	44,195	47,115	47,080	48,169	186,559
Stormwater	1,162	1,322	1,366	1,333	1,393	1,369	5,461
Corporate	38,835	37,871	39,512	40,167	41,230	41,510	162,419
Total	129,868	127,168	128,878	132,874	134,833	136,753	533,338

Expenditure area	2015	2016	2017	2018	2019	2020	Total 2017 to 2020
Our one off adjustments to establish the 2016 efficient opex							
Water	Base expenditure	39,653					
add	Water treatment	2,189					
	Profit elimination[113]	1,245					
	New initiative	987					
	Meter restrictions	631					
	Water transfer	210					
	Bulk materials	108					
	Water main leaks	202					
	Water service repairs	186					
	Hydrant maintenance	158					
	Valve maintenance	68					
	Gravel road repairs	92					
	Soil disposal	137					
	Safety equipment and tool repair	155					
	Gen Civil maintenance	221					
	MV leasing	168					
	Civil plant and trailer	221					
	SCADA and telemetry network	97					
	Water resources	95					
	HVC (water network)	185					
	EA power failure	48					
	General maintenance	134					
	Chlorine dosing	88					
	Water extraction fees	215					
less	Electricity	-2,782					
	carbon	-440					
	Water network maintenance	-165					
	Dams and catchment	-84					

[113] We understand from our discussions with HW that in 2013, IPART removed the profit element from the expenditure HW incurred due to its contract with HWA for the provision of services at HW's various WTP, WWTP and other regulated services. Since Veolia has taken over the provision of such services, it is appropriate to add back the profit element so that the base year values for the contract may be returned to its full cost base. Increments and savings from the Veolia treatment contract can then be compared to the full base year treatment cost,

Expenditure area	2015	2016	2017	2018	2019	2020	Total 2017 to 2020
	maintenance						
	Treatment labs	-373					
	Operational support	-268					
	Superannuation reduction	-135					
Efficient Water opex 2016		**43,244**					
Wastewater	Base expenditure	52,299					
add	Profit elimination[113]	1,297					
	New initiative	873					
	Soil disposal	46					
	Safety equipment and tool repair	52					
	Gen Civil maintenance	74					
	MV leasing	56					
	Civil plant and trailer	74					
	SCADA and telemetry network	97					
	General maintenance	134					
	EPA Lab reporting	55					
	EPA licence fee	96					
	Farley upgrade	44					
	Network costs	277					
Less	Electricity	-4,858					
	Carbon	-1,319					
	Veolia treatment contract	-3,166					
	Reduce maintenance contract cost	-352					
	Odour control	-506					
	Wastewater treatment labs	-321					
	Superannuation reduction	-135					
Efficient Wastewater opex 2016		**44,814**					
Stormwater	Base expenditure	965					
add	Increased maintenance	312					

Expenditure area	2015	2016	2017	2018	2019	2020	Total 2017 to 2020
	Profit elimination[113]	52					
Efficient Stormwater opex 2016		**1,328**					
Corporate	Base expenditure	38,045					
add	Head Office Lease	1,650					
	New initiative	208					
less	Electricity & Carbon	-122					
	Asset Mapping team	-442					
	Superannuation reduction	-330					
Efficient Corporate opex 2016		**39,010**					
Our adjustments to the 2016 efficient opex base to establish the efficient proposed opex for 2017 – 2020							
Labour	Water		-322	-420	-506	-323	-1,570
	Wastewater		-197	-280	-355	-198	-1,030
	Stormwater		-2	-4	-6	-2	-14
	Corporate		234	123	485	137	980
Electricity	Water		-12	301	541	910	1,740
	Wastewater		-22	597	1,028	1,730	3,334
	Stormwater		-0	0	0	0	0
	Corporate		-1	17	29	49	94
Chemicals	Water		440	440	606	607	2,093
	Wastewater		286	362	364	365	1,377
Strategies and studies	Water		147	184	131	196	658
	Wastewater		-484	517	360	340	733
	Stormwater		50	-	50	-	100
	Corporate		-	60	-	-	60
LHWP & MWD	Water		600	1,280	2,313	2,288	6,480
Operational activities	Water		-189	-189	-189	-189	-756
	Wastewater		-	-	-	-	-
	Corporate		279	279	279	279	1,115
Head office	Corporate		10	-5	-21	29	12
	Water		20	20	20	20	81
New Initiatives	Wastewater		100	100	100	100	400
	Corporate		6	6	6	6	23
Other	Corporate		420	346	284	26	1,076
Efficiencies	Water		-529	-561	-561	-650	-2,301
	Wastewater		-571	-639	-639	-750	-2,599
Our recommended efficient opex for 2017 – 2020 (excl. continuing efficiencies)							
Water		43,244	43,400	44,299	45,600	46,103	179,402
Wastewater		44,814	43,927	45,472	45,672	46,401	181,473

Expenditure area	2015	2016	2017	2018	2019	2020	Total 2017 to 2020
Stormwater drainage		1,328	1,377	1,324	1,373	1,327	5,400
Corporate		39,010	39,958	39,835	40,071	39,535	159,398
Total		**128,397**	**128,661**	**130,931**	**132,715**	**133,366**	**525,673**

For our total recommended opex (including our continuing efficiencies), refer below to Section 7.

5. Recycled Water

5.1 Purpose and scope

In this section we review the following aspects of HW's recycled water opex and capex in the current and next price submission periods, as set out in the listed sections of the RFQ scope.

- 3.3.2 d) Advise on the appropriateness of direct and allocated opex that HW has ring-fenced from its other operations associated with recycled water services. We note that some recycled water costs can be recovered from water customers as a result of NSW Government s16A directions or where the business is claiming 'avoided costs'
- 3.4.1 f) Advise on the robustness and effectiveness of HW's ring fencing of capex associated with recycled water services from its other operations, and identify opportunities for improvement
- 3.4.1 g) Advise on the appropriateness of the quantum of HW's deferred or avoided capital costs arising from recycled water projects (such as Kooragang Industrial Water Scheme 5), using IPART's 2006 Report Pricing arrangements for recycled water and sewer mining and IPART's 2011 Guidelines Assessment Process for Recycled Water Scheme Avoided Costs, and recommend adjustments if appropriate.

5.2 Data we considered for this task/item

All of the data and documents that we reviewed and used to develop this section (e.g. presentations by HW, interviews of HW, and responses to our data requests including all files/documents) are referenced in footnotes in this section.

5.3 Robustness and effectiveness of ring fencing recycled water – capex and opex

Providing recycled water to a customer does not in itself mean all expenditures relating to recycled water will automatically be classified as recycled water. Flow diagrams have been prepared in respect to each wastewater treatment plant identifying which elements (and therefore what capex and opex), should be classified as recycled water instead of wastewater.

The only wastewater treatment plants currently anticipated to require some expenditure to be recognised as recycled water (both capex and opex) are identified in Table 5.1.

Table 5.1 : Wastewater treatment plants forecast to require expenditure related to recycled water

Recycled Water Scheme	Wastewater treatment plant
Vintage (golf club irrigation)	Branxton
KIWS (industry recycled water)	KIWS
Gillieston Hts/Cliftleigh (residential)	Farley
Thornton Nth/Chisholm (residential)	Morpeth

Flow diagrams for these wastewater treatment plants identifying where costs are allocated (and ring fenced) to recycled water are shown in Figure 5.1 to Figure 5.4 below.

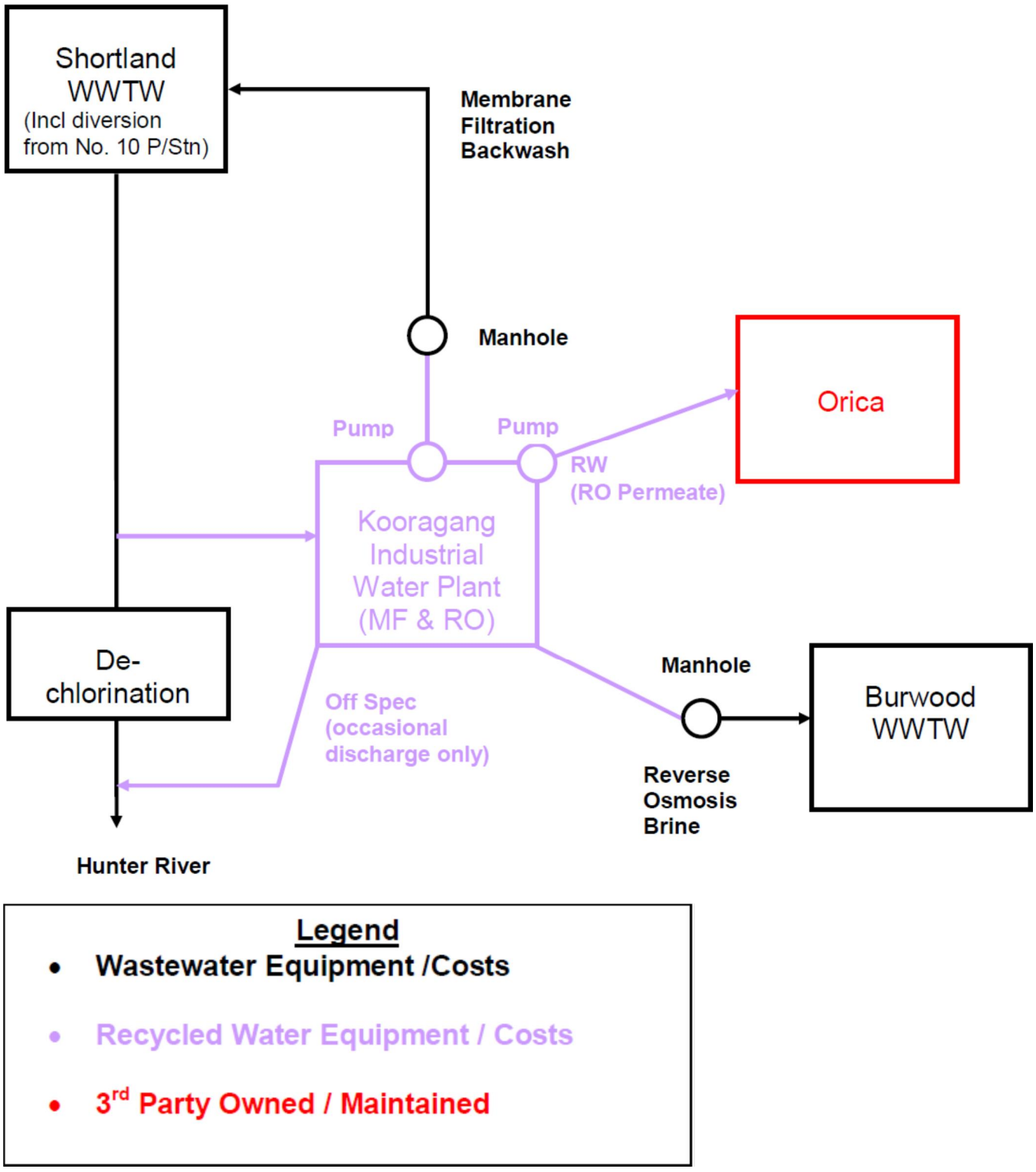


Figure 5.1 Kooragang Industrial Water Scheme – Recycled Water Flow Diagram

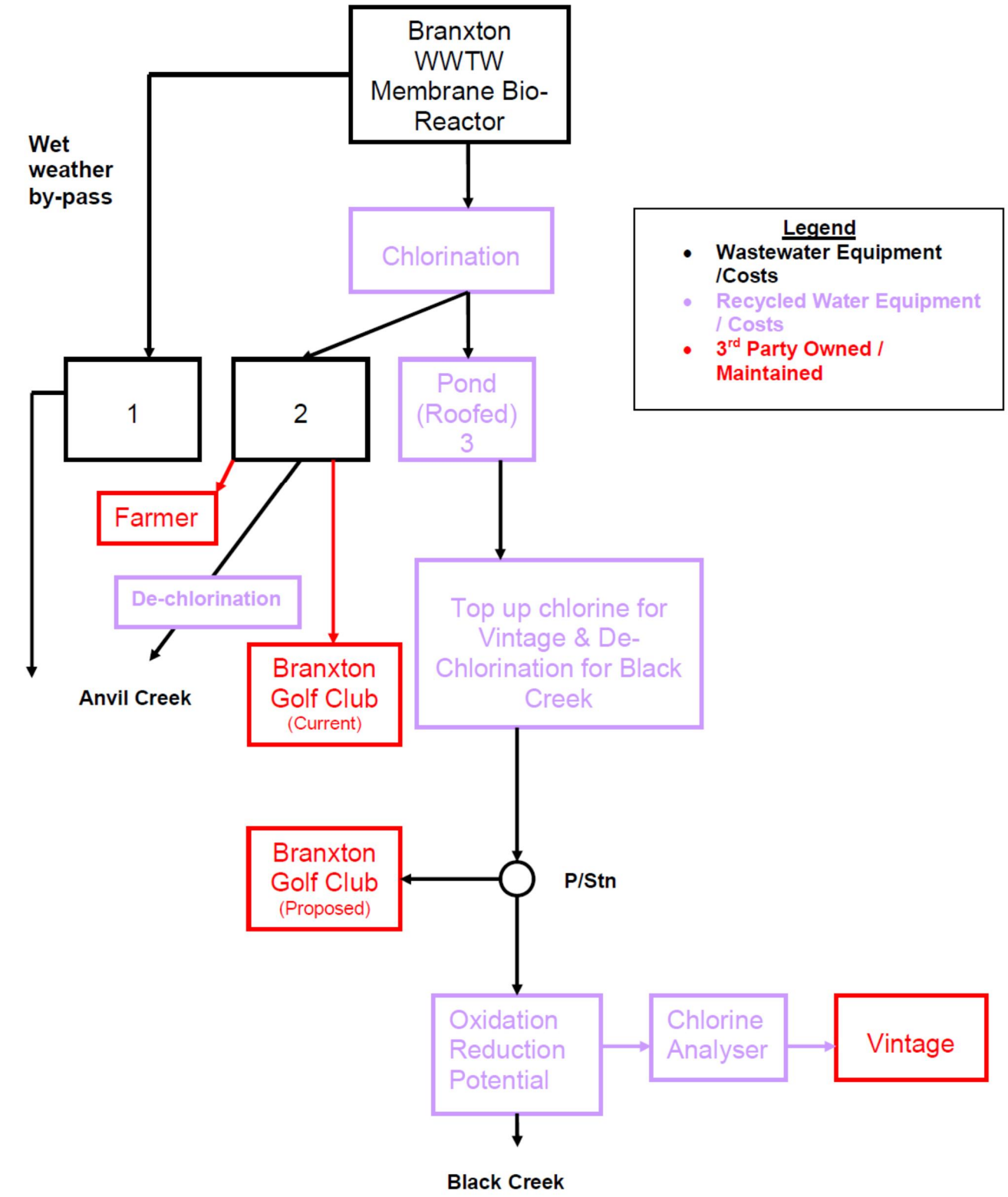


Figure 5.2 Branxton Recycled Water Flow Diagram

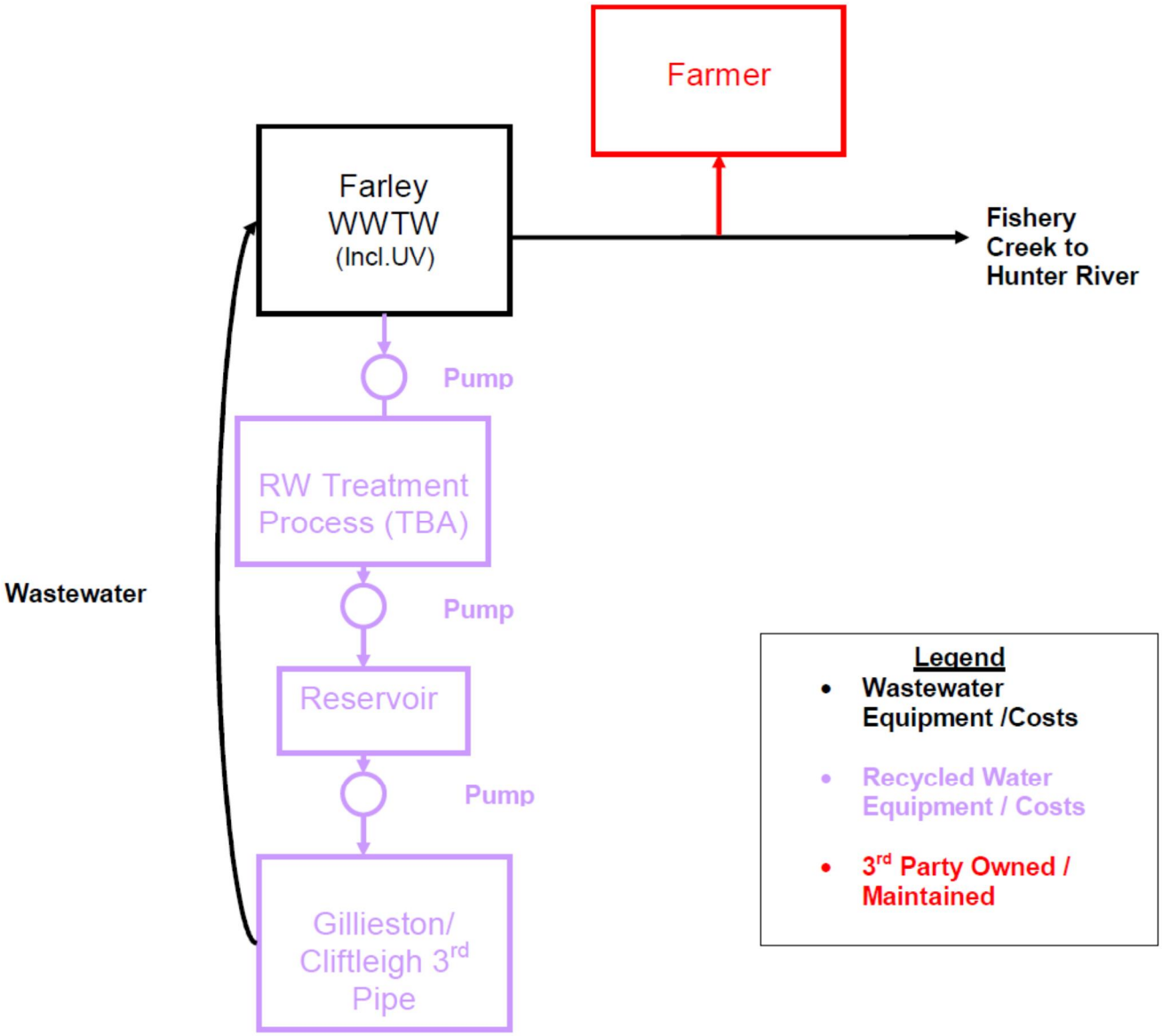


Figure 5.3 Farley Recycled Water Flow Diagram

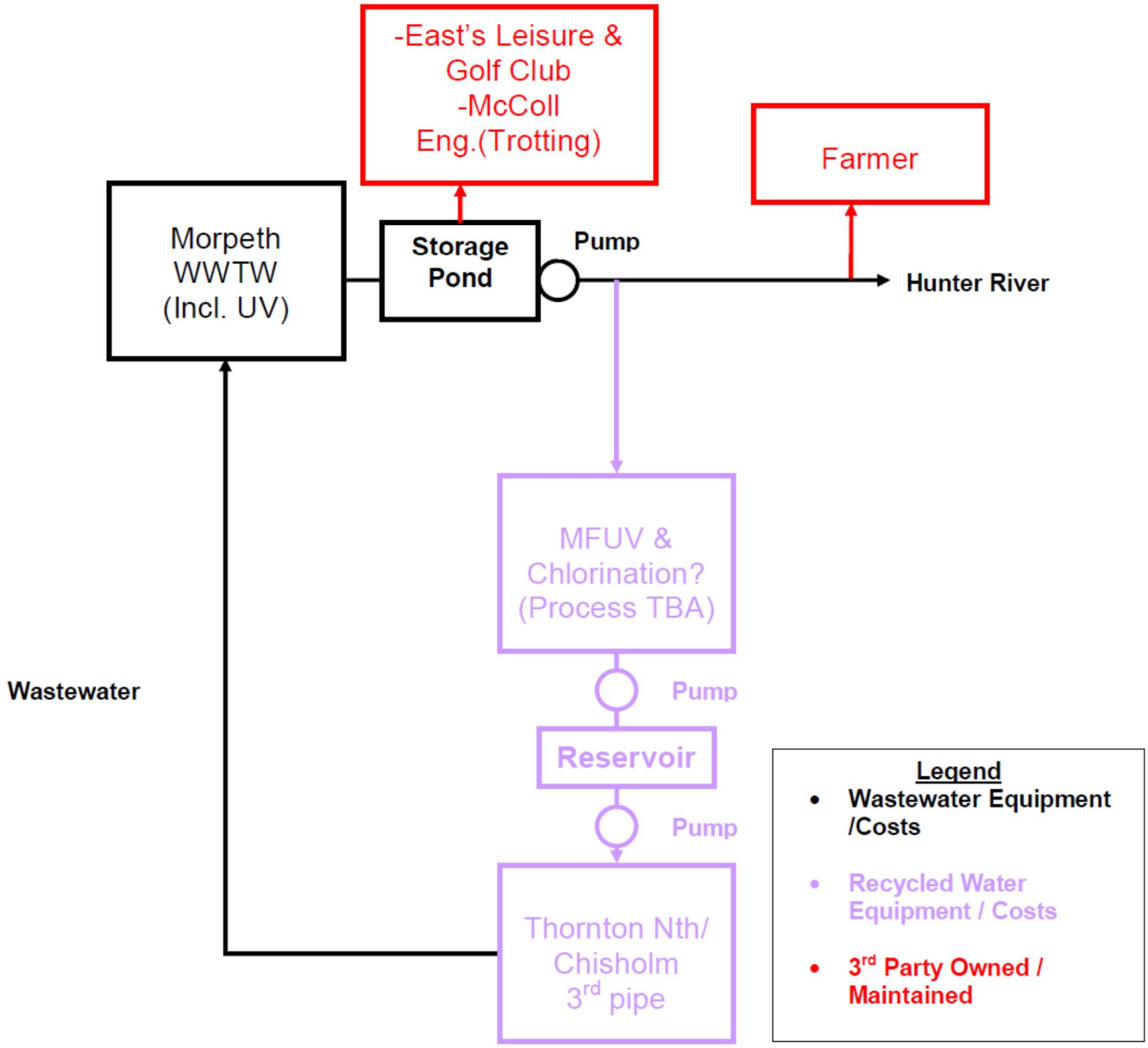


Figure 5.4 Morpeth Recycled Water Flow Diagram

Under the ring fencing rules, any capex containing recycled water elements (as identified in accordance with classifications contained in above flow diagrams), must have those recycled water components separately quantified and distinct capital projects established to ensure all recycled water capex remain segregated from the regulated wastewater activities.

Appropriate identification of recycled water capex from the outset (at the capital project budgeting stage), will assist to ensure a correct and consistent classification of recycled water within the equipment hierarchy, fixed asset register, and subsequently opex in Ellipse.

Opex is allocated directly reflecting the business decision rules that opex is to be attributed to wastewater:

- Where processes are performed and costs incurred in providing 'business as usual' wastewater services to customers
- In meeting Effluent Management Strategy as agreed with DECCW and/or meeting the requirements of an Environment Protection Licence
- Where IPART would consider it reasonable that wastewater customers will ordinarily have been expected to pay the equivalent for WW services regardless of the fact that any by-product of the WW processes may happen to be provided/sold as recycled water to select customers

We are generally[114] of the opinion that the measures and ring fencing arrangements HW has put in place are appropriate and sufficiently robust to ensure that expenditure related to recycled water is adequately ring fenced from its other products which are price regulated.

5.3.1 Recycled water labour

Based on the information supplied by HW, we note that there is an anomaly in the expenditure for labour allocated to recycled water relative to the expected FTE count. This is shown in Table 5.2.

Table 5.2 : Proposed recycled water FTE and labour expenditure

Recycled Water	2015-16	2016-17	2017-18	2018-19	2019-20
FTE count	5.1	3.1	3.0	5.6	8.2
Proposed labour expenditure	390.6[115]	363.5	372.6	381.9	391.5

In 2016, HW reports 5 FTEs with a total labour expenditure of $390,000. In 2017 and 2018, recycled water is expected to have 3 FTEs. However labour expenditure falls by only $27,000 in 2017. FTE numbers increase to 6 in 2019, and to 8 for the remaining years. Yet the proposed yearly expenditure increases by only the increase stipulated in the Enterprise Agreement, i.e. 2.5% p.a. over the whole period.

The FTE count is based on year end numbers. Variations in FTEs during the year are thus not captured. In our view, there is some uncertainty over the reliability of the FTE count. Given that in 2016, HW expects KIWS to have been sold, some reduction in labour cost can be expected in the years following. We thus accept that the cost for labour expenditure proposed by HW is reasonable for the period notwithstanding the variations in FTE count over the period.

5.4 Appropriateness of deferred or avoided costs associated with recycled water

In its 2013 determination, IPART allowed the value of 'avoided' and/or 'deferred' costs associated with KIWS to be recovered from the broader customer base via an adjustment to the RAB. The rationale for this allowance is that investment in recycled water is a benefit to all customers in that it has potential to reduce, or defer, further investment in water supply or wastewater infrastructure. These potential savings can occur in water source and water distribution infrastructure and operations. Recycling can also offset the need for further investment in wastewater treatment, network and disposal facilities and reduce wastewater operating costs.

[114] See Section 4.12.8 for the discussion on HW ring fencing of the allocation of corporate overheads and indirect corporate costs.
[115] Includes labour expenditure for KIWS. The AIR submitted by HW indicates that there are no FTEs for KIWS as the sale of KIWS is expect to take place in 2016.

Adjustments of $9.5 million were made in the 2013 price review to capital costs to include deferred and avoided costs associated with KIWS. The supply of recycled water to a large customer on Kooragang Island deferred the need to upgrade potable water treatment and trunk delivery system upgrades by substituting recycled water for potable water. The cost savings from deferring these upgrades include those associated:

- Deferment of the stage three upgrade of the Grahamstown water treatment plant
- Deferment of the need to upgrade the trunk delivery main from Grahamstown water treatment plant
- Operating cost savings at the Grahamstown water treatment plant.

With the sale of KIWS, HW considers that these avoided costs remain relevant as water customers will continue to receive benefits from the operations of KIWS (irrespective of ownership) and that the $9.5 million remain in the RAB for the next price submission period.

IPART has requested that we update the avoided cost estimate (in $2013). We have done this by reviewing the current costs and timings of the above projects, after HW advised that no additional projects are avoided or deferred, under the three demand scenarios examined in the 2013 price determination process:

- 9 M/L per day reflecting the demand scenario expected during the 2013 IPART review
- 8.2 M/L per day
- 6.3 M/L per day reflecting the take or pay component of HW's recycled water contract with the large industrial customer.

We also modelled an additional scenario of 6.2 M/L per day reflecting the current expected continuing demand by the large industrial customer.

The results of the modelling are shown in Table 5.3.

Table 5.3 : Changes in avoided cost benefits of KIWS ($2013 million)

Component		2012 Review	2015 Updated Capex @ 9ML/d	2015 Updated Capex @ 8.2ML/d	2015 Updated Capex @ 6.3ML/d	2015 Updated Capex @ 6.2ML/d
Deferment basis (*outturn sales*)	ML/day	9	9	8.2	6.3	6.2
Year of capex estimate		2013	2016	2016	2016	2016
$ terms of capex estimate		$2013	$2013	$2013	$2013	$2013
Grahamstown water treatment plant upgrade deferral	$ million	11.14	9.63	8.75	6.65	6.53
Water network deferrals	$ million	0.44	0.31	0.28	0.21	0.21
Source augmentation deferral	$ million	-	-	-	-	-
Shortland wastewater treatment plant sludge handling	$ million	-2.46	-4.48	-4.48	-4.48	-4.48
Water and wastewater net impacts	$ million	0.36	0.36	0.33	0.25	0.25
Total avoided cost benefit of capex deferred	**$ million**	**9.48**	**5.82**	**4.89**	**2.63**	**2.51**

For clarity, the avoided cost benefits have been modelled based on the current (2016) capital expenditure deflated to $2013.

Changes to the avoided cost benefits since the 2013 price determination reflect changes to:

- The capital expenditure
- The timing of capital expenditure due to changes in the demand for recycled water.

Lower than expected demand for recycled water means that the expected timing for capital expenditure of upgrading Grahamstown and other augmentation works is brought forward from that forecast at the time of the 2013 price determination. As a result some of the expected benefits have not occurred.

As set out in Table 5.3 above, the changes in the benefits of deferred capital expenditure relate largely to changes in the deferral of the Grahamstown water treatment plant upgrade. When demand for recycled water is:

- 9 ML/d, the start of the Grahamstown upgrade was modelled to be deferred for 2.52 years until 2020 (to be constructed over 4 years). This was the case in 2013 as it is now with the reduction in avoided cost benefit due to changes in the capital expenditure
- 8.2 ML/d, the Grahamstown upgrade was modelled to be deferred for 2.3 years
- 6.3 ML/d, the Grahamstown upgrade was modelled to be deferred for 1.8 years
- 6.2ML/d, the Grahamstown upgrade was modelled to be deferred 1.74 years. Based on this current scenario, Grahamstown upgrade will be required to start construction in 2019, approximately 9 months earlier than envisaged in 2013 when the demand from KIWS was expected to be 9 ML/d

For clarity, the avoided cost benefits have been modelled based on the current (2016) capital expenditure deflated to $2013.

We note that a further adjustment to the RAB also occurred in the 2013 price review relating to NSW Government directives issued to HW in 2006. The Minister for Water wrote to:

- HW under Section 20P of the State Owned Corporations Act 1989 and instructed the Board of Directors to provide a subsidy of up to $10 million for the Kooragang Island recycled water project; and,
- IPART under Section 16A of the Independent Pricing and Regulatory Tribunal Act 1992 advising IPART of the 20P instruction to provide a $10 million subsidy and that it will be applied to the Tribunal's consideration of the maximum prices charged by HW from 1 July 2009.

IPART included the $10 million subsidy in the water component of the roll forward of the RAB in the 2013 price determination.

6. Task 2B: Review of past and proposed capex

6.1 Purpose and scope

In this section we assess HW's capex from 2013 to 2020 for prudence and efficiency. When the last price review occurred in 2013, the capex for that year was a forecast. We have therefore assessed the 2013 capex to help IPART roll forward HW's RAB.

Our scope for this section is to:

a) **Core:** Assess the reasonableness of HW's capital program as a whole, within the context of its long-term plans and the assumptions underlying them, including the scale, scope and planning of the capex program from 2013 to 2021. In doing this, we will identify consequential impacts on opex (i.e. increased or reduced operating costs) of this capex.

b) **Core:** Undertake a detailed investigation into the actual outcomes and project planning for at least 10% of HW's capital projects above a $5 million materiality threshold. The 10% is to be achieved by number and by total value of HW's past and proposed capital program and is to be agreed with IPART.

c) Advise on the appropriateness of the cost allocation method used by HW to allocate operating costs to capital projects.

d) Review the business case for the proposed information and communication technology projects, and identify any forecast savings of operating expenditure arising from these projects.

e) Review the on-going efficiency of the delivery model under which works (e.g. upgrades to wastewater treatment works) are being procured.

We provide advice on systemic issues that may tend to make future capex budgets imprudent or inefficient. We have advised on the extent of the impact of those issues on the budgeting process and discussed the merit of extrapolating findings from our prudence and efficiency reviews (see further below).

6.2 Our approach to determining the prudence and efficiency of capex

In this section we the method used to review HW's capex. In accordance with IPART requirements, the review has included actual, forecast and proposed capex for the period 1 July 2012 to 30 June 2021. Our review considers HW's policies and procedures relating to the capital program and provides a detailed review of twelve (12) items (8 projects and 4 programs) as agreed with IPART.

6.2.1 Review of the overall capex program

To review HW's overall capex program, we have:

- Reviewed HW's capex related policies and procedures, including asset management, demand forecasting and risk management (undertaken as Task 1). We have then reviewed the potential impact of the findings on the proposed capex program.
- Reviewed the proposed magnitude of capex in the previous price path against the actual capex in the current price path.
- Identified systemic issues/process failings that may impact on capex budgeting and capex in general and advised as to whether these systemic issues would support and substantiate extrapolation of findings from our capex sample base to other capex items.
- Extrapolated relevant findings from detailed project reviews (described below) as appropriate.

6.2.2 Prudence and efficiency of past capex (2013 to 2015)

For the selected sampled projects, we have reviewed:

- Base data and reported on the actual and forecast capex, including commentary on any material changes to the quantum of expenditure and the timing of expenditure.
- Whether the project drivers were met and whether the anticipated outcomes of the project were achieved.
- The prudence of the project, considering the 2013 determination recommendations, where relevant.
- The efficiency of the project, based upon IPART's definition of efficiency; whether the expenditure represents the best and most cost effective way of delivering the regulated service.

We have considered the following key areas when undertaking the efficiency and prudence assessments of the sample projects, including whether:

- Projects are aligned with appropriate drivers and obligations.
- Proper consideration was given to the timing of the implementation/augmentation. Where appropriate, this approach ensures a higher cost solution that meets 'ultimate demand' is not installed too early.
- Components of capex are tested against benchmark and/or unit costs where appropriate.
- A robust options investigation was undertaken. We have assessed whether HW's documentation:
  - Demonstrates an assessment of alternative means of providing the same outcome
  - Explores/considers least cost options
  - Evaluates the need for the project (i.e. considers the risk consequences if it were not pursued, was deferred or in the case of programs of works, a lower level of expenditure was adopted).
- Proposed projects are deliverable in the regulatory period. We have reviewed project activities (i.e. scheduling for approvals, status and approvals risks, construction, etc.) to ensure they can be practically delivered over the proposed timeframe. Where relevant, we have considered HW's previous performance in delivery of major projects.

Finally, we have recommended a value for any capex considered imprudent or inefficient.

In undertaking our review of capex, we have assumed that the data provided by HW are current, complete and correct.

6.2.3 Prudence and efficiency of proposed capex (2016 to 2021)

To determine the prudence and efficiency of HW's proposed capex, we have:

- Reported on the proposed capex values.
- Undertaken a review of prudence and efficiency for the selected sampled projects (as above) including estimating the efficient level of expenditure for the projects evaluated, identifying systemic issues/process failings and determining whether findings from project reviews can be extrapolated.
- Considered the overall magnitude of HW's capital program compared to similar utilities, but caution that due to the general 'lumpiness' of capital programs, benchmarking has been limited.

6.2.4 Comparison against IPART's 2012 price determination consultant's approach

We have compared our method to that of the consultant employed by IPART for the 2012 price determination (IPART's 2012 consultant)[116] and determined that our method is consistent with that used previously.

In the 2012 review, IPART's 2012 consultant determined the efficiency of capex spend in the (then) current price path using a comparison against the 2009 determination and a review of a sample of projects.

We propose to undertake a similar comparison of the current price path against the 2013 Determination and review a range of sample projects, as outlined above.

[116] IPART's 2012 consultant

In the 2012 review, IPART's 2012 consultant determined the efficiency of capex spend in future price paths, using a method developed by Ofwat, based on identifying continuing and catch-up efficiency. IPART's 2012 consultant also applied the same method used in their 2008 review. In 2008, HW set capital efficiency targets of 0.5% p.a. continuing and catch-up efficiency rising over the period to 4.5% by 2013. In 2012, IPART's 2012 consultant assumed a continuing capital efficiency of 0.4% p.a. over the period 2013 to 2017 to reflect the impact of new technology and innovation which they stated all agencies should achieve.

This value was 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.

IPART's 2012 consultant identified three specific areas for improvement (strategic planning, method of cost estimating and procurement processes cost estimation) and applied a portion for catch-up efficiencies.

As the proposed efficiencies were lower than the efficiency targets set by HW itself, IPART's 2012 consultant adopted HW's efficiency targets in their review.

Our understanding is that Ofwat has moved away from the process of determining continuing and catch-up efficiencies. This method was not used in their latest determination.

We have determined efficiency based on:

- Findings from our review of HW's capex policies and procedures (which have identified similar issues with those items raised in the 2012 review)
- Findings from individual project reviews

We have extrapolated systemic findings across relevant items in the overall program. We present our continuing efficiencies in Section 7.

6.3 HW expenditure profile

We present HW's capex, actual and forecast, from 2011 to 2021 (inclusive) in Figure 6.1 below in which it is compared with IPART's 2013 determination expenditure.

We have used the AIR and SIR submitted to IPART on 30 June 2015 for all data in this report. The September 2015 version with updated 2014-15 actual expenditure has not been used, as this comprises an incomplete dataset. In the September 2015 version, HW updated only the actual expenditure (as agreed with IPART) whilst the forward projections are not updated. Given than most capital project span multiple years, the project totals will not be correct in the September 2015 version.

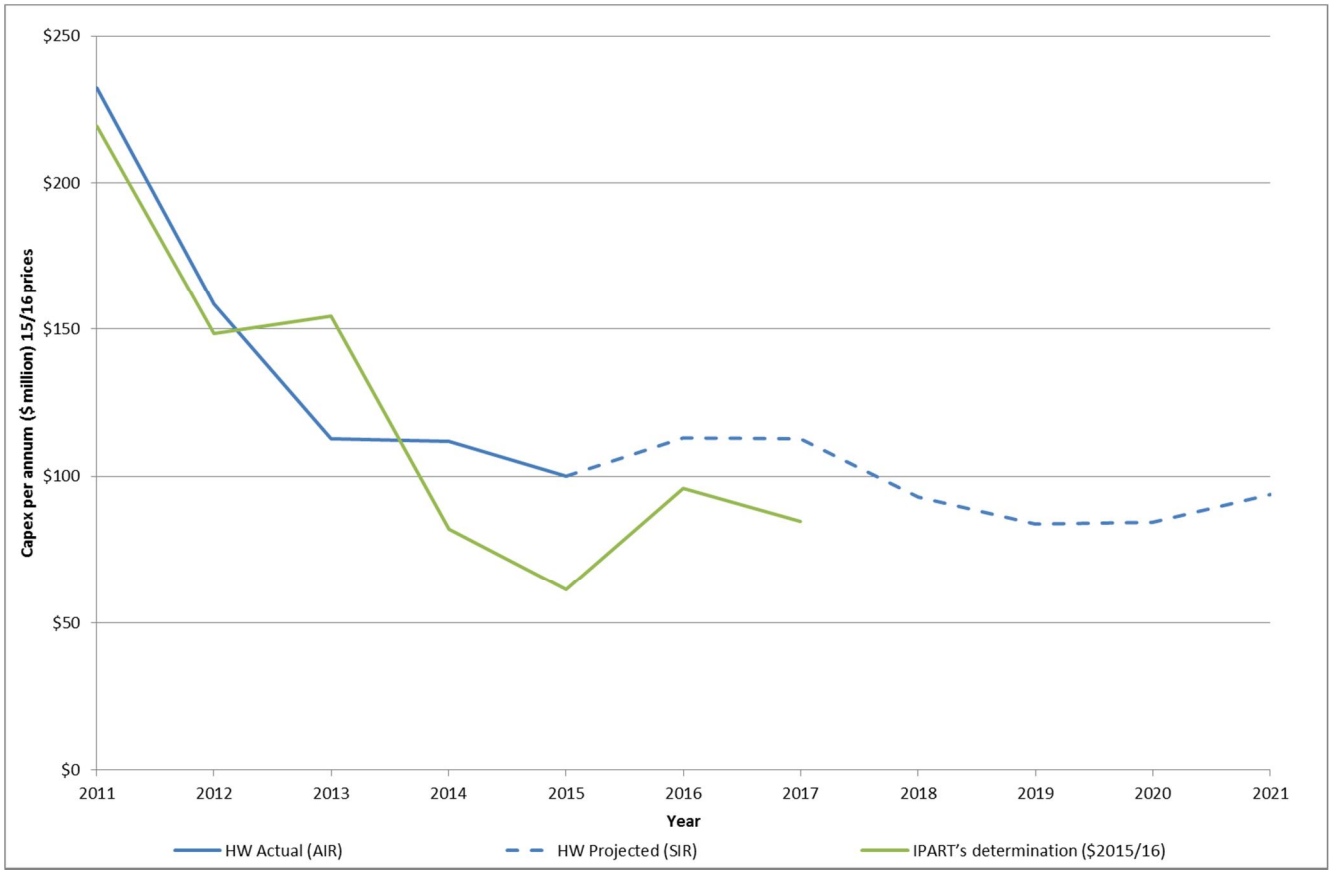


Figure 6.1 : HW's capital expenditure, actual and forecast (2011 to 2021)

Source:

HW Actual – AIR ("Capex", Table 9.2, 30 June 2015). HW Projected – SIR ("SIR Capex 2", Table 3.6, 30 June 2015). IPART's determination – source data from IPART's final report, Table 6.1 (Data has been converted from $2013 to $2016 using "SIR CPI", 30 June 2015)

On the basis of the data presented, with the exception of 2013, HW's costs are above those costs allowed by IPART.

