

Tasmanian Economic Regulator
**Review of the Tasmanian Water
and Sewerage Corporation's
Operating and Capital
Expenditure**
Draft Report

Final | 30 October 2017

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Arup
Arup Pty Ltd ABN 18 000 966 165



Arup
Level 17
1 Nicholson Street
East Melbourne VIC 3002
Australia
www.arup.com

ARUP

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1 Introduction

1.1 Overview of TasWater

TasWater operates as