We present a breakdown of HW's actual and proposed expenditure, and IPART's 2013 determination expenditure, by service in Figure 6.2 below.

The most significant service area for expenditure is wastewater, as is shown in Figure 6.2, with approximately 55% of expenditure attributed to this service area. The remaining expenditure is distributed between the other service areas: water (32%), corporate (12%) and stormwater (1%).

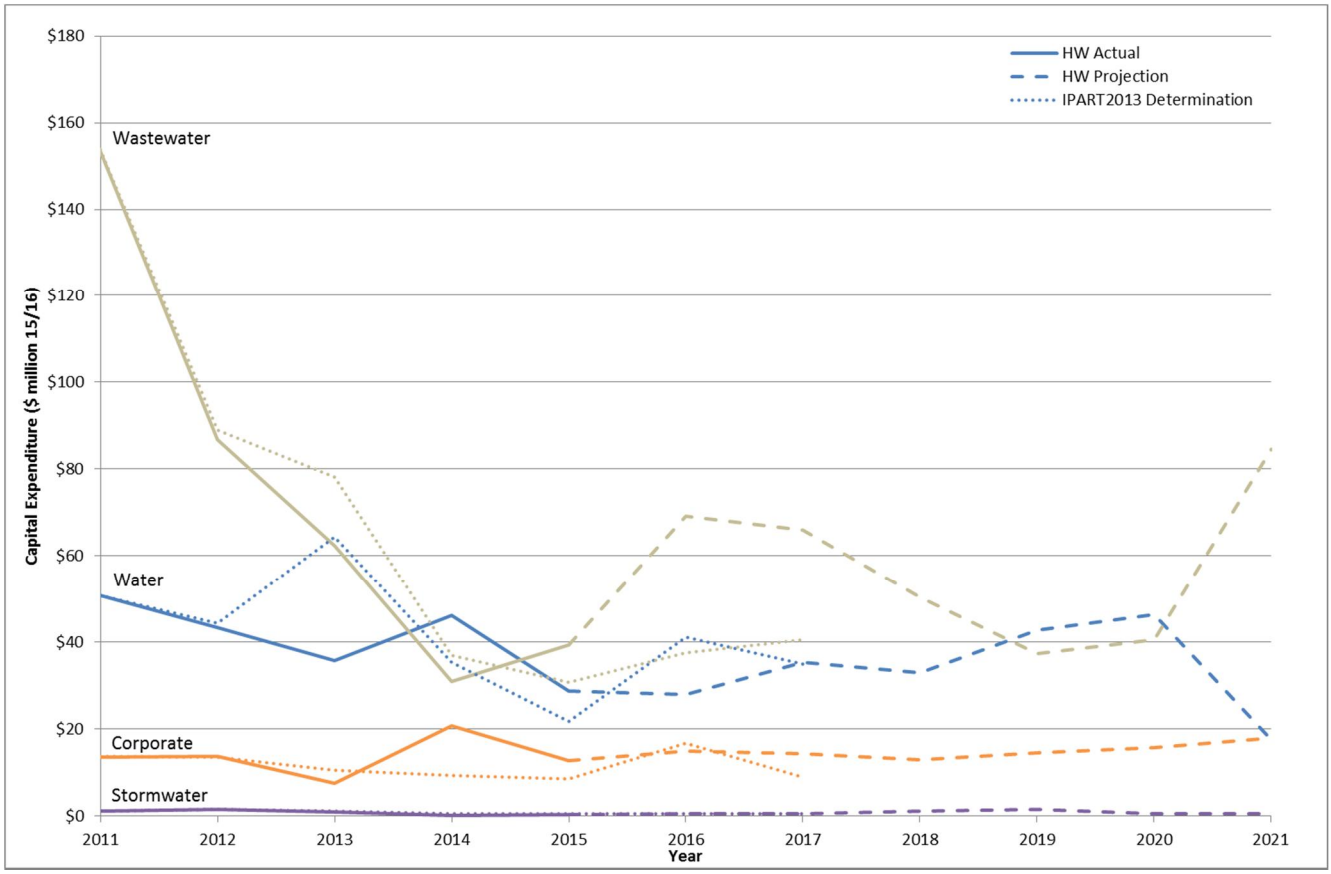


Figure 6.2 : HW expenditure by service (actual and forecast) from 2011 to 2021

Source:

HW actual and projected – AIR ("Capex", Table 9.2, 30 June 2015). The base data has been adopted without any further conversion.

IPART's determination – source data from IPART's final report, Table 6.1 (Data has been converted from $2013 to $2016 using "SIR CPI", 30 June 2015)

Figure 6.3 below presents a breakdown of HW's expenditure, actual and proposed, by driver. IPART's 2013 determination did not include a breakdown of expenditure by driver.

The most significant driver for expenditure is mandatory standards, as can be seen in Figure 6.3, with approximately 53% of expenditure attributed to this driver. The remaining expenditure is distributed between the other drivers: growth (26%), asset and service reliability (8%), business efficiency (8%), government programs (4%) and discretionary standards (1%).

The key projects contributing to the mandatory standards are a large gravity main replacement (CTGM - Duckenfield to Tarro), the Mechanical-Electrical Renewals Program, the Burwood Beach WWTW Disinfection Project and the ICT PP13 Future Portfolio Program. We provide an individual review of each of these projects later in this section.

The key project contributing to the growth driver is the Farley WWTW Upgrade - Stage 3b. This occurs in 2021 onwards (as shown in Figure 6.3). This project was not reviewed in detail due to the timing of this project.

We note that expenditure attributed to the 'asset and service reliability' driver increases significantly over the 2011 to 2021 period. About 14% of HW's forecast expenditure (2016 to 2021) is attributed to this driver.

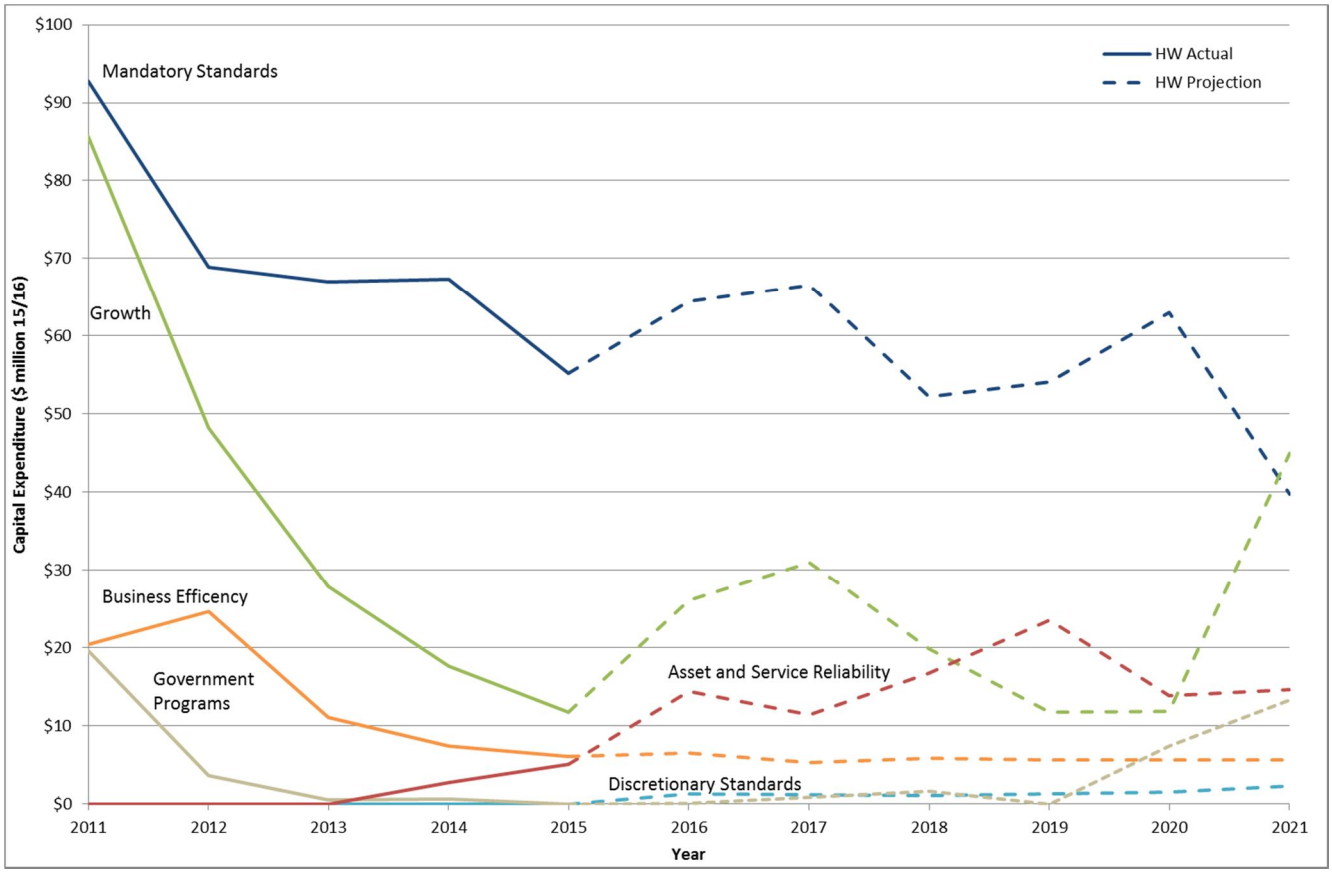


Figure 6.3 : HW expenditure by driver (actual and forecast) from 2011 to 2021

Source: HW actual and projected – AIR ("Capex", Table 9.1, 30 June 2015). The base data has been adopted without any further conversion.

6.3.1 HW expenditure profile – 2013-2016

We present a comparison of HW's capital expenditure with IPART's 2013 determination for the current price determination in Figure 6.4.

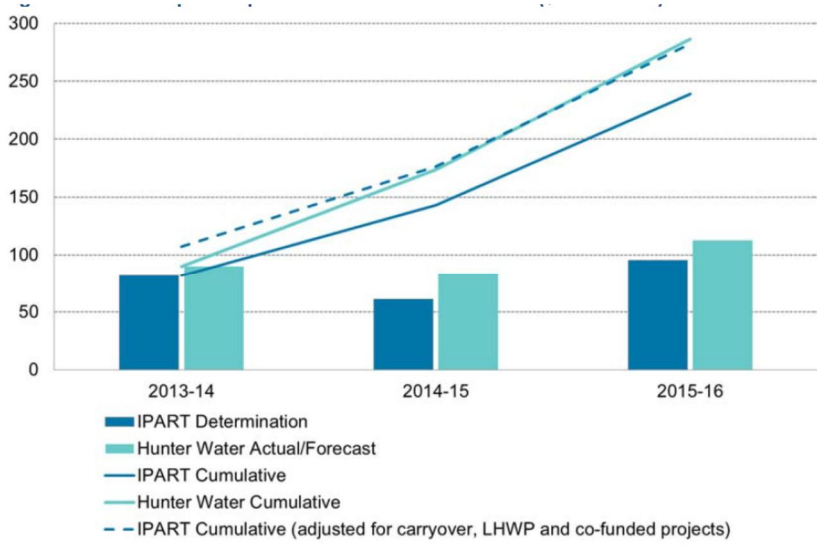


Figure 6.4 : Capex 2014 to 2016 ($million - Nominal) Source: HW's submission, Figure 6.1.

HW's expenditure profile between 2014 and 2018 exceeds IPART's 2013 determination and HW's 2012 submission expenditure by a total of $ 47.4 million.

HW states that the main variances are due to:

- Delayed delivery of projects from 2013 resulting in carryover of $36 million into the current price period
- The addition to the portfolio of $8.5 million in the price period for delivery of projects under round two of the Housing Acceleration Fund
- Hunter Central Coast transfer capacity upgrade ($2.8 million)
- The delivery of several small projects that are partially or fully funded by external parties.

The delayed delivery of projects expenditure was acknowledged in IPART, 2013(a), p.70. This equates to $30.8 million ($2016). In the 2013 determination, IPART acknowledged that the under expenditure of $28.5 million for the 2009 determination period leads to an over-recovery in HW's revenue, equivalent to the return on and of the under-spend. However, IPART noted that the over-recovery of revenue was offset by a proposed under recovery in the 2013 determination period, as IPART did not increase the allowance in 2014 to account for the delivery of the delayed expenditure.

The Housing Acceleration Fund is a NSW Government program to drive housing growth through co-funding of infrastructure projects such as water, wastewater, roads and electricity. The SIR includes three projects associated with the Housing Acceleration Fund: Lochinvar wastewater network upgrades ($1.0 million in this period); Lochinvar water mains project ($2.0 million in this period); and Maitland wastewater network upgrades ($4.9 million in this period).

The Hunter Central Coast transfer capacity upgrade ($2.8 million) is an outcome of the 2014 Lower Hunter Water Plan. We have reviewed this project separately as part of our review of a sample of projects, and found it to be prudent and efficient.

6.4 Renewal expenditure and service levels

In this section we consider the consistency of renewal expenditure against HW service level targets.

A review of the overall program shows that, over the next price path, replacement and renewal of existing assets will exceed the costs of creating new assets as depicted in Figure 6.5 below.

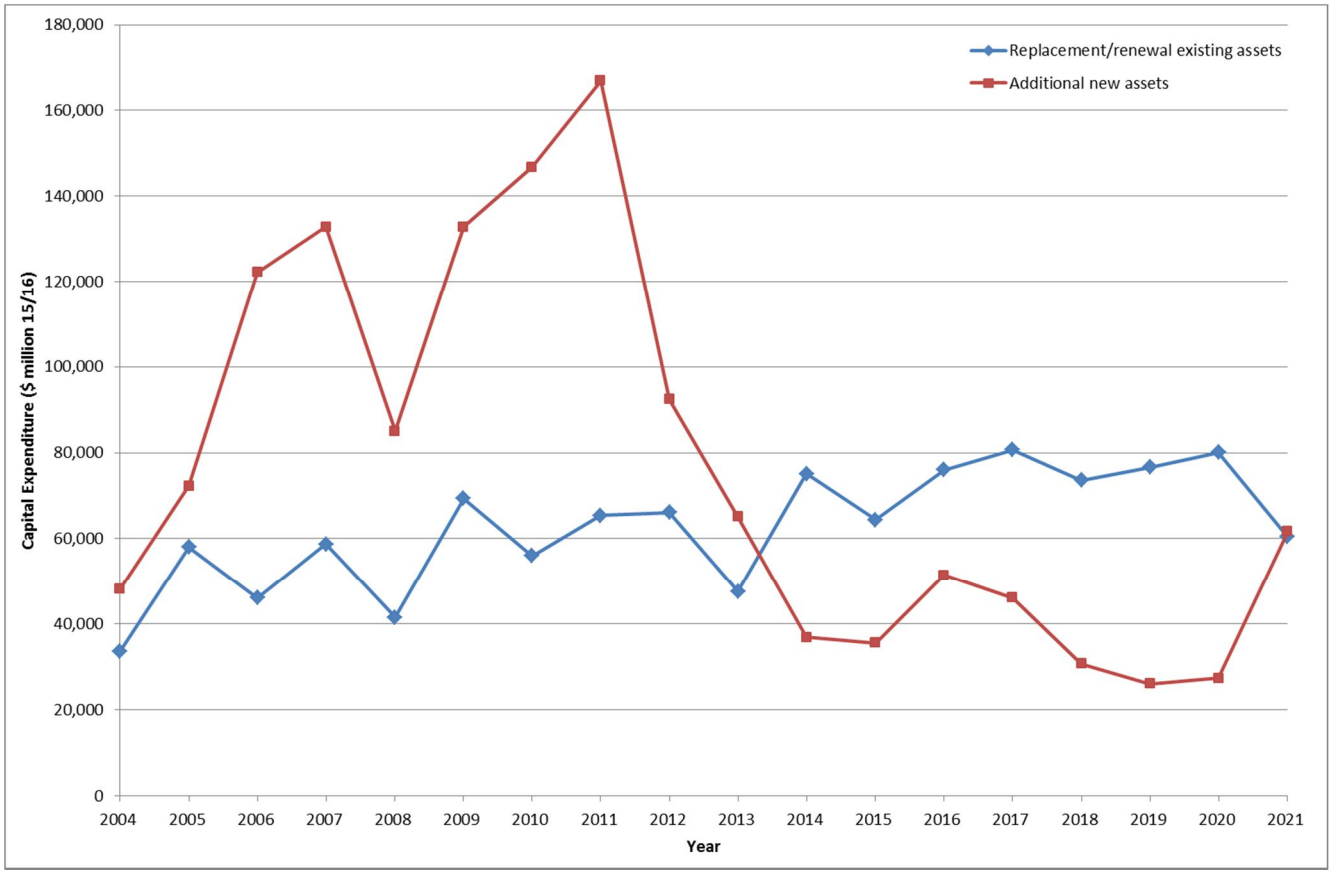


Figure 6.5 : Historic and forecast renewal and augmentation expenditure

Source: HW actual and projected – AIR ("Capex", Table 9.1, 30 June 2015).

We illustrate in Figure 6.6 below the relationship between water main renewal expenditure and the number of unplanned interruptions. Whilst we do not expect a linear correlation between these, we reasonably expect a degree of correlation between these items, as the renewal of poor condition water mains should result in fewer unplanned interruptions.

We have assumed that the following projects comprise HW's water main renewal expenditure:

- Bellbird to Pelton Trunk main Renewal
- Critical Mains Renewals
- Network Mains-Fittings Renewals
- Non-Critical Water main Renewals.

Data for these projects are taken from Table 3.1 of the SIR (30 June 2015). Cost data for these projects for years prior to 2014 are not available.

Figure 6.6 shows that expenditure is forecast to decline from 2014 to 2016, then rise until it stabilises in 2017. We have plotted data on unplanned interruptions within Figure 6.6. The source of this data is HW's Compliance and Performance Report 2014-15. From this, we note that the number of interruptions experienced by HW's customers is significantly below HW's targets. This is consistent with the trend shown in IPART's 2012 consultant's report. However, we also note that the water main renewal expenditure assumed by IPART's 2012 consultant was significantly higher than the expenditure we have assumed. We have not been provided with information basis of IPART's 2012 consultant estimate to reconcile this difference. However, we consider that this may be associated with a change in the forecast renewals expenditure by HW or additional projects of which we are not aware and have not included with water main renewal projects.

We understand that total water main renewal expenditure is a combination of reticulation (i.e. non-critical) and trunk main replacements (critical). Expenditure on non-critical water mains has been $1.8 million per year through 2013-16 and is forecast to be $2.05 million per year which is below the total renewals budget of $3.5-4.5 million per year.

We also understand that renewal of critical mains is based on asset condition and assessed risk and is not based on historic Operating Licence performance. We agree that this represents good practice, given the consequence of failure of these assets.

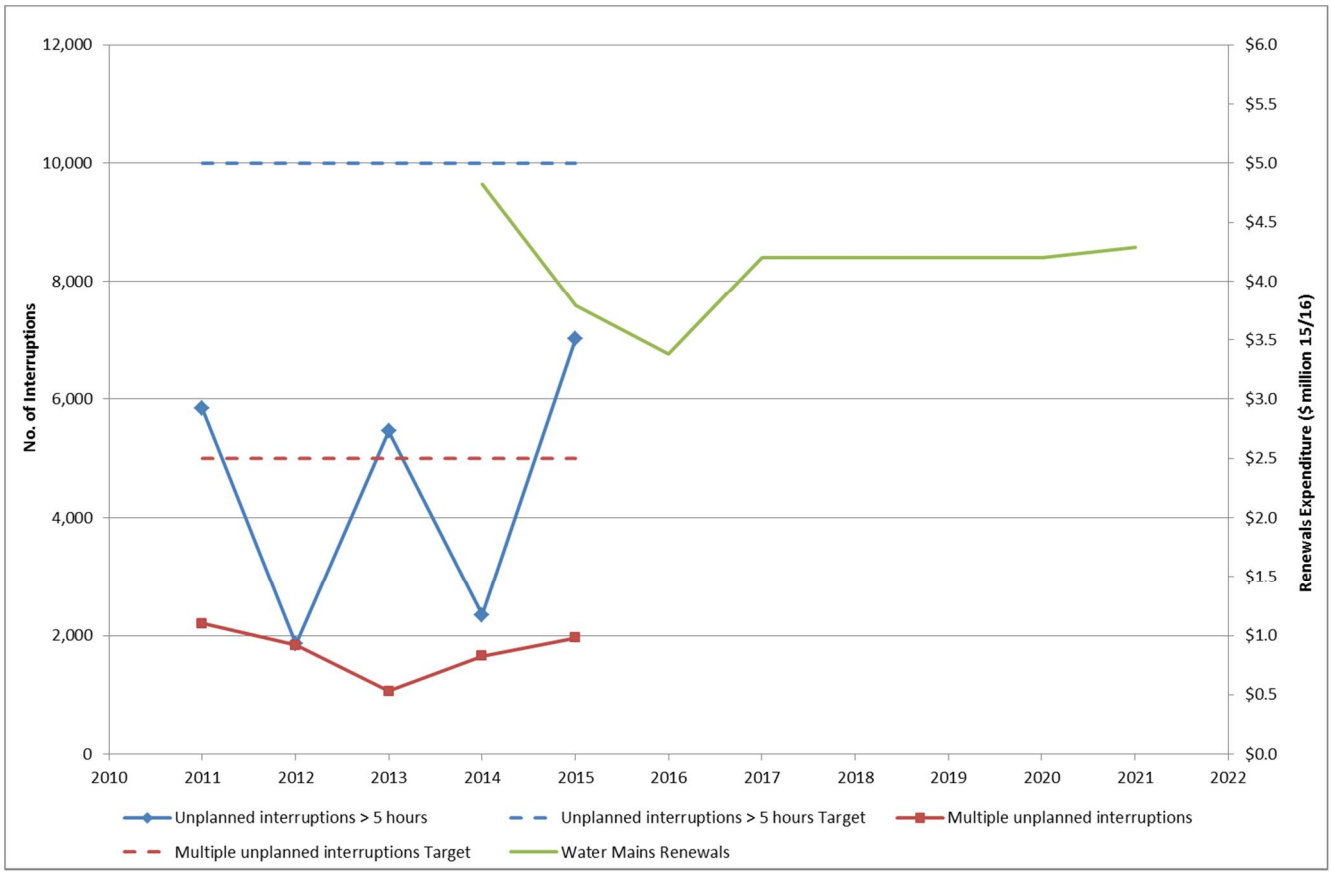


Figure 6.6 : HW's water main renewals and service interruptions

HW Projected – SIR ("SIR Capex 2", Table 3.6, 30 June 2015)

Interruptions - Hunter Water, Compliance and Performance Report 2014-15

Wastewater main renewal expenditure and the number of overflow events are shown in Figure 6.7. We have assumed that the following projects comprise HW's water main renewal expenditure:

- Critical Mains Renewals
- Non-Critical Sewer main Renewals
- Belmont 6 Rising Main Renewal.

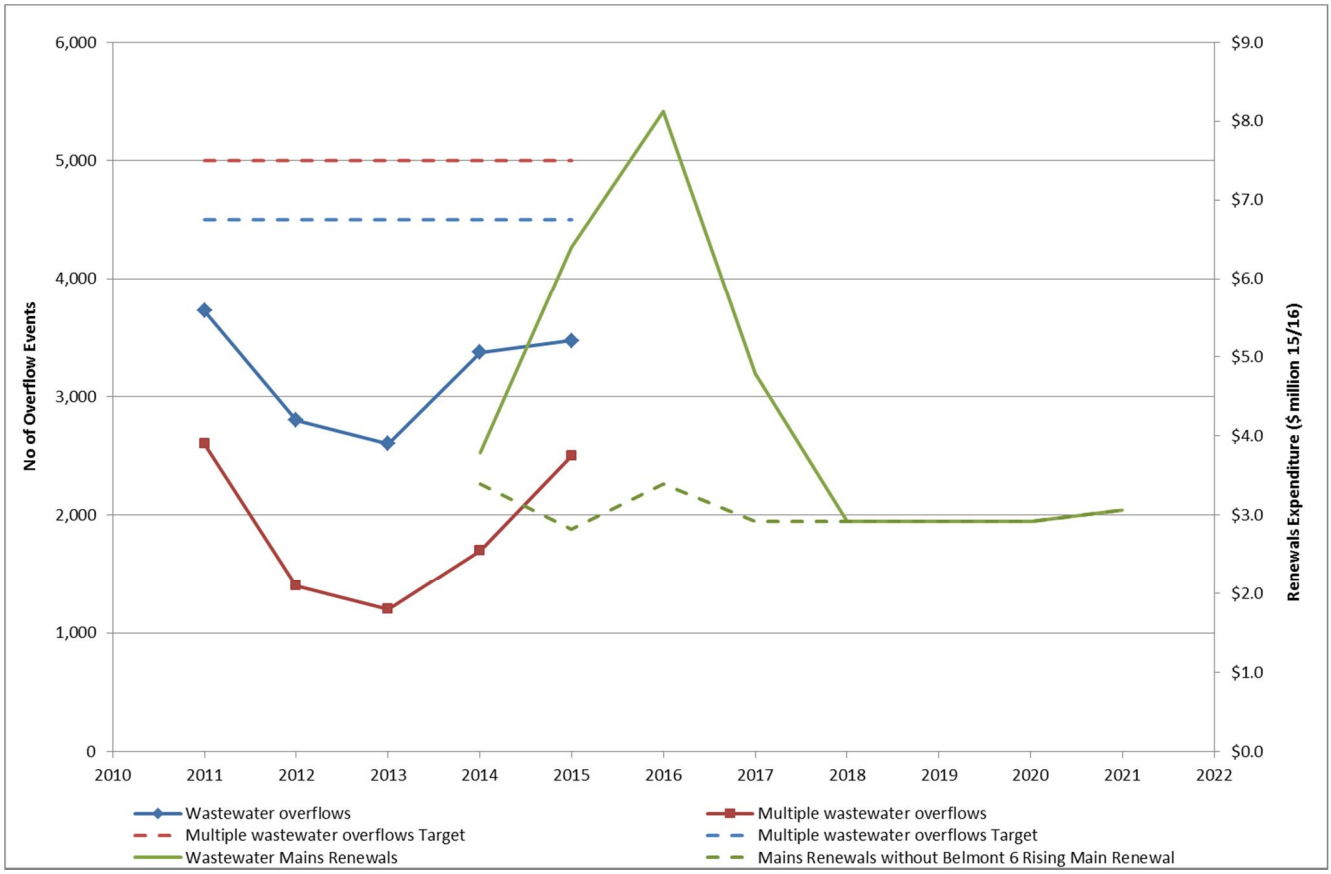


Figure 6.7 : HW's wastewater main renewals and overflow events

HW Projected – SIR ("SIR Capex 2", Table 3.6, 30 June 2015)

Interruptions - Hunter Water, Compliance and Performance Report 2014-15

Forecast expenditure increases from 2014 to 2016 and then decreases until it stabilises in 2018 as shown in Figure 6.7. The 2016 peak in expenditure is driven by the Belmont 6 Rising Main Renewal Project. Removing this cost from the forecast would result in a flatter curve at about $3 million p.a. for the period shown.

The number of overflows in HW's network is well below HW's targets. This is consistent with the service level trend shown in the Aitkin-Cardno report. The wastewater main renewal expenditure assumed by IPART's 2012 consultant was significantly lower than the expenditure we assumed. This discrepancy may be linked to a change in the forecast renewals expenditure or additional projects that we have not taken into consideration.

Again, we understand that the sewer main renewal expenditure is a combination of non-critical sewers and critical sewer replacements. The expenditure on non-critical sewers has been $1.13 million p.a. through 2013-16 and is forecast to be $1.2 million annually. This is below the presented $3.0 million p.a., which allows for critical main replacements and renewal programs. Renewal of critical mains is based on asset condition and assessed risk and is not based on historic Operating Licence performance. As noted above, we agree that replacing critical mains based on risk and asset condition represents good industry practice.

During the Part 1 interviews, HW advised that target 'headroom' was one consideration in capital project planning. We consider that renewal of critical mains based on asset condition and assessed risk represents good industry practice. We consider that HW should continue to consider opportunities to defer expenditure for non-critical assets. However, in doing so, HW must also consider any associated increases in opex in response to burst water mains or overflows.

On balance, we conclude that HW's renewal costs are reasonable.

6.5 Our capex sample

On 22 September 2015, IPART agreed to the following capex sample. The sample is presented in order of dollar value from largest to smallest in Table 6.1 below.

Table 6.1 : Agreed capex sample

Item	Costs ($'000)		
	2013 to 2016	2017 to 2020	Total capex for sample 2013 to 2020*
ICT Program	27,199	41,864	69,063
Mechanical-Electrical Renewals	26,956	29,725	56,681
High Voltage Major Upgrade	49,322		49,322
CTGM - Duckenfield to Tarro - Replacement		28,757	28,757
Burwood Beach WWTW Disinfection	10,225	16,050	26,275
Shortland WWTW Sludge Handling Upgrade	17,871		17,871
Wyee Backlog Sewer Scheme		9,035	9,035
Critical Mains Renewals	8,719	9,635	18,354
Kurri WWTW Upgrade - Stage 3	1,024	6,535	7,559
Seaham Weir		5,843	5,843
Hunter Central Coast transfer capacity upgrade	500	2,381	2,881
Munibung Creek SW Rehabilitation Works	108	1,838	1,946
Total	**141,925**	**151,662**	**293,587**

**Note: Total capex is in the period 2013 to 2020 and does not necessarily capture the total project cost, as some projects incur costs in years outside of this range.*

Our capex sample includes:

- Water, sewerage, stormwater and corporate projects/programs greater than 10% of expenditure by value of projects above the nominated $5 million threshold.
- Greater than 10% by number of the number of projects above the nominated $5 million threshold.
- A mixture of projects and programs.
- A mixture of past and forecast costs.
- Covers items that are above the $5 million threshold (10 sample items are above the $5 million threshold) and some small/medium items to be representative of HW's capital program (two sample items are above the $5 million threshold).

Our sample of 12 items exceeds IPART's stated requirement for a detailed review covering greater than 10% of expenditure by value and by number as set out in Table 6.2 below.

Table 6.2 : Sample portion of total capex

Item	Costs ($'000)		Sample as portion of total capex >$5m
	HW Proposed	Sample	
Capex 2014 to 2016*	327,771	141,925	43%
Capex 2017 to 2020	394,681	151,662	38%
Total	**722,453**	**293,587**	**41%**
No. of items > $5 million	48	12	25%

**As we do not have complete data for HW proposed 2013 program on an individual project level for 2013, this table compares the sample against the HW proposed programs for 2014 to 2016*

The sample covers eight projects and four programs. The 12 capex items actually cover 38 discrete items within the AIR/SIR, which exceeds the basis for our proposed costs. A complete sample list, showing individual items is provided in Appendix A.

We present our analysis and findings by capex item in order of dollar value from largest to smallest below.

We have assumed for all projects that the information provided by HW is current, comprehensive and correct.

6.6 Item 1 - ICT Program

Table 6.3 : Summary of ICT program

SIR/AIR (Regulatory Driver)	**Primary Driver**	Government Projects
	Secondary Driver/s	Business Efficiency/New Mandatory Standards/Existing Mandatory Standards/Discretionary Standards
Capital Project Summary Driver/s		Run (77%), Improve (18%), Transform (4%)
Service		Corporate
Project Type		Various
SIR ID No		CEM005, CNM003, CDS002, CGQ003, CBE004, CEM006, CGQ004
Major Project Reference		n/a
Project Stage		Development

Table 6.4 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	6.61	13.55	11.80	12.11	10.55	10.64	12.08	12.73	**90.08**	114.40
2013 Determination	-	6.60	6.60	6.60	6.60	6.02	6.02	6.02	**44.46**	6.02
Capital Portfolio Summary	0.00	0.00	0.00	0.00	16.72	10.79	13.53	5.56	**46.60**	-

6.6.1 Project description

The ICT Portfolio encompasses the renewal of HW's ICT computing environment to support business operations, information management needs and compliance requirements. The ICT Portfolio includes provisions for the following programs:

- Customer Service (CS) Platform Refresh - customer service, customer information management, customer relationship management and billing
- Customer Care and Billing (CC&B) program – including sustaining existing Customer Information System (CIS), metering and backflow systems
- Asset Information Systems program - including Geographic Information Systems (GIS), Supervisory Control and Data Acquisition (SCADA), drawing management, water modelling, sewer modelling and laboratory data systems
- Enterprise Resource Planning (ERP) program - including asset management, human resources management, operational management and financial management systems
- Information Management program - including Information Lifecycle Management (ILM), intranet redevelopment, Integrated Quality Management System, reporting and analytics

- Enterprise Applications program - which includes enterprise-wide applications and information systems including applications that are not included within other programs such as messaging (email), Enterprise Document and Records Management (EDRMS), Collaboration and Content management, integration services, application servers and database servers
- ICT Infrastructure Programs - which includes client computing, servers, storage, data centre, network, telephony, systems management and resilience and SCADA Digital Radio Network

We have selected two programs to review, and at least one sub-program from those two programs, on the basis of highest cost, as outlined below:

- The ICT Infrastructure Programs (circa $15 million)
  - ICT Infrastructure - Network & Communications (circa $5 million)
  - ICT Infrastructure - Client Computing (circa $3 million)
- The ICT Customer Care and Billing Major Upgrade (circa $10 million)
  - CS Platform Refresh (circa $15 million)

The 'ICT Network and Communications' program covers LAN/WAN services, telecommunications and IP telephony, while the 'ICT Client Computing' covers PCs, laptops, printers and peripherals, mobile phones, tablets and mobility. The CS Platform Refresh program will identify and implement an up-to-date Utility Billing System, Customer Relationship Management (CRM) solution and a Trade Waste Management and Billing solution.

6.6.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation for the programs we are reviewing. However, we note that IPART's 2012 consultant recommended that Enterprise Resource Plan – Stage 1 implementations (i.e. Ellipse upgrade excluding AOMS) be completed by 30 April 2014.

6.6.3 Prudence

The need for the project

The ICT drivers for the ICT Portfolio are identified as Run (77%), Improve (18%) and Transform (4%), where:

- Run is sustaining operations
- Improve is enhancing operations
- Transform is a step change in operations

HW advises that these drivers largely map to asset and service reliability and mandatory standards.

We have mapped the ICT drivers for the programs reviewed to the HW's investment drivers in Table 6.5 below.

Table 6.5 : Project drivers

Program	Description	ICT Driver	Investment Driver	Comments
ICT Infrastructure - Network & Communications	Replacement of network and communications infrastructure including WAN, and LAN.	Run (80%), Improve (20%)	Existing mandatory standards, business efficiency	The infrastructure to be replaced has a life of approximately 4 years. The need for the program is justified as without appropriate action the existing infrastructure will exceed its economic life and be unable to support essential business applications potentially resulting in HW being unable to meet service requirements.

Program	Description	ICT Driver	Investment Driver	Comments
ICT Infrastructure - Client Computing	Replacement of computers, laptops, and mobile phones	Run (100%)	Existing mandatory standards	The infrastructure to be replaced has a life of approximately 3 to 4 years. Replacing these assets when they have met or exceeded their life is appropriate.
CS Platform Refresh	Implementation of a new billing system, Customer Relationship Management (CRM) solution and trade waste system.	Improve/Transform	Existing mandatory standards, business efficiency	A Customer Service Deliver Review was undertaken in 2011 which identified deficiency in HW's system. This project is to address these deficiencies, as outlined in the Customer Service Delivery Strategy.

We consider that the need for these programs has been demonstrated.

6.6.4 Efficiency

6.6.4.1 Efficiency test part 1: Option selection

How the decision was made

For each of the programs within the ICT Capital Portfolio, an individual submission is made which includes the options assessment. For the three projects assessed, HW considered at least the 'maintain current operations' option and two alternatives. More details are included in the following table.

Table 6.6 : Options assessment

Program	Options Considered	Comments
ICT Infrastructure - Network & Communications	Option 1 – Maintain and extend existing capability	There are a limited number of options that can be considered for this program due to the nature of the works. Based on our experience, we consider that appropriate options have been considered.
	Option 2 – Maintain existing capability only.	
	Option 3 – Extend life of existing network components	
ICT Infrastructure - Client Computing	Option 1 – Continue cyclical replacement	There are a limited number of options that can be considered for this program due to the nature of the works. We discussed with HW whether they considered leasing assets. HW stated that this was considered but discounted due to the low unit cost of the assets making more economical to buy. We consider that appropriate options have been considered.
	Option 2 – Continue the cyclic replacement with the view of replacing head office desktops with thin client devices	
	Option 3 – Aim to reduce overall costs by limiting new device types and extending the life of existing devices	
CS Platform Refresh	Option 1 – Do nothing	We consider that the development of the Customer Service Strategy, following the Customer Service Delivery Review, is necessary and this process has resulted in an appropriate options development and analysis process being undertaken.
	Option 2 – Technical upgrade & minor enhancements	
	Option 3 – Customer service solution including major CC&B upgrade	
	Option 4 – Customer service solution including CC&B replacement	

Source: HW data

The preferred option for each program was determined based primarily on the capital costs with consideration of other aspects such as benefits and business requirements. More detail is included in the following table.

Table 6.7 : Preferred options

Program	Preferred options	Comments
ICT Infrastructure - Network & Communications	Option 1 – Maintain and extend existing capability	Option 1 was selected as it provides the opportunity for HW to implement good industry practice at a cost only slightly higher than business as usual. HW advises that the benefits of this higher cost option will be confirmed and quantified in the Business Case, where possible.
ICT Infrastructure - Client Computing	Option 2 – Continue the cyclic replacement with the view of replacing head office desktops with thin client devices	Option 2 was selected as it has the lowest capital cost as well as aligning to the ICT Strategy commitment of lower total cost of ownership and greener IT. HW advises the benefits, such as lower electricity consumption, have not been formally quantified.
CS Platform Refresh	Option 3 – Customer service solution including major CC&B upgrade	Both options are being taken forward in keeping with Hunter Water's procurement procedures. The preferred option to be determined through further analysis undertaken for the development of the Business Case. We consider this to be an appropriate decision at this point in time.
	Option 4 – Customer service solution including CC&B replacement	

We consider that the options development and analysis undertaken for these programs are appropriate and robust for project in the current phase of the project.

We consider that the preferred option selected for each of the programs is the most efficient option as they deliver the objectives of the project for the lowest cost.

Scope of preferred option

The scope of the preferred option is outlined in the following table.

Table 6.8 : Preferred options scope

Program	Scope	
ICT Infrastructure - Network & Communications	• LAN Refresh • WAN Refresh • WAN Optimisation	• SCADA Network Refresh • IP Telephony Refresh • Fleet GPS Tracking
ICT Infrastructure - Client Computing	• Desktop PC and Laptop Refresh (including 400-450 desktops, and 300-350 laptops) • Windows/SOE Upgrade • Minor Client Computing Assets	• Tablet Refresh (including 125 field tablets, and 20 office tablets) • Smartphone Refresh (including 500 phones)
CS Platform Refresh	• Technical Upgrade of CC&B or a system replacement • IVR Integration • Complaint Management integration • Customer Relationship Manager • Tanker Receivals • Tradewaste Management and Billing	• Meter Management System • Backflow Prevention • Commercial Customer management • Integration strategy • Electronic Billing • Self Service portals for Customers or third parties • Mobile Applications

We consider that the scope is adequately defined for the current phase of the project. We understand that the scopes will be further refined, as well as the procurement and delivery approaches, as the projects progress.

6.6.4.2 Efficiency test part 2: Cost efficiency of preferred option

We discuss the process used by HW to develop cost estimates in Table 6.9 below.

Table 6.9 : Cost estimates

Program	Basis of cost estimate	Allowances	Comments
ICT Infrastructure - Network & Communications	The costs were developed utilising historic delivery costs of previous works.	No detail	We consider this to be an appropriate basis for the estimating given that replacement of these assets is required every four years. Further details of the cost breakdown will be required to assess.
ICT Infrastructure - Client Computing	The costs were developed utilising historic delivery costs of previous works.	No detail	We consider this to be an appropriate basis for the estimating given that replacement of these assets is required every four years. Further details of the cost breakdown will be required to assess.
CS Platform Refresh	We understand that the costs were developed based on HW's experience for implementation costs, and wider industry experience for software licence costs.	20% contingency on internal costs; 30% contingency on vendor costs	We consider this approach to be acceptable for this phase of the project but expect more accurate costs to be developed as the project progresses. We consider these allowances to be appropriate.

HW advised that the ICT P3 (portfolio, programme and project management) framework does not include a cost estimation guideline but they will be developing procedures and guidelines over the next 12 months. HW provided an example business case, which will be the next document produced for the ICT Infrastructure - Network & Communications and the ICT Infrastructure - Client Computing programs, that includes the HW's standard project management overhead allowance of 4% and a contingency allowance of 10%.

We consider that HW has used an appropriate process to develop the direct cost estimates in line with market conditions, for the programs reviewed. We understand HW is working to produce procedures and guidelines relating specifically to the ICT framework to assist with the development of cost estimates. We consider that as the programs are further developed, the processes used by HW on other projects will be applied, as evidenced by the example business case provided.

We note that for the CS Platform Refresh, a higher cost option of the two shortlisted options was used to establish the budget. We consider HW has not sufficiently justified this approach given that such a decision is not in keeping with good water industry practice for budgeting. We recommend that the lower cost compliant option cost should be included in the budget until the preferred option is selected. As such, we consider the costs to be partially efficient.

How the project was executed

These items have not been delivered.

6.6.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, Preliminary Business Case and a Full Business Case for this project as required by their processes for a project at this stage. We expect that HW has also prepared a Business Case Checklist for this project (or is in the process of developing this); however we have not sighted this documentation. We understand that project management was budgeted at 4%, which is consistent with what we expect for a project at this stage. HW has applied contingencies of between 20 and 30%, which again is consistent with what we expect for a project at this stage.

6.6.6 Our recommendations for prudence and efficiency

Prudence

We consider that the programs assessed are prudent as they are required to maintain services to customers and improve business efficiency.

Efficiency

We reviewed three programs. Of these, HW selected the least cost, compliant option in two cases. However, for the third program (CS Platform Refresh), HW selected a more expensive option than the least cost compliant option, without adequate justification. As such, we have recommended a reduction of $1.5 million (in $2016) to the proposed costs in 2017.

We have made adjustments to reconcile the values stated in the SIR values with the values provided in HW's supporting documentation. These adjustments are shown in Table 6.10.

6.6.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: prudent or efficient; partially prudent or partially efficient; not prudent or not efficient

6.6.8 Jacobs' recommended capex

Table 6.10 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	6.61	13.55	11.80	12.11	10.55	10.64	12.08	12.73	**90.08**	114.40
HW Project Summary*	0.00	0.00	0.00	0.00	16.72	10.79	13.53	5.56	**46.60**	0.00
Our adjustment on HW submission (SIR)	0.00	0.00	0.00	0.00	4.67	0.15	1.45	-7.17	**-0.91**	0.00
Our recommendation	6.61	13.55	11.80	12.11	15.22	10.79	13.53	5.56	**89.17**	114.40

* ICT Capital Portfolio Summary (HW, 12/08/2015)

6.6.9 Assumptions/data gaps

We do not require any further information.

6.7 Item 2 - Mechanical-Electrical Renewals

Table 6.11 : Summary of mechanical-electrical renewals

SIR/AIR (Regulatory Driver)	**Primary Driver**	Existing Mandatory Standards
	Secondary Driver/s	Business Efficiency/New Mandatory Standards/Discretionary Standards/Growth – other
Capital Project Summary Driver/s		Existing Mandatory Standards (79%), New Mandatory Standards (4%), Discretionary Standards (6%), Growth – other (7%), Business Efficiency (4%)
Service		Water/Wastewater
Project Type		Various
SIR ID No		WEM020, WNM004, WDS003, WGO010, WBE008, DEM025, DNM012, DDS003, DBE007
Major Project Reference		PP13 reference – n/a, PP16 reference – n/a
Project Stage		Development/Delivery/Completion

Table 6.12 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	**Capex Budget ($ million)**									
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**	**Beyond**
SIR/AIR	8.10	7.65	5.22	6.37	7.43	7.43	7.43	7.43	**57.05**	95.08
2013 Determination	-	5.56	5.83	6.20	5.94	5.62	5.56	5.62	**40.33**	5.62
Capital Project Summary	0.00	7.65	6.59	6.37	7.43	7.43	7.43	7.43	**50.33**	-

The SIR is HW's submission to IPART and is the master source of capital expenditure proposals for the upcoming price period. The capital project summaries were provided to Jacobs as a snapshot of the expenditure, in the two price paths 2014 to 2016 and 2017 to 2020. The discrepancy between 2013 and 2021 relates to those years not being included in the project summaries; in these cases, HW states that the SIR should be taken as an accurate portrayal of actual costs for 2013 and forecast costs for 2016.

6.7.1 Project description

The Mechanical-Electrical Renewals project involves the upgrade, as required, of the entire electrical-mechanical assets of HW, including assets at pumping stations, treatment plants, reservoirs, dams, and weirs. The objectives of the project are to:

- Renew mechanical and electrical equipment across all HW facilities including dams, bore-fields, treatment plants, pump stations, reservoirs and network instrumentation. These renewals are either reactive (i.e. as a result of plant condition being at fail or close to fail) or are in respect of assets that are of a capital value which is not large enough to warrant an individual project. These renewals are predominantly required to meet regulatory, safety or legislative compliances.
- Modify existing assets to ensure compliance with safety, environmental and statutory requirements.
- Modify existing assets or install minor new assets to improve operational performance to minimise lowest lifecycle costs and/or meet regulatory compliance.

6.7.2 Previous IPART or consultant recommendations

IPART's 2012 consultant reviewed the 'Water and Wastewater Pump Replacements' and 'Switchboard Replacements (Water & Sewerage)' programs and recommended no change to capex budget. However, we note that the project we are reviewing covers a wider scope.

6.7.3 Prudence

The need for the project

The project driver is based on the strategic direction outlined in the Business Plan. HW's strategic direction is to maximise customer affordability while meeting regulatory and legislative requirements. These include:

- Bulk water supply and dam safety
- Water quality compliance through treatment reliability
- Water customer continuity of supply compliance and wastewater overflow compliance
- Wastewater environmental compliance (both network and treatment)
- Electrical Safety legislation, regulation, standards and codes of practice, asbestos removal
- Mechanical safety standards and codes of practice.

HW aims to achieve this through minimising discretionary capital investment and increasing operation and maintenance productivity. This has led to the selection of Business Case Option 2, which is based on modified historical forecast expenditure.

The decision to proceed was based on the need to maintain existing mandatory standards, including reliability of service and water quality, and business efficiency resulting from lower operating costs.

We note that the SIR allocates 6% of the project costs to the investment driver of 'Discretionary standards'. However, subsequently we understand that this relates to compliance with Codes of Practice and Australian Standards (which are mandatory) and that there was a misallocation due to lack of familiarity with the definitions associated with the IPART drivers.

6.7.4 Efficiency

6.7.4.1 Efficiency test part 1: Option selection

How the decision was made

HW has followed its gateway approvals process established to provide consistency of decision-making across the organisation. Following the identification of the problem, a business case was presented which, following approval led to allocation of funding. HW also carried out internal workshops with its own staff to estimate the average life and replacement costs of all the different types of mechanical-electrical equipment, and to formulate a plan based on the results.

HW has advised that the recommendation was based on evaluating the best way of meeting the overall project objectives while minimising lifecycle costs. The requirements to be met by the expenditure are the key regulatory and legislative requirements associated with mechanical-electrical assets. From our review of the process we consider that HW has adopted good industry practice, in using least lifecycle costs, coupled with meeting necessary regulatory standards, as an approach to determining the preferred option. We therefore consider the approach to be appropriate and reasonable.

Energy efficiency has also been recognised as key priority for HW to meet the strategic direction to maximise operational efficiency. The project includes technical features such as installation of variable speed drives, and power factor correction equipment to increase overall efficiency and reduce energy consumption. Variable speed drives can also improve operational performance of water networks as they allow pumps to ramp up and ramp down slowly to reduce pressure surges and allow flow rates to precisely match demand.

HW has provided evidence that it has followed its business decision-making processes.

A continuation of the historical expenditure approach in setting the budget for this project was discounted by HW as this would have been associated with a purely reactive maintenance regime, responding to asset failures as a basis for asset renewal. A third option to allow for potential increase in failures based on age and business risk arising from failure or performance deterioration was also discounted on the basis of the uncertainties it

would introduce in analysing performance. It is not possible to determine the anticipated asset performance under this option because HW has, to date, not experienced these higher failure rates. We believe it is reasonable and appropriate to discount further consideration of this option because without historical experience to support the analysis, the impact on operations cannot be accurately predicted.

Scope of preferred option

The scope comprises several activities:

- Pump renewal: the rate of renewal will be set to compensate for under-performance due to aging and to minimise the risk of non-compliance with respect to standards of performance and service delivery for water supply
- Switchboard replacement: a structured programme of switchboard replacement will replace the current “operate to failure” strategy based on performance and health and safety compliance
- Borefield equipment replacement: additional capital renewals needed to meet bulk supply redundancy requirements
- Remaining mechanical-electrical assets and system monitoring improvements to achieve lowest lifecycle cost

The work involves a staged renewal and replacement programme, based on continued condition monitoring, of a large number of individual equipment items. We consider that this is a logical and good industry practice way to proceed, given the diverse ages of the various equipment and hence the varied condition.

Sizing of the renewed facilities is based on the existing equipment as the project calls for direct replacement, with no growth rates or escalation in plant capability considered.

As the mechanical-electrical assets have been installed at varying times, and in varying quantities during different periods, then the current fleet has a non-linear age profile. Analysis of age of assets against nominal asset lives has demonstrated that there is a risk that the age profile of the assets is such, with many assets at or approaching the end of their economic life, as to start to impact HW capacity to maintain services. That is failure to implement the planned programme will result in more assets failures over historic and associated increased reactive (and hence less efficient than planned) renewal requirements to maintain regulatory service requirements. Although the recent asset failures have shown an increase over historic levels, the potential risk of such failures to the business is not considered high.

To optimise the replacement programme, a condition monitoring program has been implemented (and is currently being undertaken) by HW which assesses each asset against age, condition and asset criticality. This will be used to develop an optimised replacement programme, based on condition and asset criticality, as an alternative to a simple age compared to asset class age approach. We consider this process to be in keeping with good industry practice that is a risk and asset condition (compared to expected condition for a given asset with respect to its age) is good if not leading practice in water industry asset portfolio management.

Hence, the proactive approach taken by HW to plan renewals of mechanical and electrical assets ahead of failure is in keeping with good industry practice. However, HW’s process could be enhanced by applying a more rigorous condition and risk-based approach to asset renewal linked to asset age, assessment of asset condition against asset type condition decay curves and asset class life. That is, a condition and risk evaluation for a given asset, or suite of assets, could be used in a structured manner to modify the projected life of an asset.

This could bring forward or delay replacement of assets according to condition, versus the expected condition at its age, and given the risk arising from failure. We note some assets can run to fail with minimal or no business risk, whilst others need to be replaced before failure to avoid e.g. loss of supply.

We consider that this better approach is what HW is working towards with its current condition assessment program. We understand that HW is moving its processes over to such industry leading practice. The establishment of a good asset condition database is the first key step in this process.

6.7.4.2 Efficiency test part 2: Cost efficiency of preferred option

Three options were considered for this project:

- Option 1 - Continuation of the existing programme to replace assets at, or close to, failure
- Option 2 - Selective, condition-monitoring based approach which provides for renewals and replacements on the basis of condition and not solely age
- Option 3 - Allowance for the potential increase in failures based on both age and performance deterioration

HW's analysis is uncertain as higher failure rates are not currently being reflected in actual asset performance. This option is considered unlikely within the next price path, but will need to be monitored closely to ensure regulatory compliance is maintained.

The capital forecast for the preferred option is consistent with the overall $350 million capital program. This option forecasts $24.94 million for the 2013 to 2017 period, or $6.24 million per year. The project costs for the preferred option are 6% less than the historical costs on which Option 1 is based (Option 1 costs are $26.54 million for the 2013 to 2017 period, or $6.54 million per year).

Option 3 has not been costed, due to the uncertainties involved in analysing performance, as it is not possible to determine the anticipated asset performance under this option because HW has to date not experienced these higher failure rates. We believe it is reasonable and appropriate to discount further consideration of this option. A breakdown of the cost estimate has been provided by HW. This confirms that HW has followed its robust cost estimating procedures for this project. Option 1 and Option 2 essentially cover a similar scope of asset replacement. We consider the option selected by HW is the most efficient option.

The option for renewal represents a 6% reduction on historical expenditure. Subject to the cost breakdowns being produced which demonstrate a robust estimating procedure, we consider that the project is efficient as it achieves HW's strategic direction, while minimising discretionary capital investment (using the least expensive, Option 2) and increasing operation and maintenance productivity.

How the project was executed

This project has not yet been delivered. However, HW has prepared project development plans for the larger components of the work (e.g. the UV disinfection systems for the wastewater treatment sites). These plans outline the scope and the development steps necessary to implement the project. We consider these plans to be consistent with good engineering practice.

6.7.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, and a Business Case, as required for Gate 2. We expect that HW has also prepared a Business Case Checklist for this project (or is in the process of developing); however we have not sighted this documentation. Given that aspects of the project have been complete, we expect that HW has also prepared a Gateway 5 form and a Project Closure form in line with their processes. We have not sighted this documentation. We have not sighted documentation outlining the project management or contingencies allowances that were used for this project. As such we are unable to determine if they are consistent with HW's processes.

6.7.6 Our recommendations for prudence and efficiency

Prudence

We consider that the project is prudent as it supported by regulatory drivers (economic, safety and service standard) and it achieves the regulatory, legislative and safety objectives (in particular by compliance with existing mandatory standards, and with regard to business efficiency) and provides for reliable water supply of appropriate quality, as outlined in the Business Plan. HW is obliged to provide water treatment and supplies

safely, reliably and in compliance with environmental and other regulations. Specifically, the expenditure can be justified on the grounds of expected reductions in operating expenditure, and to meet the requirements of existing customers. The plant is required to deliver a regulated service. To maintain standards and levels of reliability, a planned replacement programme is prudent and more efficient than a reactive programme.

Without the project, HW is unlikely to meet its aim of providing sufficient asset renewals to ensure water and wastewater services are maintained within compliance and efficiency targets. The timing of this project is appropriate as some of the existing assets are known to be approaching the end of their useful life and will require renewal to meet the regulatory and legislative requirements. The plant is required to deliver a regulated service. To maintain standards and levels of reliability, a planned replacement programme is prudent and more efficient than a reactive programme.

Efficiency

We consider that the preferred option chosen is the most efficient option, because it will provide an acceptable solution at the least cost.

On the basis of the cost estimates provided by HW, we consider the full program is efficient in terms of cost. We consider the costs for the larger components of the work, as outlined in the project development plans, to be efficient and consistent with good engineering practice as are HW's processes for development of project costs.

We have made minor adjustments to reconcile the values stated in the SIR values with the values provided in HW's supporting documentation. These adjustments are shown in Table 6.13. This is consistent with the method used in other sections, where a cost reduction has been made we have adopted the most up to date costs for each project/program. This is documented in Section 6.21.1.

6.7.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	●
Is the project efficient – correct option?	●
Is the project efficient – least cost?	●

Key: ● prudent or efficient; ● partially prudent or partially efficient; ● not prudent or not efficient

6.7.8 Jacobs' recommended capex

Table 6.13 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	8.10	7.65	5.22	6.37	7.43	7.43	7.43	7.43	**57.05**	95.08
HW Project Summary*	0.00	7.65	6.59	6.37	7.43	7.43	7.43	7.43	**50.33**	0.00
Our adjustment on HW submission (SIR)	0.00	0.00	1.38	0.00	0.00	0.00	0.00	0.00	**1.38**	0.00
Our recommendation	8.10	7.65	6.59	6.37	7.43	7.43	7.43	7.43	**58.43**	7.92

** Capital Project Summary - Mechanical-Electrical Renewals (HW, 22/09/2015)*

6.7.9 Assumptions/Data gaps

No further information is required as this item is prudent and efficient based on the adequate information provided.

6.8 Item 3 - High Voltage Major Upgrade

Table 6.14 : Summary of high voltage major upgrade

SIR/AIR (Regulatory Driver)	**Primary Driver**	Existing Mandatory Standards
	Secondary Driver/s	n/a
Capital Project Summary Driver/s		Existing Mandatory Standards
Service		Water/Wastewater
Project Type		Various
SIR ID No		WEM016, DEM022
Major Project Reference		PP13 reference – 18, W132 and S152
Project Stage		Completion

Table 6.15 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	5.17	30.67	12.32	0.28	0.00	0.00	0.00	0.00	**48.44**	-
2013 Determination	14.41	24.81	5.19	-	-	-	-	-	**44.41**	-
Capital Project Summary	5.17	30.67	12.72	0.11	0.00	0.00	0.00	0.00	**48.66**	-
Business Case	12.97	33.93	5.59	-	-	-	-	-	**52.49**	-

6.8.1 Project description

HW owns, operates and maintains High Voltage (HV) assets spread across numerous sites within its operational area. The assets range from simple 11 kV/415 V kiosk type transformer fed installations to complex 33 kV power distribution networks comprising major switchyards, major pumping stations, and water and wastewater treatment plants.

The primary objectives of this project are to upgrade HW's HV assets to:

- Increase safety for operators and the public – This objective will be achieved by delivering upgraded HV assets that comply with relevant WHS and Australian Standards, effectively reducing the risk of electrocution.
- Increase operational reliability - This objective will be achieved by upgrading HW's ageing HV infrastructure so that it complies with Australian Standards and has adequate redundancy built in, which will effectively reduce the likelihood of critical asset failures.
- Reduce environmental impacts – This objective will be achieved by incorporating energy efficient solutions where feasible and installing environmental impact mitigation measures as part of the upgrades.

6.8.2 Previous IPART or consultant recommendations

IPART's 2012 consultant reviewed the 'High Voltage Major Upgrade' program and recommended the capex budget in 2014 be increased by $2.4 million. This recommendation was not adopted by IPART, as the adjustments were very small (IPART, 2013).

6.8.3 Prudence

The need for the project

We consider the need for the project to be demonstrated by HW as detailed risk assessments were carried out, utilising the corporate Risk Matrix Tool to document and determine the inherent risks (operational and safety) for each High Voltage assets at all of the sites. The risk assessments identified a number of sites which have high safety risks and operational (reliability) risks.

This project is driven by mandatory needs:

- Many of HW's HV installations are not compliant with current standards and pose a material safety risk for operators and the public. Upgraded HV assets that comply with relevant WHS and Australian Standards will reduce, if not mitigate, this safety risk.
- HW's existing HV assets are ageing and are approaching the end of their serviceable life. Upgrading HW's ageing HV infrastructure so that it complies with Australian Standards including adequate built in redundancy, will y reduce the likelihood of critical asset failures and enable HW to maintain water delivery and sewage treatment performance standards.
- Due to the age and type of HW's HV assets, they are more likely to either leak oil to the surrounding environment or fail and ignite a bush fire than assets built to modern design standards. Environmental impacts will be reducing by incorporating energy efficient solutions where feasible and installing environmental impact mitigation measures as part of the upgrades.

There is no explicit evidence of a documented obligation issued by a technical regulator of the works to be performed. However, negotiations with HW's DNSP had been ongoing for some time for an asset transfer from HW to the DNSP. When it became evident that the existing HV assets did not meet current standards for safety and reliability, these negotiations ended. Further, asset condition assessments have confirmed that many of the assets are at the end of their life and at increased risk of failure.

6.8.4 Efficiency

6.8.4.1 Efficiency test part 1: Option selection

How the decision was made

We consider that a robust options investigation/analysis for the HV Upgrades project was undertaken by HW for the reasons set out below.

All options were identified, researched and assessed by the HV Upgrades Project team in consultation with key stakeholders. Three options for the HV Upgrades Project were considered to address the safety, reliability and environmental risk associated with HW's HV network. These were:

- Option 1 – Continued ownership of HV assets but with increased expenditure to bring the assets up to modern installation standards and to address age expired assets
- Option 2 – Transfer ownership of HV assets to its DNSP
- Option 3 – Do nothing.

HW Corporation's Board considered the risk associated with Option 3 to be unacceptable for the reasons set out earlier. Consequently, this option was not examined further by HW which we consider is appropriate.

Costs for Option 1 and Option 2 were assessed for each HV Upgrades Project site, including the following:

- Capital investment costs. These costs include the HV Upgrade Project costs as well as on-going asset replacement/upgrade costs, taking into account the expected life and replacement value of each asset.
- Energy costs to reflect the increased tariff rates associated with becoming a LV customer.
- On-going maintenance costs. These costs have been based on a detailed item by item maintenance cost estimate.
- Cost implications of insurance premium were taken into consideration should ownership of HW's HV assets be transferred.

For the PV analysis, the 38 sites included in the HV Upgrade project have been grouped into 13 work areas. The quantitative assessment of the options resulted in Option 1 being most economical for 12 of the 13 work areas. Option 2 was assessed to be economically more feasible at Beresfield WPS. Transfer of ownership to the DNSP was not considered feasible for the following reasons:

- Beresfield WPS has HV motors and will not be subjected to the higher tariff associated with LV power. Consequently, there will be no financial benefit for the DNSP to accept ownership of the HV assets at this site.
- Beresfield WPS is powered by a dead-end connection to the DNSP's HV network in a remote area. The DNSP own the HV network just upstream of Beresfield WPS so there is no strategic value for the DNSP to accept ownership of the Beresfield WPS HV assets.

The qualitative assessment highlighted the following benefits for continued HW ownership of HV assets include:

- HW will retain direct operational control of the HV Assets at critical HW sites. Direct operational control will help minimise the time required to execute emergency HV repairs/works.
- A faster delivery of the HV Upgrade Project. If ownership of HV assets was transferred to the DNSP (i.e. Option 2), significant delays to the HV Upgrade Project will be incurred. It was estimated that these delays will be at least one year. However, there are many unknowns associated with transferring ownership to a DNSP, which would likely delay the project further.

We consider that robust options investigation/analysis on site level was undertaken because:

- The HV Upgrades Project was essentially an asset replacement project. At a site level, options for asset replacement (including do nothing) were considered by assessing the existing HV equipment in terms of value for money, WHS, reliability, operability and maintainability.
- All sites, with the exception of George Schroder WPS and Neath WPS, involved the replacement of existing HV Assets that are either unsafe or unreliable. Net Present Value (NPV) analysis have been approved for both these sites, justifying the installation of Variable Speed Drives (VSDs), which will result in significant energy cost savings for HW.

Scope of preferred option

We consider the scope of the preferred option to be adequately defined as the HV Upgrades Project was an asset replacement project. As mentioned above, all sites, with the exception of George Schroder WPS and Neath WPS (as mentioned above), involved the replacement of existing HV Assets that is either unsafe or unreliable.

A high level project scope definition was prepared and a detailed scope per site was developed through design development and construction packages. At a site level, concept designs were developed for each of the upgrade sites using the following Concept Design process:

- Step 1 – HV Project Team Workshop. Concept design drivers considered during this workshop included value for money, WHS, reliability, operability and maintainability.
- Step 2 – Options identification and options assessment. Options identified in brainstorming workshops were assessed and ranked in terms of merit and cost.
- Step 3 – Concept Design development. Based on the preferred option for each site, a concept design was developed and reviewed. The Concept Design was then presented to key stakeholders who provided comments and in some cases identified additional options. Additional options were subsequently assessed and adopted where they presented the best solution in terms of the project drivers. Concept Designs were finalised once all stakeholder comments were addressed.

HW's Planning group has been consulted on a site-by-site basis to determine if any equipment replacements need to have additional capacity to cater for additional growth. In all cases, it was considered that timing and certainty of proposed upgrades did not warrant an increase (or decrease) is asset capacity.

We consider the scope development of the preferred option to be in keeping with good water and electricity industry practices.

6.8.4.2 Efficiency test part 2: Cost efficiency of preferred option

We consider the preferred option to be cost-effective and in-line with market value as the delivery method for the High Voltage Upgrades project was based on multiple contracts for the three design, develop and construct packages that facilitate:

- The project being spread over multiple sites and the sites can be grouped into 'like for like' packages
- Input of construction expertise into the design
- Staging of the overall project to permit significant HW involvement (limited resources) which will be required for the shut downs and cut-ins.

A panel of four contractors was established through an Expression of Interest phase. Tenders from the contractors on the panel were evaluated against the tender evaluation criteria consisting of non-price (technical/capability/experience) and price, weighted appropriately for this type of project. The non-price criteria included suitability of proposed personnel and proposed design and construction methodology. The contract was awarded to a tenderer based on the outcome of the tender evaluation. From our review, we consider the tender process to be robust and in keeping with good industry practice as it engaged an appropriate number of contractors and applied appropriate selection criteria.

HW Corporation's Board approved $55.5 million of capital funding for the project. The ultimate project cost was $50.5 million representing a favourable variance of approximately 10%. This included contract variations of 12.6%.

How the project was executed

We consider that the project was well executed as it addressed the primary objectives of this project in a timely fashion and within budget, these objectives being:

- **Increase safety for operators and the public** – This objective has been achieved by delivering upgraded HV assets that comply with relevant WHS and Australian Standards, effectively reducing the risk of electrocution.
- **Increase operational reliability** – This objective has been achieved by upgrading HW's ageing HV infrastructure so that it complies with Australian Standards and has adequate redundancy built in, which will effectively reduce the likelihood of critical asset failures.
- **Reduce environmental impacts** – This objective has been achieved by incorporating energy efficient solutions where feasible and installing environmental impact mitigation measures as part of the upgrades.

The safety performance on the overall project was good with no serious injuries and no lost time injuries. Overall, the HV Project had a relatively small impact on the environment as the sites were brownfield, involving upgrades to already disturbed areas.

The project was delivered within the approved budgeted amount. The project was delivered with a variance against the original proposed schedule. We consider the provided justification as reasonable and appropriate.

6.8.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has, generally, followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, a Business Case, consistent with Gate 3, a Project Closure form, consistent with their Gateway 5 process, and numerous board papers. However, we expect that HW has completed a 'Gateway 5 form' (or is in the process of completing), is also required for Gate 5.

HW has allowed approximately 10% for project management in the budget. While this is higher than other HW projects (generally approximately 6%), this was proposed due to the high risk activities involved in the project. We consider this to be acceptable. Contingency allowances applied by HW varied across the packages, ranging from approximately 10% to 30%. This is more than we expect at the Board approval stage and not consistent with HW's processes. We note that, at completion of the project, all of the packages were below budget with the majority of the contingency allowance intact. This indicates that the contingency allowances made by HW on the packages were excessive.

6.8.6 Our recommendations for prudence and efficiency

Prudence

We consider that the HV Upgrades project is prudent, because it achieves the regulatory, legislative, safety and environmental objectives and provides for reliable water supply, as outlined in the Business Plan. HW is obliged to provide water treatment and supplies safely, reliably and in compliance with environmental and other regulations.

Efficiency

The selected option has been delivered to achieve these goals. The timing of this project is appropriate as some of the existing assets are known to be approaching the end of their useful life and will require renewal to meet the regulatory and legislative requirements.

We consider that the project is efficient as it achieved the primary objectives of this project, while minimising the capital investment by selecting the most economical preferred option. We consider the procurement of the preferred option to be efficient because a panel of contractors ensure market tested bids for the various packages.

We have proposed a minor increase in cost ($0.22 million) to align with the supporting documentation provided. This is consistent with the method used in other sections, where a cost reduction has been made we have adopted the most up to date costs for each project/program. This is documented in section 6.21.1.

6.8.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	●
Is the project efficient – correct option?	●
Is the project efficient – least cost?	●

Key: ● prudent or efficient; ● partially prudent or partially efficient; ● not prudent or not efficient

6.8.8 Jacobs' recommended capex

Table 6.16 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	5.17	30.67	12.32	0.28	0.00	0.00	0.00	0.00	**48.44**	-
HW Project Summary*	5.17	30.67	12.72	0.11	0.00	0.00	0.00	0.00	**48.66**	-
Our adjustment on HW submission (SIR)	0.00	0.00	0.39	-0.17	0.00	0.00	0.00	0.00	**0.22**	-
Our recommendation	5.17	30.67	12.72	0.11	0.00	0.00	0.00	0.00	**48.66**	-

** Capital Project Summary - High Voltage Major Upgrade (HW, 11/09/2015)*

6.8.9 Assumptions/Data gaps

No further information is required as we consider this this item to be prudent and efficient.

6.9 Item 4 - Chichester Trunk Gravity Main - Duckenfield to Tarro – Replacement

Table 6.17 : Summary of Chichester Trunk Gravity Main replacement

SIR/AIR (Regulatory Driver)	**Primary Driver**	Existing Mandatory Standards
	Secondary Driver/s	n/a
Capital Project Summary Driver/s		Existing Mandatory Standards
Service		Water
Project Type		Proposed
SIR ID No		WEM008
Major Project Reference		PP16 reference – 12
Project Stage		Development

Table 6.18 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.00	0.00	0.00	0.00	0.51	0.77	8.99	18.49	**28.76**	-
2013 Determination	-	-	-	-	-	-	-	-	**-**	-
Capital Project Summary	0.00	0.00	0.00	0.00	0.91	1.33	7.49	14.99	**24.71**	-
Business Case	-	-	-	-	0.93	1.39	8.06	16.54	**26.93**	-

6.9.1 Project description

The project involves the replacement of the 900 mm, 8 km, Chichester Trunk Gravity Main (CTGM) locking bar section from Duckenfield to Tarro junction with a 1,200 mm diameter pipeline, either an aboveground or underground.

6.9.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation.

6.9.3 Prudence

The need for the project

The driver for the project is identified as ‘Existing Mandatory Standards’.

The Duckenfield to Tarro section of the CTGM was constructed in 1923 of DN900 lead-jointed locking bar pipe, and is one of only four remaining sections of this type that remain in use on the CTGM. The condition of Duckenfield to Tarro section is deteriorating to an extent that it has the potential to pose an unacceptable business risk. A structural assessment confirmed that the pipe is only fit for purpose in the short term and that regular failure of varying consequences may occur if it is maintained is service (Hunter H2O, 2015).

The CTGM supplies approximately 38% of the bulk water to the Lower Hunter (Metropolitan Water Directorate, 2014). Failure of the CTGM will result in reliance on the bulk water supply from the Grahamstown WTP, which is limited to 260 ML/d, with a peak week demand of approximately 300 ML/d (HW, May 2015). The HW business case further notes that, the repair time for a major failure of the main can be 2 to 4 weeks, depending on the magnitude of the failure. If an interruption were to occur during the peak demand period, or continue for an extended period, ensuing water supply deficiencies may result in loss of supply to customers.

HW considers that the project is required to maintain supply to customers and aligns with HW's Strategic Business Plan.

6.9.4 Efficiency

6.9.4.1 Efficiency test part 1: Option selection

How the decision was made

Four options were considered:

- Option 1 – Continue Existing Operational and Maintenance Practices (do nothing)
- Option 2 – Optimised Operation and Maintenance Practices
- Option 3 – Asset Rehabilitation and Modified Operation and Maintenance Strategy
- Option 4 – Asset Replacement and Modified Operation and Maintenance Strategy (DN900)

We note that non-pipeline options, such as emergency storage with back-feed, risk mitigation measures, for example low cost pipeline support augmentation (e.g. sand bags) to prevent the failure of a pedestal, were not considered as they do not resolve the long term issue of a pipe at or nearing the end of its economic life. HW has advised that the rate of failures along the pipeline has been increasing and that this section of the pipeline has been identified as having the highest priority for replacement. We consider the selection of this section of pipeline to be reasonable as HW has demonstrated that the asset has reached the end of its economic life and solutions which do not address this core issue only increase the risk associated with complete failure.

Option 4 was determined by HW as the preferred option through qualitative and quantitative assessment. Based on the information provided, we consider replacement, Option 4, to be the appropriate and efficient solution.

Table 6.19 : Options analysis

Option	Cost ($ million)		
	Project Capital Cost	Combined Program Cost	NPV
Option 1 – Continue Existing Operational and Maintenance Practices (Do Nothing)	n/a	n/a	n/a
Option 2 – Optimised Operation and Maintenance Practices	23.6	n/a	23.1
Option 3 – Asset Rehabilitation and Modified Operation and Maintenance Strategy	36.4	n/a	25.0
Option 4 – Asset Replacement and Modified Operation and Maintenance Strategy (DN900)	23.6	n/a	22.3

Once Option 4 had been determined as the preferred option, an alternative option of upsizing of the pipeline from DN900 to DN1200 and delaying Stage 3 Grahamstown WTP upgrade was considered (Option 4b). This analysis demonstrates HW consideration of a whole of system analysis, rather than focusing on individual assets in isolation. We consider evaluation of this option (Option 4b) to be in keeping with good water industry practice.

Table 6.20 : Alternative options analysis

Option	Cost ($ million)		
	Project Capital Cost	Combined Program Cost	NPV
Option 4a – Pipeline Replacement with DN900 and current Stage 3 Upgrade Grahamstown WTP	23.6	143.6	106.5
Option 4b – Pipeline Replacement with DN1200 and delayed Stage 3 Upgrade Grahamstown WTP	31.2	151.2	91.0

Stage 3 of the Grahamstown WTP upgrade is currently due in 2028. HW states that the installation of the DN1200 pipeline from Duckenfield to Tarro could delay the Grahamstown WTP upgrade by up to 8 years, delaying the need for the upgrade until approximately 2036.

Although the DN1200 option has a higher capital cost, the NPV indicates a saving of $15.5 million over the analysis period, of 25 years. We consider the selection of Option 4b as the preferred option to be a prudent decision.

Scope of preferred option

The preferred scope of works is the replacement of the CTGM locking bar section of pipeline from Duckenfield to Tarro with a DN1200 PE pipeline. The pipeline is to be installed along the exiting alignment, as this easement is owned by HW and is the most logic location for the replacement main. The location of the pipeline, i.e. aboveground or underground, is yet to be determined.

The scope of works will be developed further during the concept design, which is planned to commence in July 2016. We note that HW has completed the replacement of a number of other sections of the CTGM with the scope for this section similar.

6.9.4.2 Efficiency test part 2: Cost efficiency of preferred option

The cost estimates for this project were developed by an external consultant, using HW's standard cost estimating template, and actual rates from the replacement of other recent CTGM sections. The PV analysis was conducted over a 25 year period using a discount rate of 7%, with sensitivity analysis undertaken for discount rates of 4% and 10%. The total design cost allowed (approximately $2.1 million) is approximately 9% of HW's estimated delivery costs. We consider this percentage to be appropriate given the current phase of the project.

We undertook a high level assessment of the direct costs associated with the new pipeline. We determined a value for direct costs of approximately $19.2 million. If the remaining value (approximately $2.7 million) is assumed to be associated with HW's overheads and costs, then this equates to approximately 14% of the direct costs. This is 4% higher than the 10% used for some of the other HW projects we have reviewed and higher than the value recommended in HW's Estimating Guidelines for projects over $10 million (of 6%).

An inherent risk contingency of 9% and a contingent risk contingency of 18% were used in the cost estimate, with a total project contingency of 27%. HW's *'Guideline – Capital Project Estimating Guidelines (QG009)'* outlines that for a Business Case, Inherent risk (Base to P50) of 10% to 15% and Inherent plus Contingent risk (Base to P90) of 25% to 35% is acceptable. From our experience, we consider these contingencies to be in keeping with good industry practice.

Based on the above assumptions, we have developed the following order of magnitude (-20% / +40%) benchmark cost estimate.

Table 6.21 : Cost estimate comparison

Component	Value ($ million)	
	HW[#]	Jacobs
Concept design	0.7	0.7*
Detailed design	1.3	1.3*
Direct costs	21.9	19.2
HW costs	Included above	1.2 (@ 6% of direct costs)
Sub-total	**23.8**	**22.3**
Contingency	6.5	4.9 (@ 22% of sub-total)
Total	**30.4**	**27.2**

[#] *Source: Business Case - CTGM Duckenfield to Tarro Preliminary Business Case*

** HW's cost adopted.*

As HW's cost estimate is within 12% of our benchmark order of magnitude cost estimate, we consider HW's costs for their preferred option (Option 4b) to be efficient.

How the project was executed

This item has not been delivered.

We note that the supporting documentation provided supports a $1.83 million reduction in cost from the costs submitted by HW in the SIR. HW has provided an explanation for the cost reduction. HW advised that it had:

> *"… reviewed the project contingency as part of the development of the business case. Costs were validated with market costs from recent projects (Tarro to Shortland, Beresfield to Stoney Pinch). Given Hunter Water's experience with recently delivered and designed projects, inherent contingency allowances were able to be minimised as part of the development of the portfolio estimate. Market costs were equivalent for the project estimates that were developed for the SIR and the preliminary business case. Both estimates were developed from the same quantity surveying."*

We understand that the $1.83 million reduction relates to a reduction in the contingency allowance. We support HW's method of reducing contingencies based on recently delivered projects. However, we have seen no evidence that the reduction of the contingency allowance is not due to a softening market.

We recommend reducing the cost of the project by $1.83 million to align with the latest cost estimates.

6.9.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has, generally, followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary and Preliminary Business Case, consistent with Gate 1 requirements. We expect that HW has also prepared (or is in the process of preparing) a Full Business Case and a Business Case Checklist for this project, as required for Gate 2. HW has allowed approximately 8% for project management, which is consistent with what we expect for a project at this stage, and a contingency allowance of approximately 22%, which is consistent what we expect for a project at this stage.

6.9.6 Our recommendations for prudence and efficiency

Prudence

We consider that the project is prudent as the existing pipeline is an essential component of the CTGM and it is near the end of its life and is experiencing an increasing rate of failures.

Efficiency

We consider that the project is efficient as the preferred option has been selected by a robust options analysis and is keeping with that which would be chosen by an efficient operator, it is one of the lowest capital cost options and has the lowest NPV.

We have proposed a reduction in cost ($1.83 million) to align with the supporting documentation provided. This is consistent with the method used in other sections, where a cost reduction has been made we have adopted the most up to date costs for each project/program. This is documented in Section 6.21.1.

6.9.7 Our traffic light summary of prudence and efficiency

Is the project efficient?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: ● prudent or efficient; ● partially prudent or partially efficient; ● not prudent or not efficient

6.9.8 Jacobs' recommended capex

Table 6.22 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.00	0.00	0.00	0.00	0.51	0.77	8.99	18.49	**28.76**	-
HW Project Summary*	0.00	0.00	0.00	0.00	0.93	1.39	8.06	16.54	**26.93**	-
Our adjustment on HW submission (SIR)	0.00	0.00	0.00	0.00	0.42	0.62	-0.92	-1.94	**-1.83**	-
Our recommendation	0.00	0.00	0.00	0.00	0.93	1.39	8.06	16.54	**26.93**	-

** Capital Project Summary - Duckenfield to Tarro CTGM Renewal (HW, 11 September 2015)*

6.9.9 Assumptions/Data gaps

No further information is required.

6.10 Item 5 - Burwood Beach WWTW Disinfection

Table 6.23 : Summary of Burwood Beach WWTW disinfection

SIR/AIR (Regulatory Driver)	**Primary Driver**	New Mandatory Standards
	Secondary Driver/s	Existing Mandatory Standards
Capital Project Summary Driver/s		New Mandatory Standards
Service		Wastewater
Project Type		Various
SIR ID No		DEM010, DNM004
Major Project Reference		PP13 reference – 2, PP16 reference – 2
Project Stage		Delivery

Table 6.24 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.34	0.17	0.39	9.00	16.05	0.00	0.00	0.00	**25.96**	-
2013 Determination	0.45	0.95	5.02	10.52	-	-	-	-	**16.94**	-
Capital Project Summary	0.44	0.17	0.39	8.08	4.98	0.00	0.00	0.00	**14.06**	-

6.10.1 Project description

Burwood Beach WWTW, HW's largest wastewater treatment facility, currently discharges treated sewage and sludge through a 1.5 km outfall. This project is to provide disinfection to the treated effluent to protect

recreational users of the local bathing waters. This project is a result of several years of studies and consultations leading to a need for improved water quality to reduce the risk to recreational water users. The chosen solution is disinfection of treated effluent using UV disinfection.

6.10.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation.

6.10.3 Prudence

The need for the project

As part of Stage 2 planning for the site, a local Community Reference Group (CRG) was formed, who expressed concern regarding potential health risk from the biosolids discharge. A Quantitative Microbial Risk Assessment was undertaken in 2010. This identified that generally there was a low risk of < 1% of illness from the existing discharge but, intermittently, the risk to bathers increases to, at times, > 10%. Generally the bathing waters meet 'Very Good' status as defined by WHO Guidelines for Safe recreational Water Environments: coastal and freshwaters (WHO 1998) and the Recreational Water Quality Guidelines NZ (1999).

According to minutes of community at a meeting dated 24 Nov 2009, NSW Health stated that the results of the study suggest the risk is small but that there is a public health risk. NSW Health advised that "this risk is not acceptable from a public health position and [NSW Health] is of the opinion that the community would also not accept the risk to public health". NSW Health formalised this position in a subsequent letter (dated 18 Dec 2009). This letter stated: "while the risk of illness is small and periodic in nature, it presents a human health risk which is of concern to NSW Health and is likely to be considered unacceptable to the community". However, NSW Health did not direct HW to undertake capital works.

The project was first included on the environment protection licence for the Newcastle sewerage system (EPL 1683) in the form of a Pollution Reduction Program in 30 March 2010. EPL 1683 required pilot testing of UV following the risk assessment to implement an effluent disinfection system.

The following is an extract from the CRG minutes dated 31 March 2010, where the proposed solution was challenged: *"NS and BH questioned whether the $15m investment in UV disinfection is justified given the apparent low level of risk identified, and whether the money could be better spent elsewhere. KY and DDur responded that even though the risk is low, the local population is expected to increase significantly and it is important to limit the risk as much as possible. Implementing UV is not extreme – it is a sensible, risk-based approach."*

The EPA (formerly DECCW) advised the effluent quality requirements for Burwood Beach WWTW in a letter dated 8 Oct 2010.

Bathing water data, provided in the Burwood Beach Outfall Extension Investigation Report (2014), indicates at times that the bathing waters have poor quality. Modelling shows this is related to dispersion from the outfall and the variation and unpredictability is caused by changes to the East Australian Current and wind direction.

As such, whilst initially there was no strict direction from EPA or NSW Health to undertake works, the concerns of both organisations have been clearly stated. A commitment to completing this work by HW to the EPA was recorded in the CRG minutes (April 2010) and in correspondence to the EPA and NSW Health. Subsequent to this, the EPA has advised that it intends to add a condition to the discharge consent necessitating reduction of pathogens in the bio-solids discharge. As such we consider the driver to be mandatory standards.

6.10.4 Efficiency

6.10.4.1 Efficiency test part 1: Option selection

How the decision was made

The project has spanned a number of years and numerous investigations and consultation has been undertaken. Our understanding of the process HW undertook is outlined below:

- 2008 to 2010 – CRG consultation
- 2009 – Quantitative Microbial Risk Assessment
- 2009 – Investigation and preliminary options development
- 2010 – Commitment to install UV
- 2012 to 2013 – Options studies
- 2013 – Value workshop
- 2014 – Outfall assessment
- 2013 to 2014 – Business Case development

Six options, plus sub-options, were discussed within the business case. These options were:

- Option 1 - Do nothing
- Option 2 - UV disinfection (with different doses as sub-options)
- Option 3 - Chlorination/Chloramination (with different technologies as sub-options)
- Option 4 - Chlorine Dioxide
- Option 5 - Ozone
- Option 6 – Microfiltration

We note that other options were considered in the value engineering session. There is limited description of the risks associated with each option in the workshop report, with the options described and considered using financial and MCA techniques. We recommend that for future projects a clear decision and action log is created and documented so that decisions, in particular discounting of options and selection of a preferred option are recorded.

An alternative option, extension of the sea outfall, was also considered by HW but excluded as the estimated cost for implementation was found to be prohibitive.

HW considered the ‘do nothing’ option but NSW Health and EPA did not view it as acceptable.

Whole life costs were considered in the optioneering process, as described in the Business Case. The lowest whole life cost solutions were low dose UV, chloramination and chlorine dioxide. The advantages and disadvantages of the options are discussed below:

- The low dose UV option was considered not viable as the site receives high turbidity effluent, which results in poor transmissivity. For it to be viable for the site a review and optimisation of upstream processes will be required. HW provided no data explaining the cause of the poor transmissivity. This option would have provided the lowest whole life cost outcome for the project; therefore, we consider that further understanding of the blockage of the solution is warranted.
- The chloramination option was discounted as it is a less effective disinfectant against viral species and was not supported by NSW Health
- The chlorination option was discounted due to the very high operational costs for using chlorine gas

- The lower cost chlorination option of using hypochlorite dosing was not discussed in detail in the Business Case, but was considered in earlier reviews but discounted due to operational and safety concerns
- Chlorine dioxide is not widely used for this application and was dismissed as it was an unfamiliar, although $10 million capex and ($4 million NPV) less than the preferred option
- Ozone and microfiltration were excluded from the options analysis due to high capital and operational costs

We note that consideration is given to the sensitivity of chlorine cost, as hypochlorite delivered to site, but not power costs for UV, giving only a partial picture.

We also note that the 'Options Cost Refinement Report' concludes that: as costs for chlorine and UV are close, the environmental benefits of not producing chlorinated by-products, such as THM, favour the selection of UV.

In support of this recommendation, we can give the following evidence of global good practice. The EU 2006/11/EC Dangerous Substances Directive (originally 76/464/EEC (1976) Directive on Pollution caused by certain dangerous substances discharged into the aquatic environment) identifies chlorinated by-products as a harmful substance. This has driven the water industry in many nations to not use chlorination for disinfection, preferring UV. The use of chlorine based cleaners on sites has also been substantially reduced in favour of less harmful alternatives.

We note that HW considered the impact that the future upgrade of the plant, Stage 3, would have in the options selection to ensure that the project was not abortive in the near future. No solution has been identified for Stage 3. HW requested deferral of the disinfection upgrade, but this was not acceptable to the regulator or NSW Health. As such, phasing of the solution was not possible.

The documentation provided shows that over the life of the project there has been considerable variation in the scope and cost. HW processes dictate that when a project changes cost substantially, the project team will review the options and solution again. We have seen a copy of the Business Case Review Checklist (dated January 2014). This records the change to the preferred project scope (from chlorination to UV disinfection) and the increase to project costs, due to the upgrade to the power supply.

Scope of preferred option

The solution selected (UV) is a technically robust, proven means of disinfection. HW advised during this review that, as part of option selection processes, capex/opex trade-off is evaluated and that this will have included control systems to provide measured applied dose control which will enable efficiency in dose applied through controlling UV output to suit changes in transmissivity, thereby minimising running (electricity costs). However, we have not sighted documentation demonstrating this. The plant has adequate redundancy to allow any planned maintenance but it is uncertain that the system will provide standby in the event of failure under all conditions.

We recommend that where risk based decisions are made that they be recorded in the business case.

We note that the 'Burwood Beach Wastewater Treatment Works – Disinfection System' report (CH2MHill, 2012) indicates that a 3.5 log kill is sufficient to meet the bathing water "A" class standard. The 'Burwood Beach Outfall – Extension Options' report (CEE, 2014) indicates that a 2,000 times dilution occurs between outfall and bathing water. Both of these reports indicate that with no disinfection, a 3 log reduction is occurring between the discharge point and at receivers. This means that a standard of 200 organisms/100 millilitre will result in no faecal organisms on the beach, which is beyond the standard required for the project and environment and customers.

We note that HW did challenge NSW Health's standards on this project and achieved a change in NSW Health's original expectations for the project. We consider that there is merit in HW continuing to challenge the regulator's and NSW Health's standards on any similar projects in future. Adoption of a lower standard can result in savings (lower capital, smaller equipment required, and operational costs and lower carbon footprint).

6.10.4.2 Efficiency test part 2: Cost efficiency of preferred option

We note that the project costs reduced throughout the life of the project, from submission cost of $25.9 million to an outturn of $14.14 million. We believe that this demonstrates that the initial submission was not efficient, as was based on a high contingency allowance.

In the costing for the business case there is a sum of 25% project value as contingency. The power supply upgrade component has a higher contingency of 35%. These contingencies contribute significantly to a project value of $27.6 million in the Business Case. At the time the Business Case was developed the Distribution Network Service Provider (DNSP) had advised HW that there was a high likelihood that it will need to upgrade the connection to site and undertake some deeper network reinforcements to accommodate the increased demand from the project. The estimate for these works ($7 million) was captured by HW in the project value. We consider the application of 35% contingency to the preliminary budget quote for supply upgrade from the DNSP to be excessively conservative.

We understand that as the project developed, HW reviewed the cost estimation with a better understanding of project scope, particularly the requirement for power supply upgrade being removed, and reduced the forecast cost.

How the project was executed

The contract was competitively tendered. Four tenders were received and evaluated against price and non-price criteria price. The contract was awarded to successful tenderer based on the outcome of the tender evaluation. HW considered the whole of life project costs in the tendering process, which was essential given the large ongoing energy costs. From our review, we consider the tender process to be robust and keeping with good industry practice as it engaged an appropriate number of contractors and applied appropriate selection criteria.

The project is progressing but not operational yet. We anticipate that the project will meet the expected outcomes.

We note that a public commitment to provide UV was made in April 2010, and the regulator stated standards to be achieved in October 2010, however options were still being assessed in 2013. Based on our experience, for a typical project of this size and nature, design and delivery should be completed within two years of commitment to the project.

HW has provided further commentary on the reasons behind the extended development and delivery program:

- The project commitment was made at an early stage of project development, at the behest of NSW Health and the EPA, and several years before the business case for the project was approved (2010 and 2013 respectively).
- Business case development included additional data gathering and scientific investigation (Quantitative Microbial Risk Assessment) of scenarios to ascertain the quantum of risk reduction achievable from the mandated expenditure. In this process, HW sought to challenge the benefit to customers and the community by looking at the impact of various log reductions on recreational water quality. The QMRA was the first of its kind in Australia with hydraulic modelling used to estimate the movement of the pathogen, as particles, from the outfall. This was combined with pathogen die off results from experimental work and statistical analysis to estimate the concentration of pathogens in bathing areas. Illness risks were then estimated based on dose-response relationships for bacterial indicators and pathogens on the rare occasions when the plume came back towards the beaches.
- Business case development included extensive liaison with regulators, stakeholders and community representatives regarding the standards for the project to challenge prudency and efficiency of the project.
- Business case development included an extensive data collection program due to the unusual nature of treated effluent for a disinfection system (e.g. low and variable UVT levels)

The project is scheduled to be commissioned within three years of the business case approval.

We accept that HW was correct to invest in additional investigations to consider the water quality risks associated with this project, particularly given the high cost of the capital works and the initial findings of low

risk. Based on the need to undertake additional investigations and to consult widely with regulators, stakeholders and community representatives, we conclude that the project delivery timeframes are within expected timeframes for a project of this size and complexity.

6.10.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, a Preliminary Business Case, a Full Business Case, a Revised Business Case and multiple board papers for this project, which is consistent for a project at this stage.

6.10.6 Our recommendations for prudence and efficiency

Prudence

We consider that the project is prudent as there is a proven need for the provision of disinfection at Burwood Beach WWTW to reduce the health risk to bathers, in line with EPA requirements.

Efficiency

We consider that the final solution selected to be efficient, as it utilises a proven technology for disinfection, with consideration to long term environmental benefit in terms of recreational water and no residual chemical by products.

We consider the costs in the SIR to be not efficient as initial cost estimates were elevated to $25.96 million, against an outcome of $14.06 million. The difference is $11.90 million. We note that the bulk of this variance is due to the following three key factors:

- Saving of $7.8 million arising from HW being able to negotiate an outcome with DNSP which avoided the need to undertake a substantial upgrade of their network. We think that it was appropriate for HW to include this item in its original cost estimate. However, we consider that the contingency applied to the supply upgrade from the DNSP to be excessively conservative. In addition, we do not consider that this supply upgrade cost should be captured in the pricing model, given that this expenditure was not required in the final solution.
- Saving of $2.8 million on contract price relative to original estimate. This saving reflects changes in market conditions since the estimate was developed.
- Saving of $1.7 million on reduced contingency due to greater price certainty at contract award.

We recommend a reduction in the costs in the SIR of $11.90 million to reflect the substantial changes in project value.

6.10.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: prudent or efficient; partially prudent or partially efficient; not prudent or not efficient

6.10.8 Jacobs' recommended capex

Table 6.25 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.34	0.17	0.39	9.00	16.05	0.00	0.00	0.00	**25.96**	-

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW Project Summary*	0.44	0.17	0.39	8.08	4.98	0.00	0.00	0.00	**14.06**	-
Our adjustment on HW submission (SIR)	0.09	0.00	0.00	-0.92	-11.07	0.00	0.00	0.00	**-11.90**	-
Our recommendation	0.44	0.17	0.39	8.08	4.98	0.00	0.00	0.00	**14.06**	-

** Capital Project Summary - Burwood Beach WWTW Disinfection (HW, 14/08/2015)*

6.10.9 Assumptions/Data gaps

No further information is required.

6.11 Item 6 - Shortland WWTW Sludge Handling Upgrade

Table 6.26 : Summary of Shortland WWTW sludge handling upgrade

SIR/AIR (Regulatory Driver)	**Primary Driver**	Growth – other
	Secondary Driver/s	Existing Mandatory Standards
Capital Project Summary Driver/s		Growth – other (60%), Existing Mandatory Standards (40%)
Service		Wastewater
Project Type		Various
SIR ID No		DEM034, DGO048
Major Project Reference		PP13 reference – 1, PP16 reference – n/a
Project Stage		Completion

Table 6.27 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.01	1.12	8.51	8.31	0.00	0.00	0.00	0.00	**17.95**	-
2013 Determination	1.11	0.00	0.00	6.01	11.02	0.00	0.00	0.00	**18.14**	-
Capital Project Summary	0.01	1.12	12.21	1.99	0.22	0.00	0.00	0.00	**15.55**	-

6.11.1 Project description

Shortland WWTW serves a large area of Newcastle, and currently treats 6.5 ML/d of wastewater. Growth is expected to increase the flow and load to site to 12 ML/d by 2021 (Shortland WWTW - Growth Projections - September 2013). KIWS and Orica have contracts for the provision of treated effluent to provide industrial water. To meet this demand ahead of the growth, flow will be transferred in part from the Burwood Beach catchment, increasing the flow to around 12 ML/d. Although the biological process at the Shortland WWTW has capacity for this flow and load, the sludge systems do not.

The current sludge system takes WAS from the bioreactor to a sludge lagoon, where it is settled and some decanting occurs. Sludge accumulates in the lagoon for a four month period, before being left to anaerobically digest for six months. The lagoon is dewatered by a temporary centrifuge, which is brought to site and operated by contractors. The plant has three lagoons, which are operated in rotation.

The proposed solution is to replace one of the lagoons with two aerated lagoons, to digest the sludge, and the installation of a permanent dewatering facility on site.

6.11.2 Previous IPART or consultant recommendations

IPART's 2012 consultant reviewed the 'Shortland Treatment Upgrades' project and recommended no change to capex budget.

6.11.3 Prudence

The need for the project

A number of issues with the existing site were identified in the Gateway 1 Approval document including:

- Sludge lagoons at capacity
- Nature of returns limits bioreactor capacity to meet Orica N and P standards
- Sludge will not meet Grade B standard for disposal at increased loading,- as per the Corporate Biosolids Management Strategy, 2004/5
- Lagoon condition
- GHG - fugitive emissions high

The outcomes to be achieved through the delivery of the project were identified as:

- Environment - Reduction of carbon footprint
- Customer - Meet recycled water commitment.

We note that the need for the project was originally identified in a Shortland WWTW risk review undertaken in 2011.

The drivers for the project are identified as 'Growth – other' and 'Existing Mandatory Standards'. From our analysis of the information we have reviewed, we consider that the driver for the project is 'Growth as the Shortland catchment will exceed the sludge capacity before 2021. In addition, we understand that there is further growth expected beyond 2025 increasing the overall flow to works to 16.5 ML/d. This project will provide this capacity in the sludge treatment.

We consider that the project is prudent in addressing the additional capacity in sludge treatment within the period up to 2021.

The project has been promoted as 60% growth, 40% other mandatory drivers. We understand that the other drivers are the condition of the lagoon and GHG fugitive emissions (i.e. environmental consent drivers). We consider that, based on our engineering knowledge, the lagoon can be repaired for circa $1 million. No additional expenditure is required to address the fugitive emissions identified, as the process selected on a whole life cost basis will fully meet that need. We, therefore, conclude that the allowance for the project should be 90% Growth, and 10% other mandatory drivers.

6.11.4 Efficiency

6.11.4.1 Efficiency test part 1: Option selection

How the decision was made

Six high level options were considered and a total of twelve variations of these options analysed and costed. The options assessed were:

- Option 1 – Sludge lagoon based sludge management system
- Option 1B – Sludge lagoon based sludge management system with permanent onsite dewatering
- Option 2 – Heated anaerobic digestion based sludge management system upgrade

- Option 3A – Diffused aeration aerobic digestion based sludge management system upgrade (5 day per week operation)
- Option 3B - Diffused aeration aerobic digestion based sludge management system upgrade (7 day per week operation)
- Option 4A – Surface aerated lagoons as aerobic digestion with mechanical thickening (5 day per week operation)
- Option 4B – Surface aerated lagoons as aerobic digestion with mechanical thickening (7 day per week operation)
- Option 5 – Surface aerated lagoons as aerobic digestion with wasting in the IDAL decant phase as thickening
- Option 6A – No digestion, onsite dewatering (5 day per week operation)
- Option 6B – No digestion, onsite dewatering (7 day per week operation)
- Option 6A with biosolids disposal to landfill
- Option 6B with biosolids disposal to landfill

Comparison using quantitative and qualitative techniques was undertaken by HW. The capital project summary states that Option 5 was selected as the preferred option as it has the lowest life cycle costs and meets the project objectives.

From comparison with our benchmark costs some of the estimates for a number of options are lower than our benchmarks and some are higher. This difference changes the order of the different options in terms of lifecycle cost. An example of this is the cost estimates for Option 4A and 4B, which consider the same solution but with 5 day or 7 day centrifuge operation. For these options, we expect Option 4A to be more expensive than Option 4B, as smaller centrifuges and pumps will be required for Option 4B and given the storage volume will be smaller for that option over Option 4A. However, Option 4A ($18.6 million) is $2.7 million less than Option 4B ($21.3 million).

We also note that the contingency applied to the options varies, Option 4A, 4B and 5 have a 10% contingency applied, while all other options have a 30% contingency applied. We take it from this that costs and or design specification for some of the options, having a higher contingency, are not as well developed as those with to which a lower contingency has been applied. The applied contingency is included in the capital cost for whole life costing assessment.

For the less developed projects, the additional 20% contingency on the base option capital cost, distorts the balance between capital and operating expenditure and influencing the whole life cost decision. We recognise that good practice is to consider and reflect the level of risk and uncertainty for each option in the options assessment. However, we consider that HW should question whether an accurate comparison can be made between options with significantly different contingency values. We recognise that to apply a common contingency, the development of the options and their cost need to be to the same level of certainty. We acknowledge that this may not always be practical or cost effective and that the application of different contingency values may be required.

In the drivers for the project there is the need for additional sludge treatment capacity and to meet the Grade B standard for disposal. The sludge disposal standard is fully met by the provision of aerated sludge digestion and off-site storage. The solutions proposed all included provision of a new onsite dewatering facility for which there is no clear justification given, nor a project need defined.

Sludge dewatering is common to all options considered for the project and composes $4.5 million of direct costs in the project scope. In our review we asked HW if it considered continuing with contract sludge dewatering as an option to reduce capital costs. In response, HW advised that: "*the continuation of contract dewatering (as opposed to provision of continuous dewatering equipment) was not explicitly considered. However it is considered this option would not be preferred for the following reasons. This alternative option would include continuation of a predominantly anaerobic sludge holding tank. Odour modelling conducted for sludge lagoon*

options show such an option would not comply with odour guidelines. This alternative option would also not achieve reductions in greenhouse gas emissions which was another driver at the time of the option selection process. This option would also include shock solids, ammonia and phosphorus loads back to the treatment process and increase risk of breaching effluent quality limits. A large holding tank would be required to control these shock loads. On this basis the continuous dewatering process was adopted.

In terms of cost effectiveness of this alternate option, the option of aerobic digestion followed by lagoon storage and contract dewatering was not assessed for the Shortland project but was assessed for the current Dora Creek sludge management upgrade. The Dora Creek project is similar to the Shortland project in that it proposes upgrading a sludge lagoon process to aerobic digestion, although without the odour and greenhouse gas emissions drivers. Capital and lifecycle cost estimates for the continuous and contract dewatering options for Dora Creek show that contract dewatering is not more cost effective than the continuous dewatering option in the Dora Creek context (both capex and lifecycle were within $0.1 million of each other)".

We consider that, given the sludge dewatering equipment costs, constitute such a large proportion of the direct project costs ($4.5 million of $8.5 million), HW should have investigated and documented alternative options for this portion of the work, prior to adopting a preferred option. In particular, we would expect to have seen documented considerations of opex/capex trade-offs, i.e. continuous vs. contract dewatering options.

HW undertook a Value Management Workshop as part of its value management process. We note from the minutes of this meeting the HW recommended consideration of further alternative options for sludge dewatering, including belt filter press and centrifuge options (with associated infrastructure). We have sighted information on the investigations, including cost analysis, which supports the selection of the belt filter press. As such, we conclude that HW undertook reasonable options analysis and investigations in selecting the preferred option.

Scope of preferred option

The scope of the preferred option includes converting one of the existing three sludge lagoons into two aerobic digesters, installation of a sludge thickening and dewatering facility (a gravity drainage deck and a belt filter press) and out loading facility.

We consider that the proposed solution will achieve the project objectives.

6.11.4.2 Efficiency test part 2: Cost efficiency of preferred option

In November 2012 the HW Board approved the preparation of a "Deed of Agreement for a Program of Work Delivery" between HW and HWA. This deed is similar in nature to an Engineer Procure Construct Manage (EPCM) Agreement. The deed was executed by both parties in January 2013. The upgrade of Sludge Management at Shortland was included as part of the program of works covered under the deed.

On the 29 August 2013 the Board approved the engagement of HWA under the deed arrangement to develop the project plan and Works Budget for the Shortland WWTW Sludge Management Upgrade.

Under the deed, the Works Budget is the estimated cost for all activities required to deliver a project including detailed design, construction, construction management, commissioning, process proving and a 12 month defects liability period. Actual costs are compared with the Works Budget and a pain/gain share incentive is applied to HWA depending on the outturn final project cost compared to Works Budget.

The Works Budget for the preferred option is based on estimates developed by HWA in 2014. A 10% contingency allowance on the preferred option is in line HW's 'Capital Estimating Guideline'. We consider the application of a contingency of 10% to appropriate and that it reflects the increase in costs associated with improvements to ancillary systems such as recycled water and liquor return pump station that were not included in the original scope.

In June 2014, an independent estimator, Evans & Peck, was engaged by HW to examine the Works Budget (of $13.5 million). Evans and Peck concluded that the proposed Works Budget was a reasonable target [estimate]

for construction of the proposed Shortland Sludge management upgrade based on comparison against market information from previous HW projects and Evans & Peck's market knowledge and experience.

The Board Paper (for the Board of Directors meeting held on 26 June 2014) contains details of benchmarking against similar projects for design costs (9% of total Works Budget Estimate),fee payable (8%), Risk and Opportunity (contingency) of 6%. All were considered reasonable based on HW's recent project experience.

We conclude that whilst there is no evidence that the works under the deed were competitively tendered, there is evidence that the cost for this contract is reasonable, including independent estimates and high level benchmarking.

Based on the contractor's performance report dated July 2015, the project was predicted to be brought in below the contract price (of $13.5 million) with a cost of ($12.8 million). Note that the difference between the Works Budget of $13.5 million and the total project cost of $17.7 million is made up of: an allowance for project contingency (10%); HW project management (3%); and other HW internal costs.

How the project was executed

We understand that the project delivery has been completed. We have reviewed the contractor's performance report dated July 2015. At this point the construction phase was at 90% completion. The project was predicting to be brought in below the contract price as varied and was projected to be delivered on time (25th August 2016). At this point the contractor's performance was rated as good overall.

6.11.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, a Business Case and a board paper, consistent with Gate 3 requirements. Business case and approval requests have followed the Gate processes for the project, and are documented clearly throughout the life of the project

We expect that HW has also prepared (or in the processing of preparing) a Gateway 5 form and a Project Closure form, in line with their processes. HW has allowed approximately 8%, for project management and a contingency allowance of approximately 8%, which is consistent what we expect for a project at this stage.

Good industry practice expects clear definition of scope when describing the options. For this project the options are poorly explained and scope is not clear. For example, in the business case for option 5, there is no mention of the sludge dewatering facility, which is 50% of the project scope. When describing similar solutions, we recommend that business cases should have indicative site layouts for solutions that will make explanation of proposals clearer. (An example where HW has used this process effectively is the Kurri WWTW).

6.11.6 Our recommendations for prudence and efficiency

Prudence

We consider that the project is prudent, in that it is required within this regulatory period, to meet the demands of growth.

Efficiency

We consider that the selection of the project option to be efficient.

The acceleration of the project ahead of growth to service the industrial water sector increases the revenue to HW. The programme of delivery is in line with our expectations for a project of this scale, with delivery from concept (2011) to completion (2016).

In addition, we consider the costs in the SIR of $18.0 million not to be efficient compared to the updated costs provided in the supporting documentation (Capital Project Summary - Shortland WWTW Sludge Handling Upgrade (HW, 31/07/2015)). We have made a further downward adjustment of $2.4 million to reflect the updated costs provided in the supporting documentation.

6.11.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	🟢
Is the project efficient – correct option?	🟢
Is the project efficient – least cost?	🟡

Key: 🟢 prudent or efficient; 🟡 partially prudent or partially efficient; 🔴 not prudent or not efficient

6.11.8 Jacobs' recommended capex

Table 6.28 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.01	1.12	8.51	8.31	0.00	0.00	0.00	0.00	**17.95**	-
HW Project Summary*	0.01	1.12	12.21	1.99	0.22	0.00	0.00	0.00	**15.55**	-
Our adjustment on HW submission (SIR)	0.00	0.00	3.70	-6.32	0.22	0.00	0.00	0.00	**-2.40**	-
Our recommendation	0.01	1.12	12.21	1.99	0.22	0.00	0.00	0.00	**15.55**	-

** Capital Project Summary - Shortland WWTW Sludge Handling Upgrade (HW, 31/07/2015)*

6.11.9 Assumptions/Data gaps

No further information is required.

6.12 Item 7 - Wyee Backlog Sewer Scheme

Table 6.29 : Wyee Backlog Sewer Scheme

SIR/AIR (Regulatory Driver)	**Primary Driver**	Government Programs
	Secondary Driver/s	n/a
Capital Project Summary Driver/s		Government Programs – Backlog Sewer Scheme
Service		Wastewater
Project Type		Proposed
SIR ID No		DGP006
Major Project Reference		PP13 reference – n/a, PP16 reference – 6
Project Stage		Development

Table 6.30 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.00	0.00	0.00	0.00	0.79	1.57	0.00	6.68	**9.04**	17.67
2013 Determination	-	-	-	-	-	-	-	-	**-**	-
Capital Project Summary	0.00	0.00	0.00	0.00	0.79	1.57	0.00	6.68	**9.04**	17.67

Source	Capex Budget ($ million)									
Business Case	-	-	-	-	0.77	1.54	0.50	6.51	**9.32**	16.74

6.12.1 Project description

This proposed backlog sewerage scheme is to provide reticulated sewer services to the township of Wyee by December 2020. Wyee is a small village of approximately 1,500 residents living in 400, mainly detached, dwellings located south west of Lake Macquarie.

6.12.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation.

6.12.3 Prudence

The need for the project

The driver for the project is to reduce environmental and public health issues surrounding the existing sewage pump out and septic tank systems. The project was initially identified in a 2002 EPA study, where it scored the highest environmental ranking.

In 2014, HW reviewed the costs of providing reticulated sewer services to backlog areas. This was supported with advice from the Environment Protection Authority (EPA), NSW Health and local councils. The township of Wyee was ranked the highest priority area.

On 13th November 2014 the Minister for Natural Resources, Land and Water announced a fully funded plan to connect Wyee to HW's sewerage system by 2020. The current program has a final completion date of December 2020.

The transfer system (to designated WWTP) will be designed to allow an increase in capacity from the initial 400 lots to approximately 1,000 lots to facilitate future development within and on the fringes of the township, or possibly up to 2,000 lots depending on the preferred servicing option for developments proximate to and potentially captured by the WWTP.

6.12.4 Efficiency

6.12.4.1 Efficiency test part 1: Option selection

How the decision was made

HW undertook a desktop assessment of project options for the backlog sewerage submission to the State Government in 2014. This assessment assumed two reticulation options (pressure and gravity) and three transfer/treatment options (Dora Creek WWTW, Charmhaven WWTW and a proposed local private network operated WWTW).

HW identified additional options but these were not assessed for the submission to the NSW Government as they were identified as non-standard options. HW states that these options will be considered as part of the full business case assessment. We understand that NPV assessments will be completed as part of the business case development process for the preferred options following the final value management session.

The risk of 'do nothing' include:

- Failure to meet a NSW Government commitment to provide reticulated sewerage to Wyee by 2020 which will reflect poorly on HW in the community and politically
- Ongoing public health and environmental issues within urban Wyee will remain
- Loss of State Government funding support to deliver the project.

HW's preferred option is a gravity sewer reticulation with transfer via road route to Dora Creek WWTW. This has been nominated as the preferred option at the preliminary business case stage due to several unknowns/risks associated with other options. These risks include:

- Uncertainty surrounding the use of the railway corridor for the delivery main
- Availability and connection to Charmhaven WWTP
- The suitability of low infiltration, pressure, hybrid and/or dual reticulation schemes (which are currently not approved by HW, though these are or parts thereof are currently under review as part of a separate policy review).

Whilst adopting the option with least risk and high capital cost (preferred option has the 5th highest estimate of the 17 options identified in the Preliminary Business Case) is considered by us to be prudent at the onset of the business case, it has resulted in the top three options all adopting the 'safe' discharge scenario of using the Dora Creek WWTP and transferring the flows via the road alignment, at significantly (up to 44%) increased capital estimates over alternative.

In response to our requests for further information on the selection of a high cost capital option, HW stated: "*Wyee backlog sewer scheme is a State government scheme that has been highly publicised in the local media and is strongly supported by the local member. With schemes that are high profile, HW will on occasion use the option that has a high probability of success prior to confirmation of preferred option in the business case. In this instance, the option that is guaranteed to be able to be delivered is a gravity scheme transferring to Hunter Water owned treatment plant via a road reserve.*

Construction in or adjacent to rail corridors will be difficult in both the Dora Creek and Charmhaven options given the issues with shared access and clearing of sensitive vegetation. Onsite assessments have confirmed that several sections of the routes that appear to be tracks that are not accessible to vehicles outside the rail corridor. As such rail corridor options are likely to require modifications to the route and increased cost estimates to use the corridor for some sections and road for others.

The option presented in the preliminary business case as preferred is $3.3 million (16%) more expensive than the cheapest option by road (low infiltration to Dora Ck) and $2.6 million cheaper than the most expensive. The cheapest option does not currently comply with Hunter Water guidelines and discussions with (confidential) indicated that low infiltration has been problematic in brownfield areas."

We recognise that in a preliminary business case, there will still be many unknowns for the project, such as the ability to construct in the rail corridor. As such, we recognise that the risks associated with each option need to be considered.

During the interviews with HW, we specifically queried the basis of the statement that low infiltration sewers were problematic in brownfield areas. HW indicated that this was verbal advice only and could provide no further supporting information. We consider that the selection of the lowest cost viable option (based on best available information) to be good practice. As such, we believe that the option selection within the business case has been conservative.

In response to our draft report, HW stated: *"Since development of the preliminary business case, additional work has been done on the options assessment and cost estimates that has seen the gap close between the low infiltration and gravity options due to the more stringent commissioning, monitoring and customer plumbing rectification (inflow prevention) for the low infiltration option in order to achieve the benefits of low infiltration. In addition the only other cost savings for low infiltration reticulation is the reduction in access chambers to maintenance shafts which save in the order of $1,500 per chamber for approximately 25 chambers."*

We recommend that the assumptions and risk avoidance, that lead to a conservative approach, be thoroughly interrogated as part of HW's value management and options assessment process to confirm that the least whole of life cost option is selected. Key assumptions or areas of risk that should be queried (and answered) include:

- Ability of Charmhaven WWTP (and Wyong Council) to accept the Wyee catchment in the short to medium term
- Viability of using the railway line as the main transfer alignment
- Applicability/acceptability of Low Infiltration Sewer (or equivalent) in the Hunter region.

Once these alternatives (among others) are assessed, comparison of the options be completed and the best value for money, least life cycle cost, compliant option can be chosen.

Scope of preferred option

The scope loosely defines the preferred option as: gravity sewer with transfer via road to Dora Creek, servicing approximately 400 lots within the existing urban area of Wyee. This level of detail is sufficient for the Preliminary Business Case, and it is assumed that in working up the capital cost estimate, that realistic quantities (lengths) were used as the basis.

6.12.4.2 Efficiency test part 2: Cost efficiency of preferred option

The capital cost estimate for the preferred option was developed in line with HW's Costing Estimating Guide. Based on similar projects we have advised on and our order of magnitude cost benchmark, the cost estimate is considered to be reasonable.

As part of the value management and options assessment process, we believe a number of items need to be considered so that an efficient scheme can be developed:

- The project assumptions and controlling parameters need to be interrogated and a documented basis of assumption definition and close out developed so that each option is assessed on an established basis of design and assessed equally
- Confirmation of and greater understanding of the current and future demands of the Wyee catchment, including the likely locations of the increased lot numbers (sporadic or focused new developments)

In response to our draft report, HW stated: *"Hunter Water has limited experience in designing and developing cost estimates for low infiltration sewer, as such there increased likelihood that the costs would change between the preliminary and full business case for this option compared with estimates for options with significant historic cost data (e.g. gravity sewer)."*

HW also states: "the latest cost estimates indicate that the low infiltration reticulation will be the same cost as the gravity reticulation with only minor (~$1m) saving on the transfer costs."

From the revised cost estimation spreadsheet HW provided, the latest cost estimate for the low infiltration reticulation system to be approximately $22.7 million, with the pressure system estimated to cost $22.8 million.

We consider that HW should continue to investigate the options to determine the most cost effective, feasible options. We accept HW's proposed capital expenditure for the low infiltration reticulation system at $22.7 million to be efficient.

How the project was executed

This item has not been delivered.

6.12.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has, in large part but not in full, followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, and a Preliminary Business Case, consistent with Gate 1 requirements. We expect that HW has prepared (or is in the process of preparing) a Full Business Case and a Business Case Checklist, as required for Gate 2. HW has allowed approximately 7% for project management, which is

consistent with what we expect for a project at this stage and a contingency allowance of 22%. This contingency allowance is consistent with what we expect for a project at this stage.

6.12.6 Our recommendations for prudence and efficiency

Prudence

We consider the end goal of the project to be prudent to address community health and environmental issues/exposure.

Efficiency

We consider that a documented planning assessment needs to be completed so that the scheme can be assessed in its entirety to support selection of the most suitable and efficient option prior to undertaking a value management and options assessment. This planning assessment will also confirm the ability of the nominated receiving WWTP to receive the anticipated development flows, at least for the short to medium term horizons.

We consider that, based on the information presented, the project is partially efficient as HW did not select the least cost feasible option that meets the objectives of the project.

We have proposed a reduction in costs to the least cost feasible solution (low infiltration sewer with transfer via road route to Dora Creek WWTW), $22.7 million).

We note that HW intends to undertake an economic analysis as part of the upcoming full business case will determine the best option based on a more detailed analysis.

We have proposed no reductions in the current cost determination period. However, overall we recommend a reduction of $4.0 million to align with the most current information provided by HW. This is consistent with the method used in other sections, where a cost reduction has been made we have adopted the most up to date costs for each project/program. This is documented in Section 6.21.1.

6.12.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: prudent or efficient; partially prudent or partially efficient; not prudent or not efficient

6.12.8 Jacobs' recommended capex

Table 6.31 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.00	0.00	0.00	0.00	0.79	1.57	0.00	6.68	**9.04**	17.67
HW Project Summary*	0.00	0.00	0.00	0.00	0.79	1.57	0.00	6.68	**9.04**	17.67
Our adjustment on HW submission (SIR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	-4.00
Our recommendation	0.00	0.00	0.00	0.00	0.79	1.57	0.00	6.68	**9.04**	13.67

** Capital Project Summary - Wyee Backlog Sewer Scheme (HW, 23/09/2015)*

6.12.9 Assumptions/Data gaps

No further information is required.

6.13 Item 8 - Critical Mains Renewals Program

Table 6.32 : Summary of critical mains renewals program

SIR/AIR (Regulatory Driver)	**Primary Driver**	Business efficiency
	Secondary Driver/s	Existing Mandatory Standards/Discretionary Standards/Growth – other/Government Projects
Capital Project Summary Driver/s		Existing Mandatory Standards (31%), Discretionary (4%), Business Efficiency (41%), Government Projects (25%)
Service		Water/Wastewater/Stormwater
Project Type		On-going
SIR ID No		WEM007, WNM003, WDS002, XW7005, WBE006, DEM015, DDS002, DGO016, DBE006, OEM003, ODS002, XD7003
Major Project Reference		W104, S128, R8
Project Stage		Development/Delivery/Completion

Table 6.33 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	2.20	1.69	2.58	2.31	2.41	2.41	2.41	2.41	**18.41**	30.13
2013 Determination	0.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	**6.86**	0.98
Capital Project Summary	0.00	1.69	2.07	2.92	2.41	2.41	2.41	2.41	**16.32**	-
Business Case	0.00	2.19	2.19	2.19	2.19	0.00	0.00	0.00	**8.76**	-

6.13.1 Project description

The project involves the replacement, renewal or asset management of critical mains that have been identified as requiring attention through a reliability strategy or failure history. The 2013 to 2017 programme of works covers critical water main management, localised discontinuity of supply, cast iron sewer rehabilitations, critical gravity sewer main rehabilitations, sewer rising main management, stormwater channel-pipeline rehabilitations and water and sewer third party relocations.

6.13.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation.

6.13.3 Prudence

The need for the project

There are various drivers for the projects within the program: Existing Mandatory Standards, Discretionary Standards, Government programs, Business efficiency and Growth – other. By value, business efficiency is the largest driver (41%), followed by existing mandatory standards (31%), government programs (25%), with discretionary standards and growth – other making up the remaining 6%. We have provided comment as to whether we consider these drivers to be appropriate and aligned to typical regulatory drivers in Table 6.34 below.

The 'Business Case Critical Mains 201317 Price Path Provision' (HWC, July 2013), outlines the types of projects that can be undertaken. HW provided project development plans for four projects within the program. The driver for each of the projects aligns with the rational outlined in the Business Case.

Table 6.34 : Project drivers

Project	Description	Value	Driver	Comments
Critical water main relocations for Council Road Works Batch 1 (12/13)	Relocation of water mains due to road work.	$440,000	Business efficiency	Consistent with the objectives outlined in the Business Case for the Critical Mains Renewal Provision.
Civil Maintenance Operating Expenditure Transfer to Capital	Projects completed under operational budget to be transferred to capital budget.	$405,340	Existing Mandatory Standards	Consistent with the objectives outlined in the Business Case for the Critical Mains Renewal Provision.
Cast Iron Sewer Rehab 2014-2015, Islington, Maryville and Tighes Hill	Rehabilitation of cast iron sewer mains.	$235,010	Business efficiency	Consistent with the objectives outlined in the Business Case for the Critical Mains Renewal Provision and the 'Cast Iron Sewer Rehabilitation & Prioritisation Strategy.
Sewer Main Rehabilitation - Lawes St, East Maitland	Rehabilitation of section of critical sewer main.	$105,000	Existing Mandatory Standards	Consistent with the objectives outlined in the Business Case for the Critical Mains Renewal Provision.

We consider that the need for these projects has been demonstrated and that they are supported by appropriate drivers and as such they are prudent.

We note that the SIR indicates that 4%, by value, of its expenditure is driven by discretionary standards (this includes WDS002, DDS002 and ODS002). We are of the opinion that no expenditure should be discretionary as by its very nature discretionary expenditure is not essential expenditure.

We understand that HW has applied a strict interpretation of the definition 'discretionary standards'. The portion of expenditure allocated to this driver is associated with addressing localised water supply discontinuity ('hotspots'). HW is compliant with system-wide service levels (service performance standards) imposed in its operating licence, which it considers to be 'mandatory standards'. Despite system-wide compliance, we understand that hotspots exist in both the water and sewer network as a result of legacy design deficiencies, asset deterioration, urban infill and changing community expectations. For most customers, asset replacement programs resolve emerging performance deficiencies. For example, water mains are replaced when a typical residential street experiences disproportionately frequent (e.g. multiple per year) and ongoing water supply interruptions.

These hotspot programs provide a means of addressing the impacts of HW operations on localised areas. Hotspots programs have been implemented to reduce the impact of repeat and frequent service level deficiencies or operational impacts that are proportionally more frequent, more persistent or represent escalating risks to the community than those experienced by most customers. The objective of the hotspots program is to investigate, prioritise and implement strategies to improve service provided to customers that experience persistent adverse impacts from the operation of water and sewer networks.

We agree that the use of asset management criteria (such as number of breaks per year) can be a prudent way of identifying mains to be replaced – which would otherwise be uneconomical to continuously repair.

6.13.4 Efficiency

6.13.4.1 Efficiency test part 1: Option selection

How the decision was made

We understand that individual projects are identified within each area, i.e. water, wastewater and stormwater, and undertaken based on a priority rating within the area or as need arises (e.g. for emergency works arising from material failure). As such there is no set list of projects to be undertaken within the 2013 to 2017 price path and hence it may be considered that HW is taking a portfolio approach to this overall project.

We understand that is no overarching risk based prioritisation process for inclusion of projects in the program. This could assist HW in the decision making process when funding is limited, however we understand that this has not been as issue historically.

For the four PDPs provided, at least the do nothing and one alternative option were considered. For more complex projects, a number of options were considered by HW. More details are included in Table 6.35 below.

Table 6.35 : Options assessment

Project	Options Considered	Comments
Critical water main relocations for Council Road Works Batch 1 (12/13)	Option 1 – Do Nothing Option 2 – Relocate all mains	We consider this to be an effective approach to undertake work in conjunction with Council, especially for mains under roads which will be difficult to repair in the future. We consider that efficiency is achieved by delivering the works with council.
Civil Maintenance Operating Expenditure Transfer to Capital	Option 1 – Do Nothing Option 2 – Transfer of project costs to capital budgets	No details of options considered prior to works being undertaken. We understand that this projects are asset failures identified by field staff that cannot be repaired and require a capital solution, i.e. pipe collapse which requires a new section of main to be installed. HW's 'Capitalisation Policy' is followed when determining if the works can be transferred from the operational to capital budgets. We consider that this approach will result in efficiencies by multiple teams responding to the issue.
Cast Iron Sewer Rehab 2014-2015, Islington, Maryville and Tighes Hill	Option 1 – Do nothing Option 2 – Undertake the work progressively in small packages under the current lining contract Option 3 – Package the works under one large contract & tender to the open market	We consider that appropriate options have been considered and that the approach is consistent with the 'Cast Iron Sewer Rehabilitation & Prioritisation Strategy'. We consider that rehabilitation of cast iron mains is required to reduce the risk of failure of the mains and maintain hydraulic capacity.
Sewer Main Rehabilitation - Lawes St, East Maitland	Option 1 – Do Nothing Option 2 – 285 m sewer rehabilitation using spirally wound structural lining Option 2a – Urgent lining of 55 m sewer rehabilitation using spirally wound structural lining Option 3 – 285 m sewer rehabilitation using CIPP lining	We consider that appropriate options have been considered for this works. A number of rehabilitation options were considered as well as staging of the works. We consider that rehabilitation of main is required to maintain services to customers.

For the projects reviewed in detail, we consider that an appropriate options analysis has been undertaken (where relevant) and that the option selected is consistent with that of an efficient operator as set out in Table 6.36 below in which we comment on HW's selection of the preferred option.

Table 6.36 : Preferred options

Project	Preferred Option	Comments
Critical water main relocations for Council Road Works Batch 1 (12/13)	Option 2 – Relocate all mains	We consider that the decision to undertake the work in conjunction with council was appropriate as the existing were nearing the end of their economic life and replacement at a later time would have resulted in significantly higher costs, especially associated with reinstatement. The scope of works for each project was the relocation of a water main. Sufficient detail of scope was included in PDP.
Civil Maintenance Operating Expenditure Transfer to Capital	Option 2 – Transfer of project costs to capital budgets	We consider the decision to transfer costs from the operational to the capital budgets to be appropriate and consistent with HW approach and management this type of work. We consider that field crews undertaking the work immediately resulted in the least cost delivery of the capital works.

Project	Preferred Option	Comments
Cast Iron Sewer Rehab 2014-2015, Islington, Maryville and Tighes Hill	Option 2 – Undertake the work progressively in small packages under the current lining contract	We consider that continuing the delivery of the relining works through the existing contractor to be appropriate solution, given the risks associated with the works and the existing contractor's experience.
Sewer Main Rehabilitation - Lawes St, East Maitland	Option 2a – Urgent lining of 55 m sewer rehabilitation using spirally wound structural lining	We consider that while economies of scale may have been achieved by delivering the full rehabilitation as one project, other factors influenced the appropriateness of the solution (i.e. a substantial rainfall event which resulted in significant issues within the network, and availability of contractors to complete the works). We consider that this solution is in keeping with what an efficient operator would have chosen as it was the least cost option to address the immediate requirements.

We consider that the options development and analysis undertaken for these for projects was appropriate.

Scope of preferred option

The scope of works for each project in outlined in Table 6.37 below.

Table 6.37 : Preferred options

Project	Scope
Critical water main relocations for Council Road Works Batch 1 (12/13)	Relocation of four water mains: • 180 m x 100 mm main into southern footway at Gillies Street, Rutherford • 580 m x 100 mm main into southern footway at Telarah Street, Telarah • 170 m x 100 mm main into northern footway at Green Street, Telarah • 123 m x 200 mm main into southern footway of Belmore Rd, 170 m x 150 mm main into northern footway of Belmore Rd and 30 m x 100 mm main into western footway of Lorn St
Civil Maintenance Operating Expenditure Transfer to Capital	11 capital projects that have already been completed as critical failure based repairs, including: • Manhole replacement at 23 Steel St, Newcastle West • Reconnection of and abandoned sewer to manhole at Lot 7344 Burwood Rd, Kahibah • Replacement of a 300 mm water main crossing over Settlers Bvd, Chisholm
Cast Iron Sewer Rehab 2014-2015, Islington, Maryville and Tighes Hill	Relining of 17 segments of cast iron sewer main, including: • 49 m of 225 mm main at 89-97 Fleming St, Islington • 54 m of 150 mm main at 45 Phoebe St - George, Islington • 38 m of 150 mm main at 22 Lewis St to 9 Ohara St, Maryville
Sewer Main Rehabilitation - Lawes St, East Maitland	Rehabilitation of a 55 m section of sewer gravity mains at Lawes St, East Maitland using spirally wound lining technique

For the four projects assessed in detail, we considered the preferred scope of works to be well understood and appropriate to achieve the project objectives.

6.13.4.2 Efficiency test part 2: Cost efficiency of preferred option

Due to the different types of works delivered under this program, the method used for the development of cost estimates varies. Details of the four sample projects and method of implementation are outlined below in Table 6.38.

Table 6.38 : Preferred options

Project	Preferred Option	Basis of Cost Estimate	Allowances	Comments
Critical water main relocations for Council Road Works Batch 1 (12/13)	Option 2 – Relocate all mains	HW internal estimate Roads NSW	HW preconstruction costs – 10% Project management – 27% Contingency – 20%	The basis for the cost estimates for this works are considered appropriate as both HW and Roads NSW undertake this type of work regularly and have a good understanding of the costs of such projects.
Civil Maintenance Operating Expenditure Transfer to Capital	Option 2 – Transfer of project costs to capital budgets	Actual cost of work	No detail provided.	No cost estimates were prepared prior to undertaking the work, due to the urgent nature.
Cast Iron Sewer Rehab 2014-2015, Islington, Maryville and Tighes Hill	Option 2 – Undertake the work progressively in small packages under the current lining contract	Rates from current lining contractor and HW internal estimate	HW preconstruction costs – 8% Project management – 7% Contingency – 15%	The basis for the cost estimate for this work is consider appropriate and in line with market rates. We consider this to be efficient as the costs are based on market prices.
Sewer Main Rehabilitation - Lawes St, East Maitland	Option 2a – Urgent lining of 55 m sewer rehabilitation using spirally wound structural lining	Supplier quote and HW internal estimate	HW preconstruction costs – n/a Project management – 21% Contingency – 20%	HW states that the cost estimate is based on supplier quotes and internal rates. Details of the cost build-up have not been provided. However, as the costs are based on supplier quotes we consider them to be market prices and hence efficient.

For the four projects reviewed in detail, we consider the approach used for cost estimation to be reasonable and in keeping with good industry practice.

We note that the allowances made for preconstruction, project management and contingency vary across the projects assessed. Based on our experience, we consider that the allowances for preconstruction and contingency are appropriate and in line with HW's processes. However, we consider that the allowance for project management to be high when compared with that outlined in the project cost estimate spreadsheet and when contrasted with our experience.

How the project was executed

The method by which the projects within the program are delivered varies depending on the type, difficultly and urgency of the work see Table 6.39.

Table 6.39 : Project delivery

Project	Preferred Option	Delivery Method	Status	Comments
Critical water main relocations for Council Road Works Batch 1 (12/13)	Option 2 – Relocate all mains	Department of Roads and Marine Services (DRMS)	Complete	Cost sharing arrangement with DRMS. Proposal prepared by DRMS and submitted to HW. Rates (and cost) cross checked against HW internal costs.
Civil Maintenance Operating Expenditure Transfer to Capital	Option 2 – Transfer of project costs to capital budgets	HW Civil Services	Complete	Operational staff already in field. We consider this to be the most cost effective solution for urgent works.

Project	Preferred Option	Delivery Method	Status	Comments
Cast Iron Sewer Rehab 2014-2015, Islington, Maryville and Tighes Hill	Option 2 – Undertake the work progressively in small packages under the current lining contract	Pipeline lining contractor	Complete	The contract was competitively tendered. Three contractors were invited with the lowest cost tenderer awarded the contract. We consider the costs to be efficient.
Sewer Main Rehabilitation - Lawes St, East Maitland	Option 2a – Urgent lining of 55 m sewer rehabilitation using spirally wound structural lining	Pipeline lining contractor	Complete	The contract competitively tendered. Three contractors were invited to tender, with only one contractor able to deliver within the required timeframe. We consider the costs to be efficient.

For the four projects reviewed in detail, we consider that an appropriate delivery method was selected, the works were procured competitively and the project objectives were met.

Details of the project delivery for the 'Critical water main relocations for Council Road Works Batch 1 (12/13)' project were provided. We consider the close out and review process undertaken by HW to be appropriate. We note that a saving of approximately 12% was made on the approved funding. HW attributes this to project management and the contingent allowances not fully utilised.

Details of the project delivery for the 'Sewer Main Rehabilitation - Lawes St, East Maitland' project were provided. We consider the close out and review process undertaken by HW to be appropriate. We have reviewed documentation justifying the increase in expenditure, due to unforeseen circumstances. We conclude that the increase in project value was appropriate and necessary to deliver the works.We consider that the program is partially efficient as the appropriate solutions were selected for all of the projects but the efficient execution of one of the four projects cannot be confirmed without further information supporting efficient delivery from HW.

Regarding project delivery documentation for the other projects:

- We have not sighted project delivery details for 'Civil Maintenance Operating Expenditure'. However, we note that the works was delivered immediately by operations, so the project implementation will not necessarily have followed HW's capital procedures.
- The 'Cast Iron Sewer Rehab 2014-2015, Islington, Maryville and Tighes Hill' project has not yet been completed, we do not expect close out documentation to be available.

6.13.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, and a Business Case, consistent with Gate 2 requirements. We expect that HW has also prepared a Business Case Checklist, a Gateway 5 form and a Project Closure form, for all projects, in line with their processes; however we have not sighted this documentation.

The project management and contingency allowances used by HW vary across the sub-projects reviewed (between 7% and 27% for project management and 20% to 25% for contingency). We consider allowances for project management in excess of 10% to be inconsistent with HW's policies. We consider the contingency allowances used to be consistent with HW's policies. **Our recommendations for prudence and efficiency**

Prudence

We consider that the projects we reviewed as part of this program are prudent as they are required to maintain service to customers and/or make improvements to the network prior to failure or in conjunction with other works that result in the least cost outcome.

Efficiency

We consider that the projects we reviewed as part of this program are partially efficient as HW selected the appropriate solutions for each of the projects.

6.13.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: prudent or efficient; partially prudent or partially efficient; not prudent or not efficient

6.13.8 Jacobs' recommended capex

Table 6.40 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW Submission (SIR)	2.20	1.69	2.58	2.31	2.41	2.41	2.41	2.41	**18.41**	30.13
HW Project Summary*	0.00	1.69	2.07	2.92	2.41	2.41	2.41	2.41	**16.32**	0.00
Our adjustment on HW submission (SIR)	0.00	0.00	-0.51	0.61	0.00	0.00	0.00	0.00	**0.10**	0.00
Our recommendation	2.20	1.69	2.07	2.92	2.41	2.41	2.41	2.41	**18.52**	30.13

** Capital Project Summary - Critical Mains Provision 13-16 (HW, 10/09/2015)*

6.13.9 Assumptions/Data gaps

No further information is required.

6.14 Item 9 - Kurri Kurri WWTW Upgrade - Stage 3

Table 6.41 : Summary of Kurri Kurri WWTW upgrade – stage 3

SIR/AIR (Regulatory Driver)	**Primary Driver**	Growth – other
	Secondary Driver/s	n/a
Capital Project Summary Driver/s		Growth – other
Service		Wastewater
Project Type		Proposed
SIR ID No		DGO034
Major Project Reference		PP13 reference – n/a, PP16 reference – 9
Project Stage		Initiation /Development /Delivery/ Completion

Table 6.42 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.00	0.00	0.00	0.87	2.12	3.16	1.26	0.00	**7.41**	0.00
2013 Determination	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	5.55

Source	Capex Budget ($ million)									
Capital Project Summary	0.00	0.00	0.00	0.00	0.51	0.34	3.43	3.43	**7.71**	0.00

6.14.1 Project description

The Kurri Kurri WWTW has a nominal capacity of 21,500 EP for the secondary process and 25,000 EP for the remainder of the plant. Growth is anticipated in the catchment which will result in flows to the plant exceeding its capacity. This project, the Stage 3 Upgrade of the Kurri Kurri WWTW, has been proposed to allow the plant to maintain compliance with the EPL requirements by 2020. The current scope of the project is the construction of a third secondary clarifier and upgrading of the Return Activated Sludge (RAS) system to increase capacity.

6.14.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation.

6.14.3 Prudence

The need for the project

The driver for this project is identified as 'Growth – Other'. The 'Preliminary Business Case Kurri Kurri WWTW Stage 3 Upgrade' (HW, 2015) states: *'The plant is currently servicing approximately 19,000 EP. The EP loading is expected to exceed 21,500 and 25,000 thresholds by approximately 2020 and 2025 respectively. Therefore, an additional clarifier is required before 2020 (Stage 3 works) and a major plant capacity upgrade (Stage 4 works) is required by around 2025.'*

In response to our draft report, HW provided evidence of growth projections for the catchment to support the timing of works. We concur with HW that the projected growth for the Kurri Kurri WWTW catchment supports the figures used in the business case. Based on the nominal capacity of 21,500 EP for the secondary process, work is required in 2020.

In addition, we understand that HW is currently undertaking a capacity review of the plant and a value management study which will further define upgrade specification through the delivery of the Stage 3 Upgrade project. We understand that the results will be available at the end of 2015.

We understand that the secondary biological process has sufficient capacity for the future load, but as the storm flows are sent through the secondary clarifiers the clarifiers are overloaded at high flows. This leads to washout of solids and effluent noncompliance. Under storm flows the RAS pumps are required to increase output to maintain the solids level in the clarifier, and are reported to be only able to meet the required duty with operation in duty assist mode. Loss of a single pump has been reported to result in noncompliance of the site in high flow conditions. We have seen the EPA annual return (1 Jan 2014 - 31 Dec 2014) for Kurri Kurri WWTW, which details an incident relating to RAS pump on 28 August 2014 resulting in failure to comply in licence condition through the discharge of effluent.

We have been provided with some documentation that supports the prudence of the project on the basis of growth and compliance drivers. However, we need to see a copy of the concept design report for the existing plant to reach a definitive opinion on the prudence of the project. The concept design report will contain the best available information regarding the existing capacity of the plant.

We note that HW is in the process of reviewing the process capacity and we recommend that any findings are used to determine the timing of this project. This relates to the growth driver and that the need for this project rests on the plant exceeding its capacity.

6.14.4 Efficiency

6.14.4.1 Efficiency test part 1: Option selection

How the decision was made

The 'Preliminary Business Case Kurri Kurri WWTW Stage 3 Upgrade' (HW, 2015) states *'The scope of the Stage 3 upgrade works is considered to be straightforward and will not require other options to be investigated.'*

In response to our concern that a thorough or robust options development or that an assessment has been undertaken to determine the most efficient or least cost option, HW has stated that "*options development is not required at preliminary business case stage especially in this case as it was part of a staged upgrade... That is, an allowance had been made in both the plant design and infrastructure for a relatively simple expansion to increase the design envelope identified in the concept design and planning approval. Options assessments were undertaken at the time of the concept design to determine the most efficient means of achieving the design envelope. Given that infrastructure has been built to specifically allow for the expansion (e.g. allowance in flow split structure and RAS pup station installation) it is a reasonable assumption at a preliminary business case stage that expansion of the plant in this manner would be cost effective. Admittedly in principle, the G1 should not have declared options would not be assessed*".

We agree that these works were identified in the 2000 concept report for the Kurri Kurri WWTW, and are part of the long term strategy for the plant. We note that the previous infrastructure was constructed to easily allow for this additional stage. We accept that this constitutes reasonable long term planning.

However, we do consider the need to review whether the works proposed in the concept report are sufficient to meet all the current issues with the plant. We recommend that the scope of the project is reviewed following the results of the assessments currently being undertaken. Alternative options (including sizing of infrastructure) could be assessed as part of the full business case development. In addition any additional issues, such as concern over the inlet works capacity, should also be considered.

Scope of preferred option

The current scope of the preferred solution is:

- Construction of a new 18 m diameter secondary clarifier and associated RAS system (2 x 60 L/s RAS pumps)
- Upgrade of RAS system capacity for the existing clarifiers to provide availability of 60 L/s of RAS pumping capacity per clarifier with 100% standby capability

6.14.4.2 Efficiency test part 2: Cost efficiency of preferred option

The costs for the preferred option were developed by an external consultant in HW's cost estimating template. We consider the allowances for project management and contingency to be appropriate and in keeping with HW's cost estimation procedures and industry practice.

We have developed the following order of magnitude (-20% / +40%) benchmark cost estimate (Table 6.43).

Table 6.43 : Cost estimate comparison

Component	Value ($'000)		Difference (Jacobs – HW)		Jacobs' assumptions
	HW^	Jacobs	Value ($'000)	Per cent (%)	
Design	879	879	0	0%	
Direct costs	7,478	4,348	-3130	-42%	Based on Jacobs' recent project experience
Total	**8,357**	**5,227**	**-3,130**	**-37%**	
Contingency	1,547	970	-577	-37%	

^ *Source: Capital Project Summary - Kurri Kurri WWTW Stage 3 Upgrade (HW, 10/08/2015)*

We have used HW's cost estimation tool to develop the above estimate, including applying the same strategic contingencies and overheads to the estimate. We have updated the cost of the clarifier based on a recent (early 2014) estimate for a comparable project to replace a clarifier. Our cost estimate was developed by an external contractor for a separate purpose but we consider the approximate benchmark cost to be an appropriate comparison to HW's cost estimate.

We understand that HW's cost estimate for the Kurri Kurri project was prepared by one of HW's consultants in 2015. This estimate was based on contract prices for a Purification Plant upgrade which was delivered in 2012. HW's consultants was part of the project team for this previous upgrade and was involved in concept design, detailed design, post design advice and tender evaluation. We consider that this previous Purification Plant upgrade project will have be tendered around 2011, when the market conditions were likely to result in higher costs than at present.

As HW's delivery cost estimate is in excess of 40% of our benchmark cost estimate, we consider HW's costs for its preferred option not to be efficient.

We consider that the difference in costs between the HW estimate and our estimate may be indicative of a change in market conditions and a general decline in market costs (see further below).

How the project was executed

This item has not been delivered.

6.14.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, and a Preliminary Business Case, consistent with Gate 1 requirements. We expect that HW has also prepared (or is in the process of preparing) a Full Business Case and a Business Case Checklist, as required for Gate 2.

HW has allowed approximately 10% for project management, which is consistent with what we expect for a project at this stage, and a contingency allowance of approximately 30%. This percentage is calculated from HW's cost estimating tool, which identifies two high risk factors: the base cost estimate is based on loading factors and the procurement approach has not been defined yet. As such, we conclude that the contingency value is appropriate.

6.14.6 Our recommendations for prudence and efficiency

Prudence

We consider that the project is prudent. It is the planned instalment of infrastructure in accordance with the master plan for the site. The timing is in line with the current growth projections.

Efficiency

We consider that an options analysis should be undertaken following the current capacity investigation, taking into account any associated issues (e.g. the inlet works capacity). We conclude that the option selected for the project has not been established to be efficient. However, this option is in-line with the long term planning for the site and we understand that HW will undertake options assessment to determine the least cost option as part of the option development.

In addition, we consider that the costs of the project are not efficient as they exceed our order of magnitude benchmark costs by more than 40%. As such, we have adopted our benchmark cost.

6.14.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	●
Is the project efficient – correct option?	●
Is the project efficient – least cost?	●

Key: ● prudent or efficient; ● partially prudent or partially efficient; ● not prudent or not efficient

6.14.8 Jacobs' recommended capex

Table 6.44 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.00	0.00	0.00	0.87	2.12	3.16	1.26	0.00	**7.41**	-
HW Project Summary*	0.00	0.00	0.00	0.00	0.51	0.34	3.43	3.43	**7.71**	-
Our adjustment on HW submission (SIR)	0.00	0.00	0.00	-0.87	-1.61	-2.82	2.17	0.95	**-2.18**	-
Our recommendation	0.00	0.00	0.00	0.00	0.51	0.34	3.43	0.95	**5.23**	-

** Capital Project Summary - Kurri Kurri WWTW Stage 3 Upgrade (HW, 10/08/2015)*

6.14.9 Assumptions/Data gaps

We do not require further information.

6.15 Item 10 - Seaham Weir

Table 6.45 : Summary of Seaham Weir

SIR/AIR (Regulatory Driver)	**Primary Driver**	New Mandatory Standards
	Secondary Driver/s	n/a
Capital Project Summary Driver/s		New Mandatory Standards
Service		Water
Project Type		Proposed
SIR ID No		WNM007
Major Project Reference		PP16 reference – 20
Project Stage		Development

Table 6.46 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.00	0.00	0.00	0.00	0.05	0.20	0.73	4.87	5.84	-
2013 Determination	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Capital Project Summary	0.00	0.00	0.00	0.00	0.25	0.62	2.19	1.58	4.65	-

6.15.1 Project description

HW owns, maintains and operates Seaham Weir, the associated gate and fish way structures, and the Balickera transfer scheme.

There are a number of rules that specify when the Seaham Weir gates must be kept open, when they must be shut, and when HW can and cannot extract water using the Balickera transfer scheme. These rules are contained in the *Water Supply Work and Water Use Approval for the Seaham Weir Management Zone of the Williams River Water Source (20CA212238)* which, in turn, reflects the requirements of the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*.

The objective of this project is to ensure compliance with new environmental flow rules and for improved fish passage as outlined in the Lower Hunter Water Plan (LHWP), and which are anticipated to be included in the next version of the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources*.

6.15.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation.

6.15.3 Prudence

The need for the project

The NSW Office of Water considers that the LHWP process met the requirements of the studies that are required in the 2011 water supply approval, and have indicated that the new rules will be reflected in changes to the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources.

The NSW Office of Water advised (NSW Office of Water, 2013) in a letter to HW that they intend to amend the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* in relation to the environmental release rules. This becomes a mandatory regulatory compliance requirement for HW. The current infrastructure at Seaham Weir (the fishway and release gates) is considered by HW to be at material risk of not complying with the new requirements of the LHWP. We note that there is no timeframe provided in the NSW Office of Water letter regarding when the amendment will be made or when HW needs to be compliant.

The need for this project is considered to be mandatory in that it is in response to a de facto instruction under HW's licencing obligations from the NSW Office of Water.

6.15.4 Efficiency

6.15.4.1 Efficiency test part 1: Option selection

How the decision was made

The preferred option for this project was determined from an options investigation process. The options investigation processed included:

- The need for the project – including risks to HW
- Development of options to meet the project needs
- Option ranking by evaluating the benefits and risk for each option
- Capital cost for each option
- Input and advice from technical specialist consultants in development of the options assessment and cost

Minimal assessment of operating costs has been undertaken as part of the preliminary business case completed to date. It is noted that operating costs arising from the new infrastructure are only expected to increase slightly over the current arrangement and will be assessed in more detail in the development of the full business case.

A timeline of project milestones has been provided in the preliminary business case, however no information has been provided on the drivers for these milestones or if infrastructure development can be delayed.

Overall the options assessment is considered to be a robust process as a comparative cost and a high level qualitative assessment of the options was undertaken to identify options that are likely to achieve the project objectives. Further analysis of the options will be undertaken by HW as part of the full business case development.

Scope of preferred option

The scope of the preferred option is defined as the construction of a new fishway and low flow control gates. The preliminary business case or project capital summary does not provide details of the fishway infrastructure. However, the cost estimate spreadsheet for the project contains the costs for five options of the infrastructure required for the fishway and low flow gates.

6.15.4.2 Efficiency test part 2: Cost efficiency of preferred option

The cost estimate for the preferred option has been developed based on unit rates and is in line with typical industry values. The 2015 cost estimate developed by HW includes an assessment of risk to determine the appropriate allowances of contingency for both the inherent risk and the contingent risk of the project (where inherent risk is the risk of inaccuracies in the measured items included in the base estimate and contingent risk is the risk of costs associated with items outside the base estimate). This is consistent with HW's Capital Project Estimating Guidelines. Based on a similar project we undertook, the cost estimate is considered to be reasonable for this stage of the project.

We consider that the project is efficient as HW has selected the most efficient option and appropriate cost estimates have been developed for the preferred option for this stage of the project. However, at this stage, these are only preliminary estimates, in keeping with the current stage of the project, and further work is required through the planning and design process to confirm these costs. No information has been supplied in the business case as to how the project will be delivered.

How the project was executed

This item has not been delivered

6.15.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary, and a Preliminary Business Case, consistent with Gate 1 requirements. We expect that HW has also prepared (or is in the process of preparing) a Full Business Case and a Business Case Checklist for, as required for Gate 2. HW has allowed approximately 10% for project management, which is consistent with what we expect for a project at this stage, and a contingency allowance of approximately 40%, which is higher than what we expect for a project at this stage (approximately 25%), unless a number of high risk elements had been identified.

6.15.6 Our recommendations for prudence and efficiency

Prudence

We consider that the project is prudent as it meets the mandatory project need to satisfy the regulatory requirements to be implemented in the LHWP.

Efficiency

We consider that the project is efficient as a robust option assessment has been conducted and the efficient option chosen and appropriate cost estimates have been developed for the preferred option for this stage of the project. Further investigation and development of the full Business Case will confirm these costs.

We have proposed a reduction in cost ($1.21 million) to align with the supporting documentation provided.

6.15.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: ● prudent or efficient; ● partially prudent or partially efficient; ● not prudent or not efficient

6.15.8 Jacobs' recommended capex

Table 6.47 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.00	0.00	0.00	0.00	0.05	0.20	0.73	4.87	**5.84**	-
HW Project Summary*	0.00	0.00	0.00	0.00	0.25	0.62	2.19	1.58	**4.65**	-
Our adjustment on HW submission (SIR)	0.00	0.00	0.00	0.00	0.20	0.42	1.46	-3.29	**-1.20**	-
Our recommendation	0.00	0.00	0.00	0.00	0.25	0.62	2.19	1.58	**4.65**	-

** Capital Project Summary - Seaham Weir Modifications (HW, 11/09/2015)*

6.15.9 Assumptions/Data gaps

No further information is required.

6.16 Item 11 - Hunter Central Coast transfer capacity upgrade

Table 6.48 : Summary of Hunter Central Coast transfer capacity upgrade

SIR/AIR (Regulatory Driver)	**Primary Driver**	Growth – other
	Secondary Driver/s	n/a
Capital Project Summary Driver/s		Drought security and growth
Service		Water
Project Type		Proposed
SIR ID No		WGO008
Major Project Reference		n/a (W152 in AIR capex, WGO008)
Project Stage		Development

Table 6.49 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.00	0.00	0.00	0.50	2.38	0.00	0.00	0.00	**2.88**	-
2013 Determination	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	-
Capital Project Summary	0.00	0.00	0.00	0.52	2.73	0.00	0.00	0.00	**3.25**	-
BC Cost Estimate Option 2	-	-	-	0.60	2.90	-	-	-	**3.50**	-

6.16.1 Project description

The objective of the Central Coast Inter-Regional Water Transfers (CCIRWT) project is to enable the transfer of an average 30 ML/d of potable water from the Central Coast into the HW distribution network. The key benefit of which is to make better use of existing water storages and improve drought resilience in the Lower Hunter. This project is a key initiative of the LHWP with completion targeted for 2017.

A two-way sharing arrangement was implemented to benefit the Central Coast water supply network in response to a severe drought experienced in 2006 and in anticipation of future similar droughts.

The Lower Hunter and Central Coast water supply systems are connected by a pipeline linking reservoirs at Morisset and Kanwal. This link can transfer up to 33 ML/day of treated drinking water south to the Central Coast water supply network.

However, the HW distribution system is only capable of receiving 13 ML/day using existing infrastructure. HW is therefore required to modify its water supply system to remove 'bottle-necks', to be capable of receiving 30 ML/day of water from the Central Coast (3 ML/day above the average usage).

6.16.2 Previous IPART or consultant recommendations

There is no previous IPART or consultant recommendation.

6.16.3 Prudence

The need for the project

The project driver identified in the information return is 'Growth – other', while the capital project summary identifies the project drivers as 'Drought Security and Growth'. We consider that this is, in effect, maintenance of service standards for water delivery and as such the appropriate driver should be 'Existing mandatory standards'.

The LHWP states: *"Wyong Shire Council and Hunter Water will construct new pipelines and water pumping stations to increase the transfer capacity so that up to 30 million litres a day of water can be transferred north in accordance with the existing water transfer agreement. This work is currently planned to be completed in 2017"* (MWD, January 2014).

HW states *"the Hunter Water distribution system is only capable of receiving 13 ML/d using existing infrastructure. Hunter Water is required to modify its water supply system to remove 'bottle-necks' in order to receive 30 ML/day of water from the Central Coast"* (HWC, 26 August 2015).

HW has made a public commitment to delivering the LHWP. We consider the work is necessary and required to meet the 30 ML/d transfer capacity target.

6.16.4 Efficiency

6.16.4.1 Efficiency test part 1: Option selection

How the decision was made

Three options (plus do nothing) were identified for increasing the receiving capacity of the Lower Hunter Distribution System.

Table 6.50 : Options assessment

Option	Description	Total Capital Cost	NPV
1 – Do Nothing	Is unable to meet project objectives.	-	-

Option	Description	Total Capital Cost	NPV
2 – Option (Non-Isolated) Trunk System with new Wangi Pump station	A range of modifications with water from the Central Coast being able to be pumped north by reversing HW's Morisset WPS and delivering water to Wangi Reservoir. A new WPS at Wangi will then pump water from Wangi Reservoir further north into the South Wallsend system.	Stage 1 - $4.29 million	$3.83 million
3 – Closed (Isolated) Trunk System with new Wangi Pump Station	The same modifications as identified in Option 2, but with isolation of the Morisset to Wangi reticulation network using a number of pressure sustaining valves to protect the reticulation network from higher pressures.	Stage 1 - $4.34 million	$4.14 million
4 – Open (Non-Isolated) Trunk System with new Wangi Boost Pump station	The same modifications as identified in Option 2, however the new Wangi WPS is located on the suction side of Wangi Reservoir at a lower elevation to limit pressure increases in the reticulation water mains between Morisset and Wangi.	Stage 1 - $5.12 million	$4.49 million

Limited commentary was available as to the full reasoning supporting the selection of the preferred option, with the main points of supporting the preferred option being:

- The lowest capital and Total Present Value Cost of the three options (excluding 'do nothing')
- The least impact in terms of land acquisition
- Least environmental impact
- Constructability
- Operationally (ability to work within existing operations)
- Relatively small increased pressures in the Wangi Reservoir Zone
- The flexibility to transition to Option 3 (or part thereof) to isolate problematic reticulation areas

We consider the options considered the selection process including selection criteria to be appropriate and make use of existing infrastructure.

Scope of preferred option

The documentation reviewed confirms the preferred solution is Option 2, with the key components described below:

- Construction of 400 m of pipeline for diversion off F3 Freeway (optional item)
- A new water pumping station at Wangi
- Modifications to reverse the pumping direction of Morisset 3 WPS and Fennell Bay WPS
- Cross connection from the discharge to the suction side of Toronto WPS to bypass the Toronto 2 boosted zone
- Pipework modifications to enable flows to bypass Teralba WPS

The scope is well defined for a project in the options evaluation and selection phase. The elements required to be undertaken are defined at a high level but have sufficient detail to demonstrate a clear understanding of the works to be performed.

6.16.4.2 Efficiency test part 2: Cost efficiency of preferred option

The capital cost and NPV estimates were developed in line with HW's Costing Estimating Guide and used the same basis for preliminaries including design costs. As such, we consider that a direct comparison as to the cost-effectiveness of the preferred option is valid.

As the NPV for Option 2 (as well as the direct capital costs) estimate is the lowest of the three identified solutions, as well as the most preferred due to constructability considerations, we consider the preferred option is the most cost effective of those identified.

How the project was executed

This item has not been delivered.

6.16.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Capital Project Summary. We expect that HW has also prepared a Preliminary Business Case, as required for Gate 1, but evidence of this has not been sighted. We expect that HW has also prepared (or are preparing) a Full Business Case, and a Business Case Checklist for this project, as required for Gate 2. HW has allowed approximately 7.5% for project management, which is consistent with what we expect for a project at this stage, and a contingency allowance of approximately 12.5%, which is lower than what we expect for a project at this stage.

6.16.6 Our recommendations for prudence and efficiency

Prudence

We consider that the project, in particular the preferred option (Option 2) is prudent as it addresses the anticipated drought triggered shortage of supply issue in the most cost effective and efficient manner.

Efficiency

We consider that the project is efficient as the option selected to address drought triggered water shortages:

- Is the most cost effective
- Has the least impact environmentally
- Is the easiest to construct and operate
- The costs estimates are in line with those of an efficient operator and our order of magnitude benchmark cost comparator

We note that the cost proposed in the supporting documentation is higher than currently recorded in the SIR. We have proposed an increase in cost ($0.37 million) to align with the supporting documentation provided.

6.16.7 Our traffic light summary of prudence and efficiency

Is the project efficient?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: ● prudent or efficient; ● partially prudent or partially efficient; ● not prudent or not efficient

6.16.8 Jacobs' recommended capex

Table 6.51 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.00	0.00	0.00	0.50	2.38	0.00	0.00	0.00	**2.88**	-
HW Project Summary*	0.00	0.00	0.00	0.52	2.73	0.00	0.00	0.00	**3.25**	-
Our adjustment on HW submission (SIR)	0.00	0.00	0.00	0.02	0.35	0.00	0.00	0.00	**0.37**	-

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
Our recommendation	0.00	0.00	0.00	0.52	2.73	0.00	0.00	0.00	**3.25**	-

** Capital Project Summary - Central Coast Inter Regional Water Transfer (HW, 26/08/2015)*

6.16.9 Assumptions/Data gaps

No further information is required as we consider this item to be prudent and efficient.

6.17 Item 12 - Munibung Creek SW Rehabilitation Works

Table 6.52 : Summary of Munibung Creek SW Rehabilitation Works

SIR/AIR (Regulatory Driver)	**Primary Driver**	Asset and service reliability
	Secondary Driver/s	n/a
Capital Project Summary Driver/s		Customer/community dissatisfaction
Service		Stormwater
Project Type		Proposed
SIR ID No		XD7004
Major Project Reference		n/a
Project Stage		Development

Table 6.53 : HW capex - actuals (2013 to 2015) and/or proposed (2016 to 2020)

Source	Capex Budget ($ million)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
SIR/AIR	0.00	0.00	0.00	0.11	0.18	0.68	0.97	0.00	**1.95**	-
2013 Determination	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	-
Capital Project Summary	0.00	0.00	0.00	0.11	0.17	0.60	0.90	0.00	**1.78**	-

6.17.1 Project description

Munibung Creek is a highly modified drainage channel flowing northwards from Mt Munibung, into Winding Creek and ultimately into Cockle Bay, Lake Macquarie. The surrounding land use is predominantly residential and industrial. The catchment area of Munibung Creek is approximately 150 ha, 80% of which is urbanised. The remaining 20% is native woodland/open forest.

HW owns a 485 m natural open section of Munibung Creek from Pendlebury Rd downstream to Gorleston Terrace in Cardiff. Upstream the creek is piped and downstream the creek is piped for a small section and then it opens out to an open trapezoidal concrete channel. Both sides of the natural creek are built up with residential and industrial properties which confine the creek.

The objective of this project is to:

- Reduce customer/community dissatisfaction
- Remove rubbish and some weeds within the creek
- Rehabilitate Munibung Creek to prevent on-going erosion and sediment build up

The project involves the implementation of rehabilitation works to stabilise the creek banks to prevent the build-up of sediment and prevent on-going erosion of the creek bed and bank. Where possible, without altering localised flood risks, the creek will be aligned within the HW lot boundary. The works will maintain:

- A natural creek style, including protection of native flora and fauna
- A green corridor/buffer between industrial (Pendlebury Road) and residential areas (Lachlan/Emery Streets)

The remediation works will involve rubbish removal, some non-native vegetation removal and the placement of rock to help direct the flow, stabilise the banks and create a pool and riffle sequence similar to a natural creek. Planting of native vegetation will also be undertaken at particular locations to rehabilitate/stabilise the banks and maintain the green corridor.

6.17.2 Previous IPART or consultant recommendations

From IPART's 2012 consultant report, it does not appear that they specifically review the 'Munibung Creek SW Rehabilitation Works' project, however they commented on the work. IPART's 2012 consultant stated:

> *"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."*
>
> *"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 ($0.9 million per year) should be made in 2016/17 and 2017/18 to at least address potential problems in Munibung Creek and minimise customer complaints."*

We do not consider approving expenditure based on *"existing low expenditure on stormwater and the likely continuation of customer complaints"* to be prudent.

Following further consultation, HW stated: *"the Munibung project was initially one project that was split in two as part of capital rationing for the 2012 price submission. Atkins reviewed the whole business case (~$1.8m) and recommended that the whole section be done at once, split over 2 years."*

6.17.3 Prudence

The need for the project

HW has no specific stormwater requirements within the Operating Licence and the Customer Contract. However, HW is responsible for the on-going maintenance of the system in accordance with its obligations under the *Hunter Water Act 1991*. We understand that, whilst HW may not have responsibility for the banks of the creek, being natural structures, it does have a duty of care to reasonably ensure free flow of the creek.

There are no explicit legal or regulatory drivers for the major upgrades to the system. However, the current condition of the creek has been determined to represent a high business risk due to on-going community dissatisfaction. The capital project summary identifies the project cost driver as customer/community dissatisfaction. This system has been the subject of multiple complaints, case investigations, as well as a

Newcastle Herald article. Customers have also indicated that they will escalate their complaints further if HW continues to leave the system in its current condition.

This project highlights the issue of HW's internal drivers not directly aligning to IPART's recommended drivers. That is, there is no direct link between HW's assigned driver of customer/community dissatisfaction and IPART allowed drivers.

We consider that the appropriate IPART drivers for this project should be asset and service reliability and discretionary. We consider that HW will be prudent to maintain its asset to prevent flooding. Such activities will include removal of the high volumes of waste, rubbish and sediment along this section of the creek. We also note that the Capital Project Summary states that "*even allowing for creek remediation, private property flooding will continue to occur, due to the topography and catchment development".*

We understand that, in keeping with a Water Utility's normal duty of care, HW is not obliged to undertake measures to prevent erosion (unless this will lead to flooding) or weed control, and that undertaking these activities are discretionary and are subject to HW demonstrating its customers' willingness to pay.

In response to notification of our preliminary findings, HW stated:

> *"Jacobs have recommended an elimination of this project and an associated reduction in capital funding of $1.78 million (100%) associated with this project not being compliance driven.*
>
> *Jacobs recommends that the project is efficient, but it is not prudent as it is not aligned to any specific regulatory driver and is discretionary. This is related to no stormwater regulatory requirements about land erosion or flooding."*

We have reviewed the 'Customer Hotspots Program', provided by HW to support this project. We consider that the fact that the program has been endorsed by HW's Planning Review Committee is in keeping with good practice. However, insufficient evidence has been provided to us to enable us to justify the inclusion of this project as part of this program. We are of the opinion that the current Customer Hotspots Program does not align well with stormwater projects. For example there are no program categories which align with this project such as: dirty water; low pressure; water supply discontinuity; customer flooding; wet weather overflows; internal overflows; and wastewater odours. However, we recognise that HW's stormwater capital programs are limited, and consider that the effort undertaken to adapt the Customer Hotspots Program to include a one-off stormwater project may be disproportionate to the effort required to justify further stormwater projects in themselves.

In response to our draft report, HW stated:

> *"Communications with customers have predominately indicated that future works are planned subject to funding, however final design and investigations are required, followed by consultation with residents and land owners.*
>
> *Failure to provide a regulatory expenditure allowance for this project will likely result in project deferral or cancellation, leading to customer and community frustration, further complaints and complaint escalation. Residents have already indicated their intention to take their issues to their local MP or the Energy and Water Ombudsman of NSW as they have not been satisfied with actions to improve the situation to date."*

We acknowledge that customer complaints have been received by HW and work will be required to minimise complaints. However, HW has not directly demonstrated the willingness of customer's to pay for the works, i.e. through direct consultation and customer acceptance of costs.

Further, whilst we note that IPART's 2012 consultant report mentions the project, the IPART's 2012 consultant did not undertake a complete review of the project drivers and need. The information provided in the report did not present a convincing argument for proceeding with the project.

6.17.4 Efficiency

6.17.4.1 Efficiency test part 1: Option selection

How the decision was made

The preferred option for this project was determined from an options investigation process. The options investigation processed included:

- The need for the project - including risks to HW,
- Development of options to meet the project needs,
- Option ranking by evaluating the benefits and risk for each option,
- Capital cost for each option, and
- Input and advice from technical specialist consultants in development of the options assessment and cost.

The business case does not discuss whether the willingness to pay has been tested with the customers. Nevertheless, the options assessment is considered to be a robust process.

Scope of preferred option

The scope for the preferred option is defined in the Soil Conservation Service report from 2012. This report documents 21 sites with the creek and the required works. The sites are also prioritised by risk ranking.

6.17.4.2 Efficiency test part 2: Cost efficiency of preferred option

The cost estimates were developed for this project by a technical specialised in the area, Soil Conservation Service. The initial estimate was completed in 2011. The costs have been developed for each proposed item of works to be completed. The cost estimate provided is based on estimates only as, due to the current stage of the project, a detailed survey had not been completed. The cost estimate developed in 2015 by HW is based on the 2011 Soil Conservation Service estimate with some validation by HW on recently completed projects in the area.

The 2015 cost estimate developed by HW includes the assessment of risk to determine the appropriate allowances of contingency for both the inherent risk and the contingent risk of the project. Based on our cost database drawn from advising on similar projects, we consider, the cost estimate to be reasonable and within our order of magnitude benchmark estimate.

One risk that has the potential to impact the cost estimate for the project is the requirement for the development of additional drainage easements. While the likelihood of the need for this requirement is not considered high, based on the preliminary business case data, it has the potential to impact the cost estimates for this project if it is required.

We consider that the project is efficient as a robust option analysis process has been followed and an efficient option selected. In addition, appropriate cost estimates have been developed for the preferred option for this stage of the project. However these are only preliminary estimates, albeit appropriate for this stage of the project, and further work is required through the planning and design process to confirm these costs.

No information has been supplied in the business case of how the project will be delivered. A competitive tender process will assist in ensuring that the efficiency by securing market based prices for this project. There is the potential risk of requiring further drainage easements which may impact the cost estimate for this project.

How the project was executed

This item has not been delivered.

6.17.5 Alignment with HW's systems

From our review of HW's processes and the documentation provided by HW on this project, we consider that HW has followed its business decision making and prioritisation processes. HW has prepared a Preliminary Business Case, as required for Gate 1. We expect that HW has also prepared (or is in the process of preparing) a Full Business Case and a Business Case Checklist for this project, as required for Gate 2. HW has allowed approximately 10% for project management, which is consistent with what we expect for a project at this stage, and a contingency allowance of approximately 14%, which is consistent with what we expect for a project at this stage.

6.17.6 Our recommendations for prudence and efficiency

Prudence

Apart from general asset maintenance (including the removal of rubbish which may lead to flooding) we consider that this project is discretionary and is not supported by a specific regulatory driver. As such, we find this project to be not prudent. We require further details of any demonstrated willingness for the customer to pay to determine whether the overall project is prudent.

We accept, however, that HW has consulted extensively with the community on other elements of this project and that IPART may need to assess whether – in the absence of demonstrated willingness to pay – HW has otherwise satisfied IPART's test/s for discretionary expenditure to be considered prudent. We are not aware of other tests and cannot reasonably recommend that the project is prudent within IPART's guidelines.

We recommend that, in the longer term, HW and IPART work together to establish whether is an opportunity to develop stormwater regulatory requirements concerning land erosion or flooding.

Efficiency

We consider that the project is efficient as an efficient option has been selected and appropriate cost estimates have been developed for the preferred option for this stage of the project. Further investigation and development of the full Business Case will confirm these costs.

However, as the need for the project has not been sufficiently established, we recommend that the project does not proceed and therefore we have allocated no costs to this project.

6.17.7 Our traffic light summary of prudence and efficiency

Is the project prudent?	
Is the project efficient – correct option?	
Is the project efficient – least cost?	

Key: prudent or efficient; partially prudent or partially efficient; not prudent or not efficient

6.17.8 Jacobs' recommended capex

Table 6.54 : Jacobs' recommended capex for the upcoming determination period ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total	Beyond
HW submission (SIR)	0.00	0.00	0.00	0.11	0.18	0.68	0.97	0.00	**1.95**	-
HW Project Summary*	0.00	0.00	0.00	0.11	0.17	0.60	0.90	0.00	**1.78**	-
Our adjustment on HW submission (SIR)	0.00	0.00	0.00	-0.11	-0.18	-0.68	-0.97	0.00	**-1.95**	-
Our recommendation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	-

** Capital Project Summary - Munibung Creek Rehabilitation Works (HW, 24/09/2015)*

6.17.9 Assumptions/Data gaps

No further information is required.

6.18 Allocation of opex to capital projects

Operating costs are considered within business cases and the capital cost estimating process (as described in Section 2.2.7). They are an important part of the NPV calculations. We have seen detailed consideration of operating costs, particularly for optioneering undertaken for large treatment projects. However, operating costs are less considered in more straight forward capital projects, where there are less opportunities for capex/opex trade-offs.

6.19 Opex savings from ICT projects

Whilst operating costs savings are referred to within the business cases of individual projects, these are not directly quantified (e.g. saving of 1FTE). We recommend that the associated impact on opex costs is fully quantified and cross referenced to capex intended to offset opex, and that this information used to inform the opex budget and future regulatory submissions.

6.20 Efficiency of proposed delivery models

HW uses a range of delivery models, which are often specific to the projects being delivered. In particular, HW uses a combination of panels and direct tendering. The use of panels is further discussed in Task1 (Section 2).

IPART has queried the process used to deliver large treatment projects. In our sample, we covered three large treatment projects (Burwood Beach WWTW, Shortland WWTW and Kurri Kurri WWTW).

Burwood Beach WWTW was competitively tendered as a design and construct (D&C) project. This aligns with the provided Procurement Plan for this project. D&C was selected for the delivery phase as the design layout for the civil works is directly dependent on the UV system supplied. Tendering the project as a D&C contract allowed competitive tension across UV equipment vendors, the cost of which is a significant capital cost. Contractors were shortlisted to tender on the project via a competitive Expression of Interest. We have reviewed the tender process and found it to be to be robust and keeping with good industry practice as it engaged an appropriate number of contractors and applied appropriate selection criteria.

The Kurri Kurri WWTW delivery method has not yet been established. As such we are unable to comment on its suitability.

The Shortland WWTW was delivered under an EPCM type agreement in the form of a deed with HWA. In 2012, HWA was engaged to assist HW in the delivery of a program of identified capital projects. The purpose of this program was to fast-track a number of capital projects for 2013. The deed formed a single point delivery method where HWA was responsible for the investigation, survey, engineering design, environmental investigation, procurement, construction and commissioning phases for HW. This model was selected to make efficient use of skills within the HW group of companies.

In this model, HW established incentives to reduce overall project costs and timeframes through open book accounting and pain/gain sharing measures. HWA's corporate profit and overhead were at risk based on performance with respect to actual completion against the Approved Works Budget and Approved Program. We discuss the individual EPCM type agreement with HWA for Shortland WWTW in Section 6.11.4.

The table below details the (approx.) $50 million program delivered by HWA, which was the manager of the EPCM contract. We have not seen documentation of HW considering alternatives to directly appointing HWA in this role. However, we think it reasonable of HW to appoint HWA as manager given the relationship at the time, the need to fast track the project work and the experience and knowledge of the staff involved. We understand that HWA contracted the work to suitable contractors under a competitive tender process.

We note that for the Shortland WWTW Sludge Handling Project, the process for establishing the EPCM type contract in the form of a deed was reasonable, including independent estimates and procurement guidelines.

We have reviewed the performance of the 14 projects based on available information in the SIR. We are aware of the following changes to projects:

- Chichester Dam Electrical Systems Upgrade has been cancelled.
- Chichester Dam Spillway Trolley Renewal and Recertification completed in 2015-16.

For all other projects, we have assumed that projects were not itemised in the SIR have been completed. However, we note that other projects may also have been withdrawn by HW (and hence not included in its submission) or replaced with other projects. Following on from the above assumptions (assuming that all projects not found in the SIR have been completed) HW is on track to deliver 7 of the 14 projects on or ahead of time.

A comparison of project costs delivered under the deed with HWA has been provided by HW (Table 6.55). However, these data are incomplete as the SIR only contains costs from 2014. We therefore have insufficient information on the program of works and full costs of each of these projects to make a complete and definitive comparison between SIR costs, original budget costs and revised or final costs.

Table 6.55 : Comparison of projects delivered under the deed with HWA

Projects	Original Project Delivery Date	Revised Project Delivery Date (based on the SIR and updates from HW)	Comparison with original dates	Original Project Cost	Revised Project Cost (based on information available in the SIR)
Anna Bay WTP Upgrade	Oct-13	2016	Delayed	3,800	909
WTP Fluoride Upgrade - various sites	Mar-14	2016	Delayed	4,800	6,540
Remediation of Inlet Works Belmont & Cessnock WWTW	Dec-13	2016	Delayed	3,400	1,827
Shortland WWTW Sludge Handling Upgrade	Jan-17	2016	Brought forwards	16,000	21,297
Morpeth WWTW Upgrade - Stage 2	Jun-15	2016	Delayed	14,000	21,244
Adamstown Wastewater System Upgrade contract management	Mar-13	Completed prior to 2014	Assumed on time		
Energy Efficiency Projects (various)	Jun-15	Completed prior to 2014	Assumed brought forwards		
Removal of asbestos from buildings at Burwood Beach Wastewater Treatment Works	Mar-13	Completed prior to 2014	Assumed on time		
Morpeth Stage 3 Wastewater Storage Upgrades	Jun-14	Completed prior to 2014	Assumed brought forwards		
Grahamstown Dam Wall Protection Works	Nov-13	2015	Delayed	800	671
Chichester Dam Electrical Systems Upgrade	Jun-13	Cancelled	Cancelled		
Switchboard Upgrades	Jun-13	Completed prior to 2014	Assumed on time		
Maitland Pipeline	Jun-13	Completed prior to 2014	Assumed on time		
Chichester Dam Spillway Trolley Renewal and Recertification	Jul-13	Completed in 2015-16	Delayed		

6.21 Systemic errors and cost savings

We have discovered a number of systematic issues in HW's processes or their application during our review of the sample projects. These are described below.

6.21.1 Differences in the values in the SIR and supporting documentation

We have discovered that for all projects, there are differences between the values stated within the SIR and HW's supporting documentation. However, we consider that some, at least, of these differences may be due to time differences between the preparation of the different budgets and submission, as the SIR is based on a budget that is locked down in November 2014. We have therefore recommended adjustments to submission (SIR) project costs to best reflect the latest information on each project.

With the exception of the Burwood Beach Project, most of these adjustments are relatively minor. Where justified, we have recommended increases as well as decreases in updating project costs, with increases being recommended for four out of the twelve projects reviewed.

In response to notification of our preliminary findings HW advised that "*the recommendation to remove $10.95 million from HW's 2016-17 capital program due to savings achieved in Burwood Beach WWTW disinfection penalises HW for its transparency in revealing project changes that have occurred since its proposed capital program was set for inclusion in the price submission*".

Whilst we do not want to penalise HW for its openness and transparency (which has been consistent across the review), we cannot conclude that the current SIR costs for this project (including allowances for a power upgrade and contingencies which did not occur) are efficient and as such we must recommend a revised value showing what we consider are efficient costs.

In addition, HW has commented that its "*cost estimating procedures allow for unders and overs in actual costs compared with estimates (particularly for projects in early stages of development) such that the total capital expenditure balances across the total program…Removal of $10.95 million for Burwood Beach would "lock in" savings that have occurred over the last 9 months but without taking into account other cost pressures (new projects that rank highly through the prioritisation process or cost increases to existing projects) that have arisen during the same time period*".

We recognise that projects change over time, and associated cost estimates also change over time as scope and budget become more certain through the various development stages and decision gates. However, we recommend that the most up to date information available should be used to inform pricing. We have consistently applied the same method, of using the most current price data, to all projects reviewed, including proposing increased costs where relevant.

6.21.2 Mismatch between HW internal drivers and IPART defined drivers

We identified a number of mismatches between the driver stated by HW and IPART's drivers during our review of the sample projects. An example of this is the Mechanical-Electrical Renewals. A proportion of expenditure was initially allocated to the investment driver of 'Discretionary standards'. This relates to compliance with Codes of Practice and Australian Standards. We consider this to be a misallocation of driver due to lack of familiarity with the definitions associated with the IPART drivers and a misinterpretation of the level of discretion HW has in complying with Codes of Practice and Australian Standards (which are mandatory).

We had initially assumed that the mismatch of drivers may be due to the drivers being assigned by the regulatory team rather than by project managers or business case owners. In response to our questions on this, HW clarified that HW adopts IPART's investment drivers in the gateway 1 process. HW reviews the drivers at the business case stage. That is, drivers are assigned by project managers and business case owners.

Further, HW states that "*a guideline was developed in 2011 to assist project managers and business case owners in assigning the project to the correct drivers. The portfolio office reviews the assignment of drivers to assist in consistency of application*".

The Critical Mains Renewal is another project example of misallocation to what HW calls 'Discretionary standards'. In this project 4% of costs were assigned to 'Discretionary standards'. However, the prime driver for this work is to address hotspots, which should, in our opinion, more accurately be associated with an asset and service reliability driver.

The 'Munibung Creek SW Rehabilitation' project is another project example of a mismatch between HW drivers and IPART's drivers. Supporting documentation provide HW refers to 'Customer/community dissatisfaction' but costs are allocated to 'Asset and service reliability' in the AIR/SIR. We consider that HW should use the IPART drivers where possible to provide consistence and clarity.

We consider that there is a need for HW to develop more formal, transparent and codified processes for mapping business/project drivers to IPART's prudence drivers (regulatory drivers). This lack of consistency in allocation of business drivers to regulatory drivers was also noted in IPART's 2012 consultant's review (although a direct recommendation was not made). The day to day use of IPART drivers will assist HW to demonstrate compliance against specified regulatory drivers. We also recommend that HW adopts IPART drivers as Primary Driver in day to day business, including reflecting this in its Capital Project Summaries.

6.21.3 Risk adverse nature

As mentioned in Section 1.3, we have noted that occasionally HW selects the project with a higher NPV or capital cost at the early planning stages. Specific examples of this are:

- The CS Platform Refresh component of the ICT Program
- The Wyee Backlog Sewer Scheme, where a high cost option was selected ($23.7 million compared to the least cost feasible solution (low infiltration sewer with transfer via road route to Dora Creek WWTW, $20.4 million – subsequently revised to 22.7 million) In response to our raising this with HW, HW has confirmed that it "*does on occasions choose an option that is higher than the least cost option at the preliminary business case stage. Reasons include high profile projects that require public announcements as to cost, or commitment to regulators that a service level with be achieved in which case the most achievable and understood option may be chosen. At a business case stage, it is rarer that an option less than the least capital or PV will be chosen… The main reason for choosing an option that is not least cost is project risk*".

However, notwithstanding this response we consider that if this risk adverse approach consistently applied, i.e. if a higher cost option is always adopted during the initial stages with a lower cost option adopted at later stages of option review and selection, this will result in the overall program costs being overestimated (as at least not all projects are likely to follow the worst case scenario and, selecting the project options with a higher NPV inherently drives HW to selection of an option that is not the most efficient to deliver the regulatory need). As such, we recommend that the least cost feasible option is selected as the preferred option in the pricing model at all stages of project definition and option selection, unless there are clearly justified reasons for adopting a higher cost.

In response, HW provided further evidence regarding the selection of projects of projects that are not the least cost:

"Over 2015 a further nine full business cases for water and wastewater projects have been presented to the ERC with a total NPV of $137 million. Of these, two projects chose an option that was not least cost to a total $0.4 million (0.3%) of the total cost. On each occasion, the non-cost factors were a consideration and were clearly justified.

Over 2015, a further 10 preliminary business cases for water and wastewater projects have been presented to the ERC with a total cost of $117 million. Of these, two projects chose an option that was not least cost to a total $0.4 million (0.3%) of the total cost. One project was a 1% increase on the least cost solution and the other had non-cost factors that made the least cost option not preferred, representing an 8% increase for this project (Central Coast transfer that Jacobs reviewed as prudent and efficient)"

Whilst we have not reviewed the business cases mentioned above, we acknowledge that this demonstrates that generally the impact of not always selecting the lowest cost option is low.

6.21.4 Contingency allowances and market conditions

We note that for two of the three large treatment projects we evaluated, where the projects are nearing completion, the costs within the SIR are materially above the projected likely final project cost. In both cases, the reduction is due to a combination of unspent contingency allowances and market factors resulting in lower direct costs than previously estimated. This is described below:

- For the Burwood Beach WWTW Disinfection Project, the SIR costs ($25.9 million) are significantly above the likely project outcome costs of $14.14 million. The variance is due to a change of scope ($7.8 million saving from avoiding an upgrade of the power network), reduced contract price relative to original estimate ($2.76 million) and reduced contingency ($1.7 million).
- For the Shortland WWTW Sludge Handling Upgrade, there is a significant difference in the SIR cost ($18.0 million) and the supporting documentation ($15.2 million) for this nearly completed project. The reasons for the variation include no use of the Risk and Opportunity allowance, a saving on procurement of contracts and design innovations and unspent contingency totalling $2.3 million.

The significant reduction in scope for the Burwood Beach WWTW Disinfection Project is a factor unique to this project and cannot be extrapolated to other projects. However, we believe that the recent change in market conditions[117] is systemic.

In response to our draft report, HW provided further information on the reasoning behind the savings on contract prices for the Burwood Beach project:

> *"The project did have savings due to market conditions in the UV market particularly in the supply of the technology. It is important to recognise that there was considerable uncertainty in the consultant's cost estimates from UV equipment suppliers for this project. The project involved a new generation of more energy efficient UV lamps. These lamps had not been sold into the Australian market previously. The suppliers themselves were not sure about pricing. Most of Hunter Water's major projects involve technologies that are used regularly – pumps, pipes and concrete. There is far less variability in the rates for such projects. On that basis, Hunter Water argues that the UV project is not typical and should not be used to form a judgment on systemic errors."*

We acknowledge that this project used new technology, with which HW and suppliers had limited experience (unlike more common items such as pumps and pipes as noted above) and which resulted in pricing challenges. We also note that the mechanical UV package (noted as the "WEDECO base quote 60 mJ/cm^2") forms a significant part of the direct costs ($4.4 million of a total of $9.7 million direct costs). However, as discussed later in this section, we extrapolate 50% of our findings, as a conservative approach to allow for project-specific issues, such as noted for Burwood Beach.

We note that the estimates for both Burwood Beach WWTW and Shortland WWTW Sludge Handling Upgrade were developed under the previous estimating guidelines v2.3 to those that are current at the time of writing. HW has advised that "*the benefits of v4.0 of the guidelines have been included in each project due to commence in the next price path*".

We suggest that similar efficiency savings may be possible for related projects that have been delivered over a similar period and hence are likely to have been developed using previous estimating guidelines and are likely to have benefited in the change in market conditions that have led to lower contractor rates.

[117] Arising from the reduction in mining activity and more recently housing sector activity leading to reductions in contractor costs.

Table 6.56 : Cost variations between SIR and other documents – Burwood Beach and Shortland WWTWs

Project	Burwood Beach WWTW Disinfection			Shortland WWTW Sludge Handling Upgrade		
Cost-related items	Cost ($ million)	%	Able to extrapolate?	Cost ($ million)	%	Able to extrapolate?
SIR Total	25.95			17.95		
Scope change	7.80	30%	No	0.00	0%	n/a
Contract price	2.76	11%	Yes	0.50	3%	Yes
Reduced contingency	1.70	7%	No	1.60	9%	No
Design innovation	0.60	2%	No	0.20	1%	No
Construction innovation	0.35	1%	No	0.00	0%	n/a

In addition to the Burwood Beach and Shortland WWTWs projects listed above, we believe that there are two other projects where changes to market conditions have resulted in an over estimate of costs. These are described below:

- Chichester Trunk Gravity Main Replacement - Duckenfield to Tarro - in this project there is a $1.8 million difference between the SIR cost and the details in the supporting documentation. Whilst HW states that this variation is due to a reduction in contingency, we have not sighted evidence to show that this is not linked to a reduction in market costs.
- Kurri Kurri WWTW Upgrade – whilst the project costs in the SIR are in line with the supporting documentation, our estimation of the project costs (based on recent market experience) indicates that the costs should be materially lower than proposed in the SIR.

Taking into account the four projects above, we have calculated the cost difference assumed to be due to market conditions. The weighted average across the four projects is shown below in Table 6.57.

Table 6.57 : Changes in project costs due to market variations

Project	Burwood Beach WWTW Disinfection	Shortland WWTW Sludge Handling Upgrade	Chichester Trunk Gravity Main Replacement	Kurri Kurri WWTW Upgrade	Total
Total (SIR) ($ million)	25.95	17.95	28.76	7.41	**80.07**
Change relating to changed market conditions ($ million)	2.76	0.50	1.83	2.18	7.26
Percentage of Total (SIR)	11%	3%	6%	29%	
Weighted average	3%	1%	2%	3%	9%

We propose that this finding relating to changed market conditions be extrapolated to one off projects, rather than programs. We have not proposed for this extrapolation to occur for programs, as we believe it is likely that a reduction in the unit costs of works will result in additional items being included in the program.

In addition, to apply a conservative approach, we propose to only extrapolate 50% of this finding, 4.5%, to individual projects as shown below. These 22 projects are selected based on:

- Cost – projects are $5 million or above in total costs (2014 – 2021)
- Unsampled – these projects have not been previously reduced through our detailed sample review.

We note HW's submission to us which states:

> *"Jacobs has accepted that Hunter Water's estimating practices and gateway approval process are reasonable and reflect current industry practice. Under these processes, projects that are pre-Gateway 3*

have a cost estimate that is based on P50 estimate i.e. there is a 50% probability that the actual cost will be below the estimate. Gateway 3 is the point at which total project funding is approved, hence a higher level of cost certainty is required. Estimates prepared for gateway 3 are a P90 estimate i.e. there is a 90% probability that the actual cost will be below the estimate. Therefore it is to be expected that the actual costs for the two projects examined will be below the project estimate. The forward capital program predominantly contains projects that are pre-gateway 3 (approximately 85% of projects). It is not reasonable to extrapolate savings from Gateway 3 projects across the remainder of the projects in the program that have a lower level of project development and definition and which have an estimate with a higher level of uncertainty."

We have considered the above HW perspective and, notwithstanding this, conclude that the approach we have applied to be fair and reasonable as our identified savings are based on tightly scoped projects (i.e. two of the projects at Gateway 3) and applied to projects with less certain scope. Given that our sample projects are at advanced planning stages, we are confident that these savings are real and achievable. We have applied these savings to projects which are less certain in scope and are likely to have higher contingency values. Our approach is therefore conservative (in HW's favour).

Cost savings are applied to projects in 2017 and onwards. This is to take account of the fact that projects to be delivered in 2016 are likely to have already been tendered. Applying this 4.5% reduction to one-off projects results in the following cost reductions set out in Table 6.58.

Table 6.58 : Proposed cost reductions due to market variations

Project	SIR Total Cost 2017 – 2020 (000's)	Cost reduction (4.5%)	Revised Total Cost 2017 – 2020 (000's)	Comment
Farley WWTW Upgrade - Stage 3b	1,409	63	1,346	
Dungog WWTW Upgrade - Stage 1	14,296	643	13,653	
Outcomes of Effects Based Strategy	11,965	538	11,427	
Dora Creek WWTW Upgrade - Stage 2b	12,936	582	12,354	
Tanilba Bay WWTW Upgrade - Stage 2	8,996	405	8,591	
Burwood Beach WWTW Preliminary Treatment Upgrade (incl. reclaimed effluent system)	3,495	157	3,338	
Belmont 6 Rising Main Renewal	1,871	84	1,787	
Morpeth WWTW Upgrade - Effluent Main Augmentation	1,401	63	1,338	
Lochinvar 1 WWPS Upgrades (Housing Acceleration Fund HAF2 Upgrades)	7,546	0	7,546	Fully funded HAF2
High Voltage Transmission Line Replacement	7,790	351	7,439	
Balickera Tunnel Stability Works	7,704	347	7,358	
Maitland 14 WWPS Upgrades (Housing Acceleration Fund HAF2 Upgrades)	2,927	0	2,927	Fully funded HAF2
Hunter River Tunnel Replacement	6,880	310	6,571	
Tarro to Beresfield WPS Augmentation	3,383	152	3,231	
WWPS Improvement Compliance Program - stations less than 1 h storage	6,427	289	6,138	
Raymond Terrace WWTW Upgrade - Stage 4	4,745	214	4,532	
SCADA Radio Network Replacement	4,147	187	3,960	
Biosolids Storage Strategy	5,852	263	5,588	
Farley WWTW Upgrade - Effluent Reuse Scheme	2,259	102	2,158	

Project	SIR Total Cost 2017 – 2020 (000's)	Cost reduction (4.5%)	Revised Total Cost 2017 – 2020 (000's)	Comment
Integrated Quality Management System	590	27	564	
Farley WWTW Interim Upgrade	1,541	69	1,471	
Telemetry System Upgrade	3,202	144	3,058	
Total	**121,364**	**4,990**	**116,374**	

Based on the above, we are recommending a reduction to the capex program of $4.99 million. From the total capex budget of $791 million for 2014 to 2020, this represents a 0.6% reduction.

HW submitted that asset management, cost estimation and procurement are sources of ongoing efficiency gains. HW has factored the potential for savings into the capital portfolio by reducing the cost estimate for each future project (projects with expenditure beyond 2016) by 5%, compared with that proposed at the preliminary business case gate. That is, the cost estimates prepared for the pricing submission were included in the early rounds of prioritisation and then reduced each by 5% to feed into the SIR and submission. We understand that these reduced costs were used in the SIR.

We note that our analysis has been undertaken on the reduced costs from the SIR. As such, the above recommended efficiency savings capture the 5% efficiency savings on asset management, cost estimation and procurement nominated by HW and a further 4.5% reduction to account for changes in market conditions.

We acknowledge HW's submission stating that:

> *"The proposed efficiencies for the capital works program have not considered the manner in which the capital portfolio has been developed and the risk associated with cutting expenditure. The proposed capital expenditure was derived by firstly considering the pricing and balance sheet impact of various capital expenditure scenarios and the level of corporate risk associated with various expenditure levels. The paper explaining this process has been previously provided to Jacobs. The reductions in capital expenditure proposed by Jacobs are based on a small sample size, have not taken into account broader economic data or the nature of the gateway approval and estimating process.*
>
> *Savings compared to budget on capital projects will be achieved and Hunter Water will have projects that require an increase in authorised funds to meet project objectives. These will be managed at a portfolio level to ensure that expenditure is within IPART approved expenditure and that risk to mitigated to an acceptable level. If Jacobs' view that market conditions will deliver lower prices in future does not come to fruition Hunter Water will bear significant compliance risk at the proposed reduced level of expenditure."*

We consider that HW has followed good practice to develop its capital works program, including consideration of corporate risk associated with various expenditure levels. We have considered HW's gateway and estimating procedure and found these procedures to be reasonable (see comments in Section 2.2.7). However, we consider there are likely to be cost savings within individual projects which comprise the overall program of works, which will allow HW to achieve our proposed reductions due to market conditions.

6.21.4.1 HW comment

In response to our draft report, HW engaged an engineering firm to comment on our extrapolation based on market conditions. In summary, the report suggested that we should:

1. Apply cost deflators, not our extrapolation approach, to adjust for softer market conditions
2. Not apply our extrapolated saving for large projects to past project/actuals
3. Allow for real cost increases to our proposed costs during the 2017 to 2020 period.

6.21.4.2 Our analysis of Point 1

On point 1, HW accepts that some kind of calibration of costs for projects being tendered given evidence of lower cost outcomes. However, HW considers that the approach adopted by us – based on updated project costs - is incorrect. HW (its engineer) prefers cost deflators.

Our approach is not one of developing cost escalators/deflators based on a basket of indices. Our approach as set out in our method statements is to use the best available information at the time of our analysis. That best available information is contemporary cost data either obtained from HW via its revised and updated project costs flowing going to market, actual construction costs, and our data obtained from the market.

We consider, therefore, that HW's (engineer's) recommended use of deflators is inappropriate. Rather, updated costs from HW or our benchmark data from similar projects or high-level costs estimates provide a better project-by-project assessment of cost overestimation and is an approach that aligns with the basis for IPART's expenditure reviews (i.e. updated submitted project costs should be the basis of pricing.

We disagree in principle, therefore, that we should use indexation not new project information to determine prudent and efficient costs, where market conditions have softened

6.21.4.3 Our analysis of Point 2

We agree and that was our intention in our draft report. However, we have since removed from our list of projects (to which our extrapolated saving erroneously applied) the two past projects with expenditure from 2013 to 2016.

We have also removed two projects funded by the NSW Housing Acceleration Fund, based on new information provided by HW in response to our draft report.

6.21.4.4 Our analysis of Point 3

We do not allow for real capex/cost increases during the 2017 to 2020 regulatory period. In part, this is a matter for IPART as it requires us to recommend forecast costs in real dollars ($2016).

Further, we consider that there will be no real increases in costs over the 2017 to 2020 regulatory period. Specifically, we assume that the general 'softening' of construction costs arising from Australia transitioning from a period of significant growth to a lower growth environment will exist for much if not all of the 2017 to 2020 regulatory period. We have not assumed that these conditions will prevail indefinitely.

This is supported by the following evidence. HW's engineer published its forecast (August 2015) that:

> *The Australian economy is going through a difficult period in the aftermath of the mining boom. And it's not over yet. The economy will stay soft until we absorb the shock of a substantial fall in mining investment which has only just begun. After 20 years of growth (averaging 5.5% p.a. in real terms), the construction sector, has begun a phase of decline which will continue for another three years.*[118]

That is, the firm considers that for (at least) 2016, 2017 and 2018 the construction sector will experience a phase of decline and note that soft growth will continue to curb inflation.

In addition, we note that over the last two regulatory periods, 2006 to 2010 and 2011 to 2015, there has been a 23% drop in average cost escalation (compared to mid-range RBA CPI). This is based on the change in average Australian All Cities CPI over those two periods (Bureau of Statistics 2015). This softening has been confirmed by our observation of HW's delivered projects (2013 to 2015) and updated forecast capex.

Perhaps more compelling still, the Australian Energy Regulator (AER) noting in its recent determination of capex forecasts for utilities considered CPI to better reflect the cost inputs required to achieve capex objectives over 2015–2020 than price escalation indices constructed from commodity and labour price indices.

[118] http://www.bis.com.au/reports/ltf_r.html (24-11-2015)

Adopting the CPI approach for forecasting capital costs for the next regulatory period, and by extrapolating and applying an averaged, 2.5% inflation forecast for 2016 and 2017 as provided by the Reserve Bank of Australia (RBA) (November 2015)[119], the projected increase in construction cost over the next five years is shown in Figure 6.8 below.

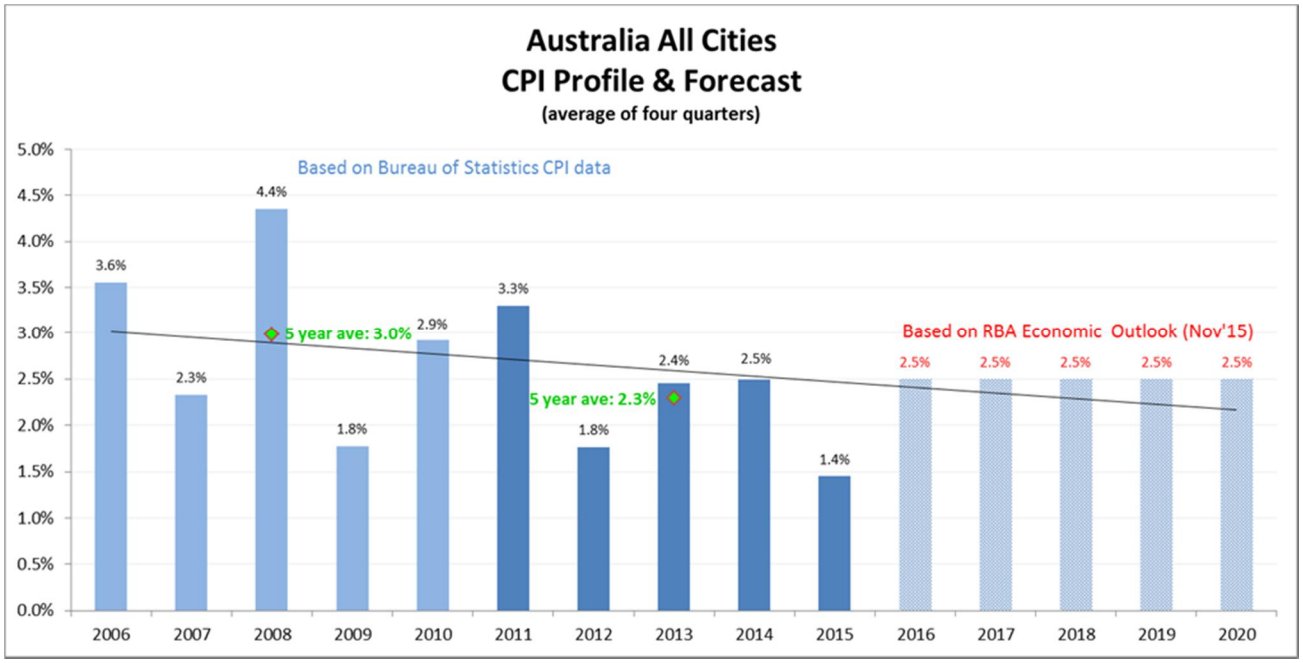


Figure 6.8: Australia All Cities CPI Profile and Forecast

Source: RBA (2015).

We interpret from the above graph that there will be no real increase in average costs over the next regulatory period. This further supports our extrapolated cost saving over this period and our application of that saving throughout the regulatory period, without allowing for real cost increases.

6.21.4.5 Conclusion

On the above basis, our capex findings, based on recent project costs (including our 4.5% cost reduction for HW capex for certain large projects) are reasonable and supported by the available data, including HW's engineer, the AER and the RBA. We recommend retaining our approach to extrapolation, with the exception that we will not apply our 4.5% saving to project costs from actual (or locked in) 2013 to 2016.

6.22 Holistic approach to planning infrastructure

HW has demonstrated in a number of projects a holistic approach to planning infrastructure. Two examples are as follows:

- Wyee – options considered included use of treatment plants outside of HW's area of operation and privately owned infrastructure.
- Duckenfield to Tarro pipeline – options considered included upsizing of pipeline to allow assessment of the combined project costs of the Grahamstown WTP upgrade and this CTGM renewal project. Upsizing the pipeline results in an increase of capacity through the CTGM system. This increase will allow the Stage 3 upgrade of the Grahamstown to be delayed up to 8 years, corresponding to a $15.5 million present value saving.

[119] http://www.rba.gov.au/publications/smp/2015/nov/pdf/06-economic-outlook.pdf (24-11-2015)

We consider that this demonstration of HW adopting a holistic approach to project option selection represents good industry practice.

6.23 Summary by sector - prudent and efficient capex adjustments and reason

The following summarises our one-off adjustments to sampled items and our adjustments based on our extrapolate cost saving due to a change in market conditions. These adjustments set out in Table 6.59 to Table 6.62 exclude our annual productivity challenge (continuing efficiency) savings, which we apply to total capex further below.

Water Projects

Table 6.59: HW proposed and Jacobs' efficient capex for water projects 2013-2020 ($2016 million)

Financial Year	2013	2014	2015	2016	2017	2018	2019	2020	Total
HW proposal	35.7	45.9	30.1	27.9	34.4	31.4	39.7	42.0	287.3
Our one-off adjustment	0.0	0.0	0.9	0.1	1.0	1.0	0.5	-5.2	-1.7
Our extrapolated adjustment	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.6	0.0	-1.2
Our recommended efficient capex	35.7	45.9	31.0	28.0	35.0	32.3	39.7	36.8	284.3
Our recommended change to capex	0.0%	0.0%	3.1%	0.3%	1.7%	2.6%	-0.1%	-12.5%	-1.0%

The key contributing factors to our adjustments, which have a 1% impact on water capex, are:

- Reductions to Chichester Trunk Gravity Main - Duckenfield to Tarro Replacement ($1.8 million) and the Seaham Weir ($1.2 million) to reflect updated cost estimates for these projects since the budget was initially established in November 2014.
- Extrapolation of findings to 4 large forecast water projects (HV Transmission Line Replacement, Balickera Tunnel Stability Works, Hunter River Tunnel Replacement and Tarro to Beresfield WPS Augmentation).

Sewerage Projects

Table 6.60: HW proposed and Jacobs' efficient capex for sewerage projects 2013 to 2020 ($2016 million)

Financial Year	2013	2014	2015	2016	2017	2018	2019	2020	Total
HW proposal	62.4	30.8	37.5	69.1	64.3	47.9	34.7	36.8	383.5
Our one-off adjustment	0.1	0.0	4.1	-7.8	-12.5	-2.8	2.2	0.9	-15.8
Our extrapolated adjustment	0.0	0.0	0.0	0.0	-0.6	-1.2	-1.0	-0.8	-3.5
Our recommended efficient capex	62.5	30.8	41.6	61.3	51.3	43.9	35.8	37.0	364.2
Our recommended change to capex	0.2%	0.0%	11.0%	-11.3%	-20.2%	-8.4%	3.3%	0.5%	-5.0%

The key contributing factors to our adjustments, which have a 5% impact on sewerage capex, are:

- The reduction to Burwood Beach WWTW Disinfection ($11.9 million) and Shortland ($2.4 million) for changes to scope, contingency and changed market conditions.
- Extrapolation of findings against 14 sewerage projects.

Stormwater Projects

Table 6.61: HW proposed and Jacobs' efficient capex for stormwater projects 2013 to 2020 ($2016 million)

Financial Year	2013	2014	2015	2016	2017	2018	2019	2020	Total
HW proposal	0.97	0.20	0.37	0.58	0.59	1.09	1.38	0.41	5.60
Our one-off adjustment	0.00	0.00	-0.06	-0.01	-0.18	-0.68	-0.97	0.00	-1.91
Our extrapolated adjustment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Our recommended efficient capex	0.97	0.20	0.31	0.56	0.41	0.41	0.41	0.41	3.69

Our recommended change to capex	0.0%	0.0%	-16.6%	-2.2%	-31.0%	-62.4%	-70.4%	0.0%	-34.1%

The key contributing factor, which has a 34% impact on stormwater capex, is our reduction to Munibung Creek Rehabilitation Works due finding it not to be prudent. HW identified the project driver as discretionary and HW has not demonstrated that its customers are willing to pay for it. IPART suggests that HW should demonstrate its customers' willingness to pay for discretionary expenditure and HW has not done so.

We accept that HW has consulted with the community on other elements of this project and that IPART may consider whether HW has satisfied IPART's criteria for discretionary expenditure to be considered prudent.

Corporate Projects

Table 6.62: HW proposed and Jacobs' efficient capex for corporate projects 2013 to 2020 ($2016 million)

Financial Year	2013	2014	2015	2016	2017	2018	2019	2020	Total
HW proposal	7.6	20.5	17.2	14.9	13.9	12.3	13.6	14.2	114.4
Our one-off adjustment	0.0	0.0	0.0	0.0	4.7	0.1	1.4	-7.2	-0.9
Our extrapolated adjustment	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.2
Our recommended efficient capex	7.6	20.5	17.2	14.9	18.5	12.4	15.0	7.1	113.3
Our recommended change to capex (%)	0.0%	0.0%	0.0%	0.0%	32.9%	0.7%	10.2%	-50.4%	-1.0%

The key contributing factors to our adjustments, which have a 1% impact on corporate capex, are:

- Reductions to the ICT program, where a lower cost feasible option was available
- Extrapolation of findings to two projects (SCADA Replacement, Integrated Quality Management System).

6.24 Our summary of capex for IPART report 2013 to 2020

HW has proposed the following capex to IPART for the next determination period (Table 6.63).

Table 6.63 : HW proposed capex for the period 2013 to 2020 ($ million, $2016)

Area of expenditure	2013	2014	2015	2016	2017	2018	2019	2020	Total
Water	35.7	45.9	30.1	27.9	34.4	31.4	39.7	42.0	287.3
Sewerage	62.4	30.8	37.5	69.1	64.3	47.9	34.7	36.8	383.5
Stormwater drainage	1.0	0.2	0.4	0.6	0.6	1.1	1.4	0.4	5.6
Corporate	7.6	20.5	17.2	14.9	13.9	12.3	13.6	14.2	114.4
Total	**106.7**	**97.4**	**85.1**	**112.6**	**113.3**	**92.8**	**89.4**	**93.5**	**790.8**

Source: Derived from HW's AIR (30 June 2005) – Table 9.1

We recommend the following one-off adjustments to HW's capex to take effect during the next determination period to accommodate the recommendations set out above (Table 6.64).

Table 6.64 : Our one off adjustments to capex ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total
ICT	0.00	0.00	0.00	0.00	4.67	0.15	1.45	-7.17	**-0.91**
Mechanical-Electrical Renewals	0.00	0.00	1.38	0.00	0.00	0.00	0.00	0.00	**1.38**
High Voltage Major Upgrade	0.00	0.00	0.39	-0.17	0.00	0.00	0.00	0.00	**0.22**
CTGM Duckenfield to Tarro Renewal	0.00	0.00	0.00	0.00	0.42	0.62	-0.92	-1.94	**-1.83**
Burwood Beach WWTW Disinfection	0.09	0.00	0.00	-0.92	-11.07	0.00	0.00	0.00	**-11.90**

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total
Shortland WWTW Sludge Handling Upgrade	0.00	0.00	3.70	-6.32	0.22	0.00	0.00	0.00	**-2.40**
Wyee Backlog Sewer Scheme	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Critical Mains Renewals	0.00	0.00	-0.51	0.61	0.00	0.00	0.00	0.00	**0.10**
Kurri Kurri WWTW Stage 3 Upgrade	0.00	0.00	0.00	-0.87	-1.61	-2.82	2.17	0.95	**-2.18**
Seaham Weir	0.00	0.00	0.00	0.00	0.20	0.42	1.46	-3.29	**-1.20**
Hunter Central Coast transfer capacity upgrade	0.00	0.00	0.00	0.02	0.35	0.00	0.00	0.00	**0.37**
Munibung Creek Rehabilitation Works	0.00	0.00	0.00	-0.11	-0.18	-0.68	-0.97	0.00	**-1.95**
Total	**0.09**	**0.00**	**4.96**	**-7.76**	**-7.00**	**-2.31**	**3.18**	**-11.45**	**-20.28**

Source: Jacobs' Draft Report (26 October 2015)

We recommend the following extrapolated adjustments to HW's wider capex program for the regulatory period (Table 6.65).

Table 6.65 : Our extrapolated adjustments to capex ($ million, $2016)

Projects	2017	2018	2019	2020	Total
Farley WWTW Upgrade - Stage 3b	0.00	0.00	-0.01	-0.06	-0.06
Dungog WWTW Upgrade - Stage 1	-0.05	-0.42	-0.17	0.00	-0.64
Outcomes of Effects Based Strategy	-0.02	-0.09	-0.22	-0.20	-0.54
Dora Creek WWTW Upgrade - Stage 2b	-0.03	-0.20	-0.35	0.00	-0.58
Tanilba Bay WWTW Upgrade - Stage 2	-0.03	-0.02	0.00	-0.35	-0.40
Burwood Beach WWTW Preliminary Treatment Upgrade (incl. reclaimed effluent system)	-0.09	-0.07	0.00	0.00	-0.16
Belmont 6 Rising Main Renewal	-0.08	0.00	0.00	0.00	-0.08
Morpeth WWTW Upgrade - Effluent Main Augmentation	0.00	0.00	-0.03	-0.03	-0.06
Lochinvar 1 WWPS Upgrades (Housing Acceleration Fund HAF2 Upgrades)	0.00	0.00	0.00	0.00	0.00
High Voltage Transmission Line Replacement	-0.02	-0.09	-0.24	0.00	-0.35
Balickera Tunnel Stability Works	-0.01	-0.02	-0.32	0.00	-0.35
Maitland 14 WWPS Upgrades (Housing Acceleration Fund HAF2 Upgrades)	0.00	0.00	0.00	0.00	0.00
Hunter River Tunnel Replacement	-0.20	-0.11	0.00	0.00	-0.31
Tarro to Beresfield WPS Augmentation	-0.15	0.00	0.00	0.00	-0.15
WWPS Improvement Compliance Program - stations less than 1 h storage	-0.03	-0.09	-0.09	-0.09	-0.29
Raymond Terrace WWTW Upgrade - Stage 4	-0.11	-0.10	0.00	0.00	-0.21
SCADA Radio Network Replacement	-0.05	-0.06	-0.07	-0.01	-0.19
Biosolids Storage Strategy	-0.02	-0.13	-0.11	0.00	-0.26
Farley WWTW Upgrade - Effluent Reuse Scheme	0.00	-0.08	-0.02	0.00	-0.10
Integrated Quality Management System	-0.03	0.00	0.00	0.00	-0.03
Farley WWTW Interim Upgrade	-0.07	0.00	0.00	0.00	-0.07
Telemetry System Upgrade	-0.04	-0.04	-0.04	-0.04	-0.14
Total	**-1.03**	**-1.52**	**-1.66**	**-0.78**	**-4.99**

On the basis of the two sets of adjustments above, we estimate that the following prudent and efficient capex (excluding our recommended continuing efficiencies) (Table 6.66). For recommended capex refer below to Section 7.

Table 6.66 : Our prudent and efficient capex for the period 2013 to 2020 ($ million, $2016)

Item	2013	2014	2015	2016	2017	2018	2019	2020	Total
HW actual/proposed capex									
Water	35.68	45.94	30.07	27.92	34.42	31.45	39.75	42.02	287.25
Sewerage	62.45	30.77	37.45	69.15	64.32	47.89	34.69	36.79	383.51
Stormwater drainage	0.97	0.20	0.37	0.58	0.59	1.09	1.38	0.41	5.60
Corporate	7.59	20.54	17.21	14.94	13.94	12.34	13.59	14.25	114.42
Total	**106.69**	**97.45**	**85.11**	**112.59**	**113.28**	**92.78**	**89.41**	**93.48**	**790.78**
Our one off adjustments to establish the 2015 efficient capex									
Water	0.00	0.00	0.92	0.08	0.97	1.05	0.54	-5.23	-1.68
Sewerage	0.09	0.00	4.11	-7.82	-12.46	-2.82	2.17	0.95	-15.78
Stormwater drainage	0.00	0.00	-0.06	-0.01	-0.18	-0.68	-0.97	0.00	-1.91
Corporate	0.00	0.00	0.00	0.00	4.67	0.15	1.45	-7.17	-0.91
Total	**0.09**	**0.00**	**4.96**	**-7.76**	**-7.00**	**-2.31**	**3.18**	**-11.45**	**-20.28**
Our ongoing adjustments to establish the efficient proposed capex									
Water	0.00	0.00	0.00	0.00	-0.40	-0.24	-0.58	-0.02	-1.23
Sewerage	0.00	0.00	0.00	0.00	-0.56	-1.22	-1.02	-0.75	-3.55
Stormwater drainage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Corporate	0.00	0.00	0.00	0.00	-0.07	-0.06	-0.07	-0.01	-0.21
Total	**0.00**	**0.00**	**0.00**	**0.00**	**-1.03**	**-1.52**	**-1.66**	**-0.78**	**-4.99**
Our recommended efficient capex									
Water	35.68	45.94	30.99	28.00	34.99	32.25	39.71	36.77	284.34
Wastewater	62.54	30.76	41.56	61.33	51.30	43.86	35.83	36.99	364.18
Stormwater	0.97	0.20	0.31	0.56	0.41	0.41	0.41	0.41	3.69
Corporate	7.59	20.54	17.21	14.94	18.54	12.43	14.97	7.07	113.30
Total	**106.79**	**97.44**	**90.07**	**104.84**	**105.24**	**88.95**	**90.93**	**81.25**	**765.51**

Source: Jacobs' Draft Report (3 November 2015)

Refer to Section 7 below for our total recommended capex (including our continuing efficiencies).

7. Efficiency factors for HW's opex and capex

7.1 Purpose and scope

In this section, we present our expected cost reductions arising from HW's anticipated productivity and efficiency improvements over the regulatory period, in line with relevant Australian productivity movements.

Our recommended efficiency factors are applied to our prudent and efficient opex and capex estimates from earlier sections of this report. We have structured this section as follows:

- Purpose of continuing and catch-up efficiency limits
- Previous IPART use of continuing and on-going efficiency
- Continuing and catch-up efficiency in other jurisdictions
- Our recommended continuing efficiency for HW
- Our application to our efficient costs.

7.2 Purpose of continuing and catch-up efficiency measures

The purpose of continuing and catch-up efficiency measures (savings) is to bring monopoly providers into quasi-competition with each other through constraining revenue growth. A regulator expects improvements in efficiency over time and the continuing and on-going efficiency factors can help to achieve this result.

7.2.1 Function of continuing and catch-up efficiency

7.2.1.1 Competition and efficiency

In a competitive market, inefficient corporations must improve if they wish not to lose market share to efficient corporations (which can charge lower prices). This does not happen with an unregulated monopoly, which, without effective regulation may have market power to increase its charges to accommodate inefficiencies.

The continuing and on-going efficiency factors provide a way for regulators to allow consumers to benefit from cost reductions due to productive efficiency and technological improvements under revenue (or price) cap regulation. Applying these factors does not diminish the incentives for the regulated entities to undertake activities that create these efficiencies.[120]

The continuing and ongoing efficiency artificially creates a market force by constraining costs of the monopoly to an estimate of what its costs should be in a competitive market. As this competitive market does not exist, estimating the continuing and on-going efficiency factors is both important and difficult, necessitating the use of judgement where there is a paucity of data.

7.2.1.2 Efficiency and on-going efficiency factors

The two efficiency factors are:

1. Catch-up efficiency – Refers to the cost reductions an inefficient firm can make to become as efficient as the frontier corporation (the competitively efficient corporation). In the context of HW, there is insufficient data available to determine a benchmark corporation for HW to aspire to. Moreover, as a low cost provider of services is it conceivable that in some parts of its business HW may represent a frontier corporation's level of high efficiency. Finally, the methods we adopt above to recommend prudent and efficient costs have the effect of achieving catch-up efficiency. We do not apply further catch-up efficiencies.

2. Continuous improvement – Refers to potential cost reductions due to the improved productivity and efficiency of the entire sector over time. In a theoretical market with perfect competition, all corporations will

[120] King (2012), 'Principles of price cap regulation', Infrastructure regulation and market reform, p. 47.

improve at this rate. This rate is determined by the 'frontier corporation' (or benchmark corporation that exhibits highest efficiency).

Finding the benchmark corporation is difficult, as different corporations operate under different conditions. Statistical methods are used to find and extrapolate between benchmark corporations and to normalise benchmark parameters in an attempt to accommodate the cost implications of these different conditions. The extrapolation between the benchmarks (setting out the most efficient expenditure) is known as the frontier, and benchmark corporations on the frontier are known as frontier corporations.

Recommendation: Apply only continuous improvements to HW as our prudency and efficiency reviews (refer Task 2A and 2B above) likely achieve the effect of catch-up efficiencies.

7.3 Previous IPART use of the continuing and catch-up efficiency

IPART considered continuous efficiency targets in its previous determinations for NSW water corporations.

7.3.1.1 IPART's 2012 price determination for HW

Atkins-Cardno recommended a 0.25% p.a. continuing efficiency target for HW in 2012 (applied to controllable opex) which IPART did not adopt as it accepted HW's submission. Atkins-Cardno estimated that 50% of HW's total opex was controllable so effectively recommended a 0.125% continuing efficiency.

Atkins-Cardno recommended this value based on the value used by Ofwat in its 2009 determination for water prices in England and Wales. Atkins-Cardno did not recommend a further catch-up efficiency as it considered that HW's proposal already incorporated catch-up efficiencies. We note that the process by which Atkins-Cardno adjusted the Ofwat continuing efficiency for Australian conditions is not clear in its report.

To address this, we have derived an appropriate continuing efficiency factor from Australian productivity data and then tested this against efficiency factors used in other jurisdictions such as the UK.

7.3.1.2 IPART's 2012 price determination for SWC

IPART used the following efficiency targets (Table 7.1) for Sydney Water Corporation (SWC) in its 2012 Determination. These were again based on efficiency targets used by Ofwat and Atkins-Cardno's judgement regarding potential for catch-up efficiency, and (we understand) applied to controllable opex.

Table 7.1: Efficiency factors for SWC

Efficiency	Applied to controllable opex (% p.a.)
Catch-up	2.0
Continuing	0.25

7.4 Efficiency pricing in other jurisdictions

Continuing (and catch-up) efficiency has been used or considered by economic regulators in Australia and overseas. We present important aspects of efficiency pricing in other jurisdictions in this section.

7.4.1 UK regulators (Ofwat and Ofgem)

Two regulators in the UK, namely Ofwat (water regulator) and Ofgem (energy regulator – gas and electricity), have used benchmarking to set limits for costs.

7.4.1.1 Ofwat

7.4.1.1.1 Price Review 2004 (PR04)

Ofwat noted that the continuing efficiency targets it set in PR04 were about half of the potential efficiency improvements it estimated were possible. (This is similar to our approach to halving our extrapolation for capex.)

Opex

Efficiency targets were set separately for water and wastewater wholesale opex. Efficiency targets for wholesale opex were given as a five year total. Separate targets were set for enhancement and maintenance.

Capex

Ofwat published the continuing efficiency targets for capex as a total over the five years of the price cycle. Ofwat set catch-up targets for both maintenance and enhancement capex. The enhancement targets applied over the five years of the price cycle but the maintenance targets only applied for the first three years.

7.4.1.1.2 Price Review 2009 (PR09)

Opex

Ofwat applied an ongoing efficiency factor of 0.25% to wholesale opex, more than the general efficiency improvement of the economy. The catch-up efficiency for wholesale opex was calculated to catch-up 60% of the gap between each company and the benchmark within the five years of the price cycle.

Capex

For PR09, Ofwat used a different approach for introducing ongoing efficiency for capex in place of continuous and catch-up efficiencies. This was the Capital Incentives Scheme (CIS). Ofwat predicted the efficient capex of utilities based on a 'middle company'. Ofwat's CIS set an implicit target at just over 2% over the 2010 to 2015 pricing period.

7.4.1.1.3 Price Review 2014 (PR14)

We note that for PR14, Ofwat used a more comprehensive statistical model than previously employed. Ofwat used statistical benchmarking to forecast the yearly efficient total expenditure (Totex). This is a more direct, intensive and costly way to use statistical benchmarking than allowing the firms to find efficiencies themselves.

Ofwat moved to a Totex approach, so regulated entities will be restrained in their ability to move spending between opex and capex (typically small project capex) to avoid regulation.

7.4.1.2 Ofgem

Ofgem, the UK energy regulator has recently adopted a new regulatory framework called Revenue, Incentives, Innovation and Outputs (RIIO).

7.4.1.2.1 RIIO

Under the RIIO, Ofgem determines the network outputs (e.g. connections) each provider must provide to meet service requirements. Each company must submit a business plan which is benchmarked, like Ofwat's new approach. We note that our AER is migrating to a regulatory approach similar to Ofgem in its most recent regulatory determinations.

7.4.2 QCA (Queensland)

We note the QCA has recently identified the move towards CPI-X for a new regulatory framework to commence in 2015. The two elements of QCA's CPI-X index are:

1. Consumer price index (CPI) representing inflation

2. An X factor that represents reductions in a utility's prices arising from efficiency and productivity improvements. It is used to adjust CPI and cause real price decreases over time.

The QCA set the X factor at 0.25% p.a. applied to the maximum allowable revenue (MAR) for retail water prices in Queensland, for example, Queensland Urban Utilities. QCA based this value on the lowest value of the range of continuous efficiency factors used by other regulators, which was IPART in its 2012 determination for SWC (which was in turn based on the 2009 determination of Ofwat).

7.4.3 ESC (Victoria)

For the 2016 Melbourne Water price review, the Essential Services Commission (ESC) set Melbourne Water a 2% p.a. efficiency saving applied to 'controllable opex' for the next price review period.

Previously, the goal was 1% p.a. The ESC increased the goal based on the highest rate they could find that another Australian regulator had used. This was 2% p.a. used by the Economic Regulation Authority (ERA) in Western Australia (WA).

We note that for the 2018 price review, ESC is considering using Ofgem's RIIO model.

7.4.4 ERA (Western Australia)

In its 2012 price review, ERA imposed a 2.0% p.a. efficiency target on the [total] opex of the WA Water Corporation (WC). This target was supported by a report from Cardno. In the same review, ERA allowed opex to grow at 21% for Aquest and 19.2% for Busselton Water, both in nominal terms.

ERA has imposed a 1.88% target on WC since 2008. WC has submitted that this target could not be maintained in the long term, and that all easy efficiency gains had already been made.

7.5 Summary of continuing efficiency factors

In Table 7.2 we summarise the values for the components of the continuous and cat-up efficiency factors used by regulators in other jurisdictions we have considered for this report.

Table 7.2: Summary of continuing efficiency factors in other jurisdictions

Jurisdiction	Price review	Expenditure	Continuing efficiency (% p.a.)
Ofwat	2004	Wholesale opex	0.30-0.5
Ofwat	2004	Capex	0.50-0.88
Ofwat	2009	Wholesale opex	0.25
Ofgem	2006	Opex	1.5-3
ERA	2012	Controllable opex	2.0
IPART	2012	Controllable opex	0.25
QCA (CPI-X)	2015	MAR	0.25
ESC	2016	Controllable opex	2.0

We note:

- Recent application in Australia of continuing efficiencies (which we consider relevant to HW) ranges from 0.25-2.0% p.a. to controllable opex or in the case of the QCA's CPI-X to total MAR (i.e. capex and opex).
- The QCA and Ofwat consider that it is appropriate to apply an efficiency measure to capex of 0.25-0.88%.
- Ofwat's continuing efficiency targets have been applied in Australia to water entities.

However, these targets were developed through econometric modelling of the productivity and efficiency of water corporations in England and Wales and therefore may not be directly mappable to an Australian context

7.6 Application to Hunter Water and our recommendations

7.6.1 Summary of our recommended costs for HW (excl. continuing efficiency)

Task 2A and 2B (Sections 4 and 6 above) summarise our estimated prudent and efficient opex and capex for HW (excluding continuing efficiency). We do not repeat this data here.

As noted earlier in this section, we consider that our prudency and efficiency findings are equivalent to catch-up efficiencies in this context, particularly as we have a paucity of data with which to establish a benchmark efficient/frontier corporation.

7.6.2 Benchmarking and catch-up efficiency

Our research to date has revealed that there are insufficient data available to undertake statistical analysis to establish a frontier corporation for the water sector in Australia. As an alternative, a preliminary approach is to consider easily accessible metrics in the National Performance Report across water companies (e.g. opex/ML or new capex/incremental capacity), by identifying those metrics' ranges and averages. This can provide early indications of targets that HW can aim to catch-up to.

We have used the NPR to assess the efficiencies of HW's businesses as:

- Water – Highly efficient based on the lowest opex per property for its group of major utilities
- Wastewater – Medium efficiency based on the fifth highest opex per property and opex 5% higher than the median provider in the NPR.

However, we do not recommend relying on such information to form definitive positions. Instead, we have adopted the approach set out further below.

It will be misleading to use metrics that fail to account for the different circumstances (e.g. scope of coverage, geography of coverage area, asset age, customer type and density) applied to the various water companies. It is therefore important to work towards establishing benchmarking metrics that can address these considerations. This could form a future body of work for IPART and its regulated entities.

7.6.3 Our application of continuing efficiencies to HW

In this section, we recommend the application of continuing efficiencies to HW, based on our review of HW's proposed expenditure and our key observations from other jurisdictions above:

- Continuing efficiencies of 0.25-2.0% p.a. apply to controllable opex or total costs (i.e. capex and opex).
- QCA and Ofwat apply efficiency measures to capex of 0.25-0.88%.

We recommend for HW that a conservative continuing efficiency factors of 0.25% be applied to:

- Controllable opex
- Total capex.

We apply our continuing efficiency factors in this way, in line with other regulators and our observations about HW, because:

1. Applying the same efficiency factor to opex and capex reduces the incentive for cost shifting (e.g. we consider that businesses are incentivised to move opex items to small capex items as opex has a direct 1:1 impact on prices that IPART scrutinises, whereas small capex items are rarely extensively sampled as (IPART and other regulators) favour reviewing large capex items.

2. Applying the continuing efficiency factor to total capex encourages both large and small projects to benefit from technology improvements and better ways of delivering projects over time.

3. Applying the continuing efficiency factor to controllable opex recognises that HW is not in a position to readily improve the productivity of externally determined costs such as regulatory fees, electricity tariffs and external contractors. Moreover, our prudence and efficiency reviews will improve the efficiency of uncontrollable opex. And finally, external contracts (e.g. Veolia) will include productivity measures within the contract if established prudently and efficiently by HW (which we opine on in the section above).

7.6.4 Recommended continuing efficiency factor for HW opex

Our value for the continuing efficiency factor for controllable opex is the 0.25% used by Ofwat in 2009.

We have apportioned opex between controllable and uncontrollable using the opex profile in 2015 from HW's submission to IPART on prices to apply from 1 July 2016.

We considered the following factors when apportioning between controllable and uncontrollable opex:

- Contractors: HW has the ability to pass efficiency factors on to contractors. However, HW cannot introduce this element into existing contracts, such as the Veolia contract which comprises a large proportion of HW's operating and maintenance opex.
- Electricity: HW has the opportunity to implement continuing efficiency through the adoption of more energy efficient and productive technology and processes as these are developed. However, HW does not have the ability to influence electricity tariffs.
- Regulatory fees: HW has no control over these.

HW does not specify what portion of its opex is controllable in its submission to IPART. HW simply states that "The majority of non-labour operating costs are either uncontrollable or only partially-controllable."

Atkins-Cardno assumes 50% controllable opex in their 2012 review of HW expenditure. We are unsure of the basis for this assumption.

Using HW's submission to IPART, we estimated 56% controllable opex by excluding uncontrollable opex from total opex using our benefit of the doubt approach. That is, we excluded uncontrollable costs (to favour HW) where we were uncertain of the nature of the costs including all of energy, *operations and maintenance* (including the Veolia contract) and regulatory fees. We set out our apportionment between controllable and uncontrollable opex based on HW's submission to IPART in Table 7.3.

Table 7.3: Distribution between controllable and uncontrollable opex

Opex component	Portion of opex (%)	Controllable portion (%)	Uncontrollable portion (%)	Controllable portion of opex (%)
Salaries and wages	35	100	0	35
Operations and treatment	16	0	100	0
Maintenance	14	0	100	0
Electricity	9	0	100	0

Opex component	Portion of opex (%)	Controllable portion (%)	Uncontrollable portion (%)	Controllable portion of opex (%)
Regulatory	5	0	100	0
IT	4	100	0	4
Property management	4	100	0	4
Consultants	4	100	0	4
Strategy studies	3	100	0	3
Motor Vehicles	2	100	0	2
Sludge and spoil disposal	1	100	0	1
Other	3	100	0	3
Total	**100**			**56**

We note that the portion of controllable opex of 56% using our approach is similar to Atkins-Cardno's 50%.

Table 7.4 shows the application of our efficiency factor to the portion of controllable opex to find the efficiency factor for total opex.

Table 7.4: Jacobs' efficiency factor for opex

Efficiency factor for controllable opex (%)	Controllable portion (%)	Efficiency factor for uncontrollable opex (%)	Uncontrollable portion (%)	Efficiency factor for total opex (%)
0.25	56	0	44	**0.14**

Our recommended continuing efficiency factor for total opex is 0.14% p.a. for 2017-2020.

7.6.5 Recommended continuing efficiency factor for HW capex

As noted above, our key observations for capex from other jurisdictions are QCA applied continuing efficiencies of 0.25% p.a. to total costs (i.e. capex and opex) and the QCA and Ofwat applied efficiency measures to capex of 0.25-0.88% p.a.

We recommend applying the same continuing efficiency factor of 0.25% to capex and controllable opex due to the: uncertainty of the other approaches; and to provide a disincentive for regulated entities to move expenditure between opex and capex. Symmetrical cost signals should best prevent perverse incentives for HW to shift costs, once it achieves productive efficiency.

In the meantime, if capex has a higher continuing efficiency factor, it disincentives the shifting of opex projects to small capex projects, to avoid regulatory assessment as part of future expenditure reviews. The following analysis also provides support for this recommendation.

7.6.5.1 Multifactor productivity (MFP) in Australia

The Australian Bureau of Statistics (ABS) regularly publishes various measures of productivity. The productivity measure which we will be interested in is the multifactor productivity (MFP). We have taken an average over the last five years, shown in the table below, to avoid the bias of adopting a change from year to year.

A positive number means productivity is rising and costs are falling (e.g. construction and whole economy).

A negative number means productivity is falling and costs are rising (e.g. energy, water and waste).

Table 7.5: Jacobs' analysis of historical MFP data

Yearly change in MFP	2010	2011	2012	2013	2014	Average	Half of average
Construction	-0.9%	-0.5%	9.4%	1.4%	-1.0%	1.66%	0.83%
Market Sector industries (c)	0.3%	-1.1%	0.8%	0.4%	-0.1%	0.04%	0.02%
Electricity, Gas, Water and Waste Services	-3.7%	-5.0%	-3.0%	1.0%	-5.1%	-3.16%	-1.58%

- We note the construction sector has become more productive by an average of 1.7% p.a. for five years. The construction average is inflated by the large productivity gains during the downturn in 2011/12.
- We note that utilities have seen declining productivity on average by 3.2% p.a. for five years. Our view is that economic regulation has not effectively incentivised productivity over this period. The AER, IPART and others are clearly addressing this problem with forecasts of CPI or less for 2015 to 2020.
- The whole economy is stable in terms of MFP.

7.6.5.2 Ofwat precedent supports our continuing efficiency factors

Following the example of Ofwat in PR04, it is reasonable to apply an efficiency factor half of what is considered achievable, which is 0.8% for construction. We have dismissed the -1.6% for utilities on the basis that better economic regulation will be needed in the pending regulatory periods. It is interesting to note that the construction sector has achieved productivity aligned Ofwat's high continuing efficiency factor of 0.88%.

We note that Ofwat estimated that its Capital Incentives Scheme CIS will result in a 2% reduction in capex costs over five years. This is equivalent to a 0.4% p.a. target (2% divided by 5) over the 5 years of the pricing period.

We have again adopted a benefit of the doubt approach and applied the smallest number from this range, 0.25%, given the uncertainty of the other approaches.

7.6.5.3 Application of opex inefficiencies to capex

We apply our continuing efficiency factors to total forecast capex 2017 to 2020. There is no sense in applying this retrospectively to capex from 2013 to 2016. As noted above we also apply this to small and large capex projects because:

- We seek to avoid HW cost shifting between large and small capex (by aggregating or disaggregating projects around the $5 million threshold)
- We seek to avoid HW cost shifting between capex and opex
- While (catch-up equivalent/prudence and efficiency) cost reductions have already been applied to large capex projects, these did not reflect technology and productivity improvements. Our extrapolation related to changing market conditions at the time of HW proposal.

Arguably, large capital projects offer greatest incentive for efficiency gains in construction methods and technological improvements, due to their scale and high expenditure allowing access to new technology.

Our recommended weighted continuing efficiency factor for total capex is 0.25% p.a. based on our benefit of the doubt approach.

7.6.6 Recommended continuing efficiency for total costs

We recommend the following ongoing efficiency factors be applied to HW's proposed costs for 2017 to 2020 (Table 7.6).

Table 7.6: Jacobs' recommended efficiency factors for HW's opex and capex

Expenditure to which continuing efficiency applies for 2017 to 2020	On-going efficiency (% pa)
Total opex	0.14
Total capex	0.25

7.7 Our total recommended costs (including continuing efficiencies)

The following tables show HW and our prudent and efficient opex and capex (due to our earlier findings) adjusted for our continuing efficiency factor, which is applied to our recommended prudent and efficient opex and capex in 2017 to 2020. The tables show our final recommended costs for HW.

7.7.1 Our recommended opex

Base year opex 2016

We recommend prudent and efficient opex of $128.4 million in 2016, which is $1.2 million (1.0%) more than HW's proposed $127.2 million for the 2016 base year.

Our base year opex is higher than HW's due to a timing difference in HW's payments for its defined benefits superannuation contribution. During the 2013 price determination, HW and IPART had expected an increase in the annual defined benefits superannuation cost of $2.8 million. This increase had not eventuated when HW submitted its cost proposal to IPART, so HW excluded it from the base year but included it in 2017-2020 costs.

Since then, HW received advice that up to $2.2 million of annual defined benefits superannuation cost will be incurred in 2016 subject to the NSW Treasurer's agreement.[121] Accordingly, we included the $2.2 million in our base year, which offset our other opex savings, leaving our base year $1.2 million higher than HW's base year.

We note our recommended base year opex is $2.6 million (1.9%) less than IPART's 2013 Determination.

Regulatory period opex 2017 to 2020

Our recommended costs for 2017-2020 (the regulatory period) are lower than HW's. Our savings are evident once HW includes the $2.2 million superannuation cost in its costs for the regulatory period. The following presents our findings for HW's opex for 2017-2020.

HW proposed opex of $533.34 million over the four-year period. Based on our prudency and efficiency considerations, we estimated HW's efficient opex to be $525.7 million (excluding our continuing efficiency adjustments) for 2017-2020. This reflects a $7.7 million (1.4%) saving and equates to our 'catch-up' efficiency measures, which help to ensure that HW is operating as a prudent and efficient business.

In addition, we recommend a continuing annual efficiency saving for the four years of 0.14% p.a. (based on 0.25% applied to HW's controllable costs) or $1.85 million, which reflects our expectation that a business as efficient as HW will still achieve productivity improvements over the regulatory period. HW's proposed opex, our recommended adjustments and total opex are presented in Table 7.7 below.

Table 7.7: HW-proposed and Jacobs-recommended efficient opex 2016 to 2020 ($2016 million)

Financial Year ($2016 '000)	2016	2017	2018	2019	2020	Total 2017-2020
HW proposal	127.2	128.9	132.9	134.8	136.8	533.3
IPART 2013 price determination	131.0	n/a	n/a	n/a	n/a	n/a
Our catch-up adjustment to HW	1.23	-0.22	-1.94	-2.12	-3.39	-7.67
Our catch-up adjustment to HW (%)	0.97%	-0.17%	-1.46%	-1.57%	-2.48%	-1.44%

[121] JO1_10_1 STC letter to Treasury re HW super contributions.pdf

Financial Year ($2016 '000)	2016	2017	2018	2019	2020	Total 2017-2020
Our prudent and efficient opex (excl. continuing efficiency)	128.4	128.7	130.9	132.7	133.4	525.7
Our continuing efficiency (%)	0%	0.14%	0.14%	0.14%	0.14%	n/a
Portion of our prudent and efficient opex (incl. continuing efficiency) (%)	100%	99.86%	99.72%	99.58%	99.44%	n/a
Our continuing efficiency adjustment	-	-0.18	-0.37	-0.56	-0.75	-1.85
Our recommended opex	128.4	128.5	130.6	132.2	132.6	523.8
Change to HW proposal	1.23	-0.40	-2.31	-2.68	-4.13	**-9.52**
Change to HW proposal (%)	1.0%	-0.3%	-1.7%	-2.0%	-3.0%	**-1.8%**

Source: Jacobs' Final Report, 2015.

Our opex savings, in total over the four years relative to HW's proposals are comprised of:

- Lower labour costs than proposed by HW by $4.09 million
- Lower costs for Head Office than proposed by HW by $1.96 million, reflecting costs associated with owning the building rather than leasing
- Increased costs for new initiatives but at lower levels than proposed by HW by $0.87 million
- Lower costs for the MWD to undertake LHWP activities (reflecting an incorrect costing basis used originally) by $0.17 million
- Lower costs for the digitisation project by $0.19 million
- A series of changes in the 2016 base year which have either been removed or added to reflect ongoing costs, with a total impact of $0.36 million (e.g. removal of corporate strategy/study costs and removal of an ongoing reduction in water treatment savings that HW will not realise)
- Annual productivity-based continuing efficiency of $1.85 million.

Our recommended total opex savings (including continuing efficiencies) are $9.5 million (or a 1.8% reduction**)** to HW's proposed opex over the regulatory period. We recommend annual savings ranging from $0.4 million (2017) to $4.1 million (2020).

Our savings are in addition to HW's proposed $4.9 million of opex savings, which HW removed from its costs prior to submitting them to IPART.

7.7.2 Our recommended capex

The purpose of our capex review is to assess the prudence and efficiency of HW's actual and forecast capex from 2013 to 2020. Our review focused on HW's capital program policies and procedures and a sample of 12 items (eight projects and four programs) to assess HW's capex prudence and efficiency. The 12 sample items were agreed with IPART to meet its requirements and cover all major components of HW's business.

We made three types of cost adjustments:

1) One-off changes to our sample items
2) Extrapolated changes to large unsampled forecast capex items, where HW costs showed a moderate systemic bias due to market conditions softening since the time of its initial proposal to IPART
3) Our recommended continuing efficiency savings relating to expected productivity improvements by HW over the regulatory period.

Sections 6.23 and 6.24 above summaries our capex adjustments pertaining to the sampled capex items and extrapolation of findings yielding:

1) One-off changes to the capex sample items ($20.3 million)
2) Extrapolated changes to large unsampled forecast capex items ($5.0 million).

In addition to these recommended adjustments to capex we present our recommended continuing efficiency savings applied to (the above) prudent and efficient capex below.

Recommended capex (incl. continuing efficiency adjustment)

In summary, our total capex savings from one-off and extrapolated adjustments are $25.3 million (3.2%) of HW's proposed capex over the period 2013-2020 (excluding our continuing efficiency savings). In Table 7.8 below, we present HW's proposed capex, our recommended one-off and extrapolated savings, and our continuing efficiency savings – resulting in our total recommended capex.

Table 7.8: HW proposed and Jacobs' efficient capex 2016 to 2020 ($2016 million)

Financial Year ($2016 '000)	2013	2014	2015	2016	2017	2018	2019	2020	Total	% HW
HW proposal	106.7	97.4	85.1	112.6	113.3	92.8	89.4	93.5	790.8	100%
Our one-off adjustment	0.09	0.00	4.96	-7.76	-7.00	-2.31	3.18	-11.45	-20.28	-2.56%
Our extrapolated adjustment					-1.03	-1.52	-1.66	-0.78	-4.99	-0.63%
Our total catch-up adjustment (excl. continuing efficiency)	0.09	0.00	4.96	-7.76	-8.04	-3.82	1.52	-12.22	-25.27	-3.20%
Our prudent and efficient capex (excl. continuing efficiency)	106.8	97.4	90.1	104.8	105.2	89.0	90.9	81.3	765.5	96.8%
Our continuing efficiency (%)	0.00%	0.00%	0.00%	0.00%	-0.25%	-0.25%	-0.25%	-0.25%	n/a	n/a
Efficient portion of 2016 capex (%)	100.00%	100.00%	100.00%	100.00%	99.75%	99.50%	99.25%	99.00%	n/a	n/a
Our continuing efficiency adjustment	0.00	0.00	0.00	0.00	-0.26	-0.44	-0.68	-0.81	-2.20	-0.28%
Our recommended capex	106.8	97.4	90.1	104.8	105.0	88.5	90.2	80.4	763.3	96.5%
Our total adjustment	0.09	0.00	4.96	-7.76	-8.30	-4.27	0.84	-13.04	**-27.47**	-3.47%
Our total adjustment to HW	0.09%	0.00%	5.83%	-6.89%	-7.33%	-4.60%	0.93%	-13.95%	**-3.47%**	n/a

Source: Jacobs' Final Report, 2015.

In summary, our total capex savings are $27.5 million (or a 3.5% reduction) of HW's proposed capex from 2013-2020. This includes our recommended continuing efficiency saving of $2.2 million (0.3%) of HW's proposed capex over the same period. We recommend annual savings ranging from zero (2014) to $13 million (2020). Our savings are in addition to HW's proposed 5% uniform saving, which HW removed from costs prior to submitting to IPART.

8. Task 3: Output measures

8.1 Purpose and scope

In this section we assess HW's performance against its output measures as set out in the 2013 determination and propose output measures for the next determination (Task 3 of IPART's Request for Proposals).

8.2 Previous IPART and consultant recommendations

For the 2013 determination, Atkins-Cardno reviewed HW's opex and capex and recommended targets for a range of output measures.

Following this review, IPART confirmed the output measures and issued targets for a number (the majority) of these proposed output measures in its 2013 determination covering the period from 2014 to 2017. The recommendations by Atkins-Cardno and the ensuing 2013 determination targets are presented in Table 8.1.

Table 8.1 : Atkins Cardno recommendations and IPART 2013 determination of targets

Output Measure	Units	4 year target	
		Atkins-Cardno	IPART
Water			
Renewal/reliability of water distribution mains	km	21	21
Trunk mains undergoing condition assessment	km	67	67
Replacement of critical trunk mains	km	3	3
Water treatment plant upgrades (chemical storage systems)	systems	3	3
Water facilities high voltage upgrades	sites	28	28
Deferral of Grahamstown WTP Upgrade (Stage 3 - $11.15m)	-	n/a	Construction deferred to after 1/7/2018
Wastewater			
Renewal of non-critical sewer mains	km	41	41
Critical sewer mains undergoing condition assessment	km	148	82
Renewal/refurbishment of critical sewerage mains (cast iron program)	km	4.2	4.2
Wastewater facilities high voltage upgrades	sites	3	3
Mechanical and Electrical Assets			
Telemetry upgrades (water & wastewater)	sites	138	138
Replacement of pumps (water & wastewater)	No.	342	342
Replacement of switchboards (water & wastewater)	sites	40	40
Drainage			
Rehabilitation of stormwater drainage channels	km	0.6	0.6
Corporate			
Replacement of customer meters (20 mm)	No.	13,200	13,200
Enterprise Resource Plan – Stage 1 implementation (i.e. Ellipse upgrade excluding AOMS)	-	Complete by 30/4/14	n/a
Feasibility studies on capex to save opex			
Energy optimisation and on-site electricity generation	-	Yes	n/a
Water treatment residuals management	-	Yes	n/a

Output Measure	Units	4 year target	
		Atkins-Cardno	IPART
Recycling of excavated spoil	-	Yes	n/a
Biosolids disposal	-	Yes	n/a

8.3 HW's performance during current period

In its submission to IPART, HW provided actual output measure figures for 2014 and forecast figures for 2015 and 2016. HW pro-rated the output measure targets, outlined in the 2013 determination, from a four year period to a three year period to match the review period.

Table 8.2 to Table 8.3 below summarises HW's performance over three years (2014 to 2016) and HW's comments on its performance.

Table 8.2 : HW's performance for 2014 to 2016 against output measures

Output measure	Units	IPART target [A]		Actual/projected [B] [b]				Difference		HW comment
		4 Year	3 Year [a]	2014	2015	2016	Total	[B-A]	(%)	
Water Services										
Renewal/reliability of water distribution mains	km	21	15.8	5.4	4.9	4.9	15.2	-0.6	-4%	Lower output is due to slight increase in unit rate.
Trunk mains undergoing condition assessment	km	67	50.3	0	20	50	70	19.7	39%	Large package of assessments scheduled to commence mid-2015.
Replacement of critical trunk mains	km	3	2.3	0	0	0	0	-2.3	-100%	Focus has been on replacement of trunk valves and fittings. Two large sections of trunk main are currently in design phase.
Water treatment plant upgrades (chemical storage systems)	systems	3	3	0	0	3	3	0	0%	All systems in construction phase.
Water facilities high voltage upgrades	sites	28	28	0	28	0	28	0	0%	All sites completed by January 2015.
Deferral of Grahamstown WTP Upgrade (Stage 3 - $11.15m)	-	After 1/7/2018	After 1/7/2018	n/a	n/a	n/a	After 1/7/2023	5	n/a	Design work scheduled to commence in 2021.
Wastewater Services										
Renewal of non-critical sewer mains	km	41	30.8	7.3	8.4	8.4	24.1	-6.7	-22%	Lower output is due to a slight increase in unit rate.
Critical sewer mains undergoing condition assessment	km	82	61.5	0	30	30	60	-1.5	-2%	The critical sewer model was updated in 2014, so additional assessments will be delivered in 2014-15 and 2015-16.
Renewal/refurbishment of critical sewerage mains (cast iron program)	km	4.2	3.2	<0.1	0.6	0.5	1.1	-2.1	-66%	Renewal scope reduced due to access difficulty and risk associated with the full scope of work. There have also been cost increases for gravity critical main and access hole renewals.
Wastewater facilities high voltage upgrades	sites	3	3	0	3	0	3	0	0%	All sites delivered in 2014.
Mechanical and Electrical Assets										
Telemetry upgrades (water & wastewater)	sites	138	103	15	10	90	115	12	12%	Strategy updated in 2014 with accelerated rate of renewals scheduled for 2015-16.
Replacement of pumps (water & wastewater)	No.	342	256	91	85	80	256	0	0%	The decision to repair or replace pumps is determined by risk.

Output measure	Units	IPART target [A]		Actual/projected [B] [b]				Difference		HW comment
		4 Year	3 Year [a]	2014	2015	2016	Total	[B-A]	(%)	
Replacement of switchboards (water & wastewater)	sites	40	30	12	8	10	30	0	0%	A standardised switchboard has been developed to improve the process.
Drainage										
Rehabilitation of stormwater drainage channels	km	0.6	0.45	<0.1	0.1	0.1	0.2	-0.25	-56%	Minor renewals to date with longer section planned for 2016-17.
Corporate										
Replacement of customer meters (20 mm)	No.	13,200	9,900	9,252	28,413	28,413	66,078	56,178	567%	New strategy to replace a style of meter identified with a defective backflow device.

Notes: Target outputs (or activities) for linear assets were pro-rated over truncated price period. Actual figure for 2014. Forecast figures for 2015 and 2016.

We consider that any measure where HW is within 5% of the target has been materially achieved. In the following table, we present output measures where HW is >5% above or below the target. We also comment, providing a summary of our analysis.

Table 8.3 : HW's performance for 2014 to 2016 against output measures

Output measure	Units	IPART target [A]		Actual/projected [B] [b]				Difference		Jacobs analysis/comment	Our view
		4 Year	3 Year [a]	2014	2015	2016	Total	[B-A]	(%)		
Water Services											
Trunk mains undergoing condition assessment	km	67	**50.3**	0	20	50	**70**	19.7	39%	On track to exceed output target.	Ok
Replacement of critical trunk mains	km	3	**2.3**	0	0	0	**0**	-2.3	-100%	Output target not achieved. HW's priority has been on replacement of trunk main valves/fittings associated with actual failures. We consider this to be an appropriate approach. Three trunk mains (totally 3.05 km) are planned to be delivered in 2017.	Ok
Wastewater Services											
Renewal of non-critical sewer mains	km	41	**30.8**	7.3	8.4	8.4	**24.1**	-6.7	-22%	Likely to achieve under output target. HW states that the unit rate for delivery increased by approximately $20/m based on historical contract delivery costs and inflation allowances.	Ok

Output measure	Units	IPART target [A]		Actual/projected [B] [b]				Difference		Jacobs analysis/comment	Our view
		4 Year	3 Year [a]	2014	2015	2016	Total	[B-A]	(%)		
Renewal/refurbishment of critical sewerage mains (cast iron program)	km	4.2	**3.2**	<0.1	0.6	0.5	**1.1**	-2.1	-66%	Output target not achieved. We understand the high risks involved in renewing the majority of mains which are either fully or partially built over. HW delayed the renewals until a more thorough, site based risk assessment. HW states that the cost increases occurred at a program level and relate to the types of activities and local constraints, rather than project cost variations, that will be managed through contractual arrangements. We consider this to be reasonable.	Ok
Mechanical and Electrical Assets											
Telemetry upgrades (water & wastewater)	sites	138	**103**	15	10	90	**115**	12	12%	On track to exceed output target.	Ok
Drainage											
Rehabilitation of stormwater drainage channels	km	0.6	**0.45**	<0.1	0.1	0.1	**0.2**	-0.25	-56%	Likely to under achieve output target, however HW states that renewal works are planned for Munibung Creek (0.49 km) in 2017. However, we note that the Business Case indicates delivery will occur in 2018 and 2019.	Ok
Corporate											
Replacement of customer meters (20 mm)	No.	13,200	**9,900**	9,252	28,413	28,413	**66,078**	56,178	567%	On track to significantly exceed output target. HW increased the volume of meter replacements to replace a meter with a risk of early failure.	Ok

Notes:

a) Target outputs (or activities) for linear assets were pro-rated over truncated price period.

b) Actual figure for 2014. Forecast figures for 2015 and 2016.

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8.4 Our analysis of 2014 to 2016

We have commented on HW's performance in the table above. HW has met the majority of the output measures set for the previous period and provided valid reasons for any under or over target achievement.

We expect under-achievement of output targets, to a certain extent, considering the shortened review period from that originally envisaged. The four year regulatory period was reduced to three years. As such, some programs and projects had been planned for 2017, which now fall out of the regulatory period.

We consider that where output measures differed from the target by more than can be explained by the shortened review period, HW has provided valid reasons for under achievement.

The largest discrepancy (550%) is due to HW identifying a fault in a certain type (batch) of meters, which required prompt replacement of those meters. On identifying this defect, HW ramped up its replacement program to address the defective meters.

8.5 HW's proposal for 2017 to 2020

HW outlined the output measures it proposed for 2016 to 2020 in its submission to IPART. HW states:

> (it) supports the use of output measures to help determine the delivery effectiveness and value for money achieved from the capital portfolio. As required by IPART, HW has proposed new output measures for the coming price period. The proposed measures are consistent with the approach taken by IPART in setting measures for both Sydney Water and Hunter Water in the most recent price reviews.

The output measures proposed by HW are presented in Table 8.4 below.

Table 8.4 : HW's proposed output measures for 2017 to 2020

Output measure	Units	HW's proposed 4 year targets
Water Services		
Renewal/reliability of distribution mains	km	20
Trunk mains undergoing condition assessment	km	12
Critical trunk mains replacement	km	0.4
Wastewater Services		
Renew non-critical mains	km	36
Critical sewer mains undergoing condition assessment	km	55
Renewal/refurbishment of critical sewerage mains (cast iron program)	km	1.5
Mechanical and Electrical Assets		
Telemetry upgrades (water and wastewater)	sites	250
Replacement or refurbishment of pumps	No.	430
Switchboards replaced	sites	40
Drainage		
Stormwater drainage channel rehabilitations	km	0.7
Corporate		
Replacement of customer meters (20 mm)	No.	67,000

8.6 Our analysis and recommendations for 2017 to 2020

HW proposed new output targets for the 2017 to 2020 period. IPART clarified that our scope is to recommend output targets for the four years 2017 to 2020.

Accordingly, we have compared HW's proposed targets with IPART's previously (2013 determination) recommended output targets and recommended four year targets in Table 8.5 below.

We have developed our output targets based on those proposed by HW, our interviews of HW, our review of performance against past targets and on our review of HW's medium and long terms capex plans in conjunction with HW's service standards and targets.

Table 8.5 : Jacobs' proposed output targets for 2017 to 2021

Output measure	Units	HW proposed 4 year target (a)	IPART 2013 4 year target	Our analysis	Jacobs proposed 4 year target	Difference to HW proposal
Water Services						
Renewal/reliability of distribution mains	km	20	21	HW has slightly reduced its expected output since the 2013 determination. We consider a 5 km per year target to be reasonable.	20	0%
Trunk mains undergoing condition assessment	km	12	67	HW has substantially reduced its expected output since the 2013 determination. HW advised that the program has progressed beyond high risk pipelines investigations to other asset classes and network appurtenances, such as maintenance holes, vents, valves, etc., which do not fit within the linear output measure. We consider the target set for linear assets to be reasonable.	12	0%
Critical trunk mains replacement	km	0.4	3	HW has substantially reduced its expected output since the 2013 determination. The reason for this has not been provided. As such, we propose a higher target in line with the 2013 determination.	3	650%
Wastewater Services						
Renew non-critical mains	km	36	41	HW has reduced its expected output since the 2013 determination. This is in line with HW's commentary regarding its performance against the target for the last period. We consider that the target is reasonable.	36	0%
Critical sewer mains undergoing condition assessment	km	55	82	HW has reduced its expected output since the 2013 determination. HW advised that the condition assessment program has progressed beyond high risk pipelines investigations to other asset classes and network appurtenances, such as maintenance holes, vents, valves, etc. We agree that as the program progresses the length of mains to be assessed will reduce. We consider that the target is acceptable.	55	0%
Renewal/refurbishment of critical sewerage mains (cast iron program)	km	1.5	4.2	HW has reduced its expected output since the 2013 determination. We consider this to be reasonable based on HW's actual performance against the target for the last period and reasoning for not achieving the target output measure. We consider that the target is acceptable.	1.5	0%
Mechanical and Electrical Assets						
Telemetry upgrades (water and wastewater)	sites	250	138	HW has substantially increased its expected output since the 2013 determination. HW states the higher target is due to the increase in PLC replacements driven by an increasing failure rate of the existing PLCs, a lowering salvage rate of replaced PLCs and an increasing likelihood of significant spike in failures occurring with age. We consider the target set to be reasonable.	250	0%

Output measure	Units	HW proposed 4 year target [(a)]	IPART 2013 4 year target	Our analysis	Jacobs proposed 4 year target	Difference to HW proposal
Replacement or refurbishment of pumps	No.	430	342	HW has increased its expected output since the 2013 determination. HW advised that this is driven by an increased focus on reducing the risks of non-functioning stations due to equipment downtime and an increased use of offline standby units to be rotated in/out of service to reduce downtime is also expected to contribute to a larger number of renewals per year. We consider the target set to be reasonable.	430	0%
Switchboards replaced	sites	40	40	HW has kept its expected output the same since the 2013 determination. Given the size of HW's fleet and ongoing renewal requirements, we consider maintain this target to be reasonable.	40	0%
Drainage						
Stormwater drainage channel rehabilitations	km	0.7	0.6	HW has slightly increased its expected output since the 2013 determination. As this target is consistent with the previous target, we consider it to be reasonable.	0.7	0%
Corporate						
Replacement of customer meters (20 mm)	No.	67,000	13,200	HW has substantially increased its expected output since the 2013 determination. As per HW's performance against the previous output measures, the increased number of meters to be replaced relates to issues with a specific meter type. We consider this target to be reasonable.	67,000	0%

In addition to the above measures, we propose the following business process measures. In relation to our second and third recommendations below we note that HW's operating licence indicates consistency with our recommendations. We recommend that IPART accept certification under ISO 55000 (or a consistent approach).

Table 8.6 : Jacobs' proposed output targets for 2017 to 2021

Output measure	Units	HW proposed 5 year pro-rated target [(a)]	IPART 2013 determination 5 year pro-rated target [(a)]	Our proposed measures	Jacobs proposed 5 year target
Business processes					
1. Condition and risk based approach	%	n/a	n/a	Develop and implement an enhanced condition and risk based approach to portfolio asset management, consistent with good practice. This includes enhancing capture and storage of asset condition data and comparing that against expected condition for each asset.	For projects and programs exceeding $5 million ($2020), base forecast costs submitted to IPART on an improved condition and risk based asset management approach.

Output measure	Units	HW proposed 5 year pro-rated target [(a)]	IPART 2013 determination 5 year pro-rated target [(a)]	Our proposed measures	Jacobs proposed 5 year target
2. Asset management processes	Yes or No	n/a	n/a	Achieve ISO 55000 certification. [Prior to this HW should continue the Aquamark process as required under HW's operating licence to 2017.]	Certification achieved.
3. Risk processes	%	n/a	n/a	HW completes and implements its action plan in response to Deloitte's findings on its risk management framework.	Risk will be covered by achieving ISO 55000 compliance.

a) Target outputs (or activities) for linear assets were pro-rated over increased review period.

9. Depreciation

9.1 Purpose and scope

IPART calculates regulatory depreciation allowances for HW using asset lives of 70 years for existing assets and 100 years for new assets. Our scope is to review the appropriateness of these assumed asset lives and to recommend adjustments if necessary. We are not to recommend disaggregation (i.e. asset life per asset class).

9.2 Previous IPART and consultant recommendations

9.2.1 Previous IPART determinations for HW

IPART's 2012 determination recommended using straight line depreciation on the RAB using the following asset lives for new and existing assets. The asset lives are shown in Table 9.1.

Table 9.1 : IPART's 2012 determination asset lives

Asset	Asset life (years)
Existing	70
New	100

IPART refers to the 2003 determination on HW prices when it recommends these asset lives in its 2005 determination. The assumed asset life for all assets was 70 years in 2003. IPART did not provide the source of the information, but expected the actual life of assets to be more than 70 years. IPART considered this was a conservative estimate resulting in a return of capital sufficient to cover depreciation.

IPART used the same asset lives in the determinations for HW in 2005, 2009 and 2012. In 2012, IPART stated there were no submissions on the issue.

9.2.2 Previous consultant recommendations

Atkins-Cardno excluded asset lives from its HW expenditure review for IPART's 2009 determination.

9.2.3 Previous IPART determinations for other metropolitan water utilities

We found IPART uses a different asset-life approach relative to other councils.

9.2.3.1 Gosford City Council (GCC) and Wyong Shire Council (WSC) 2013 determination

IPART determined weighted average asset lives for GCC and WSC in the 2013 determination. These were calculated from asset lives in each business. IPART used 100 years for all new assets, but, for existing assets, the assumed life ranged from 69 to 99 years as follows in Table 9.2.

Table 9.2 : GCC and WSC 2013 determination - asset lives

Asset group	New assets	Existing assets	
	GCC and WSC	GCC	WSC
Water	100	81.06	82.44
Wastewater	100	76.99	72.44
Stormwater	100	98.89	69.76
Weighted average	**100**	**79.29**	**77.21**

9.2.3.2 SWC 2009 determination

IPART calculated depreciation as a weighted average of asset classes in its 2009 determination for SWC. Each asset was divided into Civil, Electrical, Mechanical, Electronic and Non-Depreciating (CEMELND) classes. A weighted average of each category was found for each asset group.

9.2.3.2.1 Existing assets

Table 9.3 shows the asset lives for existing assets in IPART's 2009 determination for SWC. The difference in the asset lives among the various asset classes can be large; for example, in the water group, civil assets have an expected remaining life of 86 years, and electronic assets have a remaining life of 8 years. These lives are specific to SWC in 2009, but we provide this table for comparison with our analysis (further below) of HW's assets.

Table 9.3 : SWC 2009 determination asset lives

Asset group	Asset class	Remaining asset lives
Water (conventional potable)	Civil	86
	Mechanical	32
	Electrical	17
	Electronic	8
Wastewater	Civil	87
	Mechanical	21
	Electrical	19
	Electronic	8
Stormwater	Civil	116
	Mechanical	7
	Electrical	0
	Electronic	5
Water (recycled)	Civil	86
	Mechanical	32
	Electrical	17
	Electronic	8

9.2.3.2.2 New assets

Table 9.4 shows the CEMELND category lives for new assets for SWC. IPART provided lives for corporate assets and the desalination plant in addition to the categories for existing assets.

Table 9.4 : CEMELND category asset lives

Asset group	Asset class	Asset life
Corporate	Civil	68
	Mechanical	8
	Electrical	n/a
	Electronic	6

Asset group	Asset class	Asset life
Water (conventional potable)	Civil	140
	Mechanical	40
	Electrical	30
	Electronic	15
Wastewater	Civil	90
	Mechanical	25
	Electrical	25
	Electronic	15
Stormwater	Civil	150
	Mechanical	25
	Electrical	25
	Electronic	15
Water (recycled)	Civil	140
	Mechanical	40
	Electrical	30
	Electronic	15
Desalination	Civil	90
	Mechanical	15
	Electrical	20
	Electronic	15

New asset lives vary widely depending on asset category. In the water group, new civil assets have a life of 150 years while electronic assets have a life of 15 years. The above is for illustrative purposes only in this context.

9.3 HW proposal for 2016-17 to 2020-21

HW proposes using the same asset lives as IPART's previous determination – 100 years for new assets and 70 years for existing assets.

9.4 Our approach to revising asset lives

HW's submitted approach seems unlikely to accurately reflect the lives of existing and new assets due at least in part to changes in assets over the (over) 10 years that HW has assumed this approach. We acknowledge that asset spends occur each year, but sought to calculate a more accurate estimate of asset lives based on HW's updated SIR data (HW 2015) - asset life worksheets.

We calculated weighted averages for:

3) Expected remaining lives for existing assets
4) New assets.

We considered three ways to categorise assets:

1) Across the whole corporation

2) Each asset group (water, wastewater and stormwater)

3) Asset classes (CEMELND) in each asset group. As this is excluded from our scope and as IPART's SIR template does not include a request for these data from HW, we did not conduct this analysis. We consider, however, that these data should be requested in the future, consistent with good industry practice and the fact that SW provides such data.

We excluded recycled water assets from our calculations because those assets are 'ring-fenced' and, accordingly, do not form part of HW's RAB.

9.4.1 Data source for lives for existing assets

We liaised with HW officers to ensure we accessed the best available information and accordingly, calculated weighted averages from the following information within HW's updated SIR (also provided to IPART):

- Assets tab: Table 8.2 - Depreciated replacement cost and Table 8.3 - Contributed assets for each asset type (e.g. dams, treatment plants, pipelines) separated into asset groups
- Asset lives tab: Table 8.5 - Average remaining life of existing assets for each asset type, separated into asset groups

9.4.1.1 Across the whole corporation

We did the following to find the remaining life of existing assets across the whole corporation:

- Subtracted the contributed assets from the depreciated replacement cost of each depreciating asset type, and added these together to find an indicative RAB (less non-depreciating assets)
- Divided the depreciated replacement cost for each asset type less contributed assets by the indicative RAB (less non-depreciating assets), to find the percentage contribution to the RAB of each asset type
- Multiplied the average remaining life of each asset category by the percentage contribution to the RAB, to find a weighted age, and added these together to find a weighted average age.

We have not added non-depreciating assets (e.g. mainly land) into the weighting. As a non-depreciating asset, land is not given an expected remaining life. We could have alternatively given land an arbitrary high value for expected life. We consider this approach deficient as the resulting weighting will depend on the choice of this arbitrary value. We have also excluded any 'unallocated assets' from our calculation because no asset lives were assigned to that asset category. In summary, we have removed non-depreciating assets and unallocated assets from our method.

We set out our estimated weighted average asset lives for existing assets based on the portion of the current indicative RAB across the whole corporation in Table 9.5 below.

Table 9.5 : IPART and Jacobs' weighted average remaining life of existing assets for corporation

Organisation	Remaining life of existing assets (years)
IPART	70
Jacobs recommendation	62
Change	**-8**

We repeated the analysis for existing assets using the depreciated replacement cost (RAB plus contributed assets) to check any variations and found the same result of 62 years. The reduction in the expected remaining life of existing assets is due in part to the appropriate weighting given to assets with shorter remaining lives such as pump stations and reservoir tanks.

9.4.1.2 Asset groups

We did the following to find the weighted average remaining life for assets in each service group:

- Added the depreciated replacement value less contributed value for each asset type in each asset group to find the group total
- Divided the value for each asset type by the group total to find the proportion contributed to each group
- Multiplied the expected remaining age of each asset category by its proportion of each service group.

Table 9.6 shows the weighted average remaining life of existing assets for each service group.

Table 9.6 : IPART and Jacobs' weighted average remaining life of existing asset for business sectors

	Remaining life of existing assets (years)		
Asset group	**Water - conventional**	**Wastewater**	**Stormwater**
Previous IPART asset lives	70	70	70
Group asset lives	55	66	51
Change	**-15**	**-4**	**-19**

The weighted average of these four service areas (as above) is 62 years of remaining life for existing assets.

The large reduction in the age of the water assets group is largely due to the large weighting given to dams, which now (in HW's data) have an expected remaining life of 30 years. Treatment plants and reservoir tanks also contribute to the lower average remaining life of existing water assets.

The reduction in the weighted average of the wastewater group is more modest, and is largely due to the shorter remaining life of treatment plants.

The large reduction in the weighted average for the stormwater group is explained by the low expected remaining lives of HW's existing stormwater pipelines and drains.

9.4.2 New assets

For new assets, we calculated weighted averages from the following information in the SIR of HW:

- Asset lives tab: Table 8.4 - New asset lives for each asset type, separated into asset service groups
- Capex tab: Table 9.2 - Capex for each asset type (excl. non-cash contributed assets) separated into asset service groups.

9.4.2.1 Across the whole corporation

We did the following to find the weighted average life of new assets across the whole corporation:

- Averaged the projected capex for each asset type in each service group over 2016 to 2021
- Added together the average projected capex, excluding non-cash contributed assets for 2016 to 2021
- Divided the average projected capex for 2016 to 2021 for each asset type by the total average projected capex to find the percentage contribution to the average projected capex by each asset type
- Multiplied the expected new life of each asset type by the percentage contribution to find a weighted age, and added these together to find a weighted average age.

We have used the average projected capex over the review period of 2016 to 2021, as we consider it appropriate to calculate an estimate of the proportions of the future capex of each asset type, rather than current or past capex proportions.

We chose not to remove the values of cash contributed assets from the current capex as these values were not distributed between asset types. We chose not to include corporate assets in the weighting as HW did not provide assets lives for the largest contributions to corporate assets (i.e. revenue meters and IT systems).

Table 9.7 shows the weighted average asset lives for new assets based on the portion of the average projected capex over 2016 to 2021 across the whole corporation.

Table 9.7 : Previous IPART and Jacobs' weighted average life of new assets for the whole corporation

	New assets (years)
Previous IPART asset life	100
Our asset life	67
Change	**-33**

The large reduction in the life for new assets is explained by the large portion of capex relating to new treatment plants, which have an expected life of between 50 and 60 years.

9.4.2.2 Asset groups

We did the following to find the weighted average new life for assets in each service group:

- Added the capex for each asset type in each group to find a group total
- Divided the value for each asset type by the group total to find the proportion contributed by each group
- Multiplied the expected new life of each asset type by its proportion of each service group.

Table 9.8 shows the weighted remaining average life of new assets for each asset group.

Table 9.8 : Previous IPART and Jacobs' weighted average life of new asset for business sectors

	Life of new assets (years)		
Asset group	**Water - conventional**	**Wastewater**	**Stormwater**
Previous IPART asset lives	100	100	100
Group asset lives	84	57	100
Change	**-16**	**-43**	**0**

As with existing assets, the large proportion of capex spent on new treatment plants, which have an expected life of 50-60 years compared with 100 years for pipes, accounts for the significant reduction in the weighted average life of each group. The expected life for the stormwater group is unchanged as all capex is for pipes with an expected new life of 100 years.

9.5 Recommendations

9.5.1 Recommendation for this price review

We recommend that IPART use the following weighted asset lives for the whole corporation to calculate regulatory depreciation as set out in Table 9.9.

Table 9.9 : Jacobs' recommended and HW proposed asset lives

Asset	Jacobs – Recommended asset life (years)	For comparison – HW proposal (years)
Existing assets	62	70
New assets	67	100

Our recommendation is easy to implement, as it accords with the past IPART practice of using two simple asset lives, and is consistent with HW's proposed method (albeit with different numbers).

9.5.2 Recommendation for the next price review

To more accurately allow for depreciation in the future, we also recommend the following changes to HW's next SIR, for the subsequent price review, so the effects of CEMELND disaggregation can be studied:

- The inclusion of a CEMELND disaggregation tab
- The assignment of expected lives to corporate assets such as revenue meters and IT systems
- The assignment of cash contributions to asset types, so they can be removed from current capex.

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Appendix A. Full capex sample

$'000				$ nominal	$2016 real	Totals										
FY	Project	HWID	Driver	2014	2015	2016	2017	2018	2019	2020	2021	Balance to complete	2014 to 2016	2017-2021	2014-2021	Overall
No.				Actual	Actual	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Both	Forecast	Total	Total
1	Burwood Beach WWTW Disinfection	DEM010	Existing Mandatory Standards	162	385	-	-	-	-	-	-	-	547	-	547	547
1	Burwood Beach WWTW Disinfection	DNM004	New Mandatory Standards	-	-	9,000	16,050	-	-	-	-	-	9,000	16,050	25,050	25,050
2	Critical Mains Renewals	WEM007	Existing Mandatory Standards	192	262	246	492	492	492	492	492	5,412	700	2,460	3,160	8,572
2	Critical Mains Renewals	WNM003	New Mandatory Standards	(66)	-	-	-	-	-	-	-	-	- 66	-	(66)	(66)
2	Critical Mains Renewals	WDS002	Discretionary Standards	92	282	-	-	-	-	-	-	-	373	-	373	373
2	Critical Mains Renewals	XW7005	Government programs	-	-	164	328	328	328	328	328	3,608	164	1,640	1,804	5,412
2	Critical Mains Renewals	WBE006	Business efficiency	229	705	410	820	820	820	820	820	9,020	1,344	4,100	5,444	14,464
2	Critical Mains Renewals	DEM015	Existing Mandatory Standards	554	506	564	205	205	205	205	256	2,819	1,624	1,076	2,700	5,519
2	Critical Mains Renewals	DDS002	Discretionary Standards	110	101	113	41	41	41	41	51	564	324	215	540	1,103

$'000	Project	HWID	Driver	$ nominal	$2016 real	Totals										
FY				2014	2015	2016	2017	2018	2019	2020	2021	Balance to complete	2014 to 2016	2017-2021	2014-2021	Overall
No.				Actual	Actual	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Both	Forecast	Total	Total
2	Critical Mains Renewals	DGO016	Growth – other	1	-	-	-	-	-	-	-	-	1	-	1	1
2	Critical Mains Renewals	DBE006	Business efficiency	331	405	451	164	164	164	164	205	2,255	1,187	861	2,048	4,303
2	Critical Mains Renewals	OEM003	Existing Mandatory Standards	157	-	-	-	-	-	-	-	-	157	-	157	157
2	Critical Mains Renewals	ODS002	Discretionary Standards	27	169	-	-	-	-	-	-	-	196	-	196	196
2	Critical Mains Renewals	XD7003	Government programs	-	-	359	359	359	359	359	359	3,946	359	1,794	2,153	6,099
3	CTGM - Duckenfield to Tarro - Replacement	WEM008	Existing Mandatory Standards	-	-	-	514	770	8,987	18,487	-	-	-	28,757	28,757	28,757
4	High Voltage Major Upgrade	WEM016	Existing Mandatory Standards	26,227	12,406	255	-	-	-	-	-	-	38,888	-	38,888	38,888
4	High Voltage Major Upgrade	DEM022	Existing Mandatory Standards	3,249	-	25	-	-	-	-	-	-	3,274	-	3,274	3,274
5	ICT PP13 Future Portfolio	CEM005	Existing Mandatory Standards	-	-	731	2,668	3,568	3,618	4,842	4,722	8,659	731	19,417	20,148	28,807
5	ICT Program	CNM003	New Mandatory Standards	14	5	105	73	63	189	105	131	1,574	124	562	685	2,260

$'000	Project	HWID	Driver	$ nominal	$2016 real	Totals										
FY				2014	2015	2016	2017	2018	2019	2020	2021	Balance to complete	2014 to 2016	2017-2021	2014-2021	Overall
No.				Actual	Actual	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Both	Forecast	Total	Total
5	ICT Program	CDS002	Discretionary Standards	203	200	289	370	328	399	582	446	5,353	692	2,125	2,816	8,169
5	ICT Program	CGQ003	Government programs	2,649	3,788	7,906	5,761	5,034	5,933	6,529	6,678	80,137	14,344	29,934	44,277	124,414
5	ICT Program	CBE004	Business efficiency	1,914	493	637	607	231	478	488	420	5,038	3,044	2,223	5,267	10,305
6	Mechanical-Electrical Renewals	WEM020	Existing Mandatory Standards	1,278	1,103	2,362	2,337	2,337	2,337	2,337	2,452	26,975	4,743	11,800	16,543	43,519
6	Mechanical-Electrical Renewals	WNM004	New Mandatory Standards	37	19	144	144	144	144	144	148	1,629	199	722	922	2,551
6	Mechanical-Electrical Renewals	WDS003	Discretionary Standards	109	106	287	287	287	287	287	296	3,258	502	1,444	1,947	5,205
6	Mechanical-Electrical Renewals	WGO010	Growth – other	35	-	-	-	-	-	-	-	-	35	-	35	35
6	Mechanical-Electrical Renewals	WBE008	Business efficiency	388	40	310	308	308	308	308	322	3,540	738	1,552	2,290	5,830
6	Mechanical-Electrical Renewals	DEM025	Existing Mandatory Standards	4,407	4,229	2,579	3,485	3,485	3,485	3,485	3,781	41,593	11,215	17,721	28,936	70,530
6	Mechanical-Electrical Renewals	DNM012	New Mandatory Standards	26	125	152	205	205	205	205	222	2,447	303	1,042	1,345	3,792
6	Mechanical-	DDS003	Discretionary	152	221	152	205	205	205	205	222	2,447	524	1,042	1,567	4,013

$'000	Project	HWID	Driver	$ nominal	$2016 real	Totals										
FY				2014	2015	2016	2017	2018	2019	2020	2021	Balance to complete	2014 to 2016	2017-2021	2014-2021	Overall
No.				Actual	Actual	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Both	Forecast	Total	Total
	Electrical Renewals		Standards													
6	Mechanical-Electrical Renewals	DBE007	Business efficiency	917	586	383	461	461	461	461	479	5,265	1,886	2,324	4,210	9,476
7	Seaham Weir	WNM007	New Mandatory Standards	-	-	-	49	195	730	4,869	-	-	-	5,843	5,843	5,843
8	Shortland WWTW Sludge Handling Upgrade	DEM034	Existing Mandatory Standards	429	4,766	3,324	-	-	-	-	-	-	8,519	-	8,519	8,519
8	Shortland WWTW Sludge Handling Upgrade	DGO048	Growth – other	643	7,149	4,986	-	-	-	-	-	-	12,778	-	12,778	12,778
9	Wyee Backlog Sewer Scheme	DGP006	Government Programs	-	-	-	787	1,573	-	6,675	11,777	5,889	-	20,813	20,813	26,701
10	Hunter Central Coast transfer capacity upgrade	WGO008	Growth – other	-	-	500	2,381	-	-	-	-	-	500	2,381	2,881	2,881
11	Munibung Creek SW Rehabilitation Works	XD7004	Government programs	-	-	108	184	681	973	-	-	55	108	1,838	1,946	2,001
12	Kurri WWTW Upgrade - Stage 3	DGO034	Growth – other			871	2,117	3,156	1,262	-	-	-	871	6,535	7,406	7,406
Total				44,467	38,052	37,412	41,400	25,438	32,409	52,416	34,609	221,485	119,931	186,271	306,201	527,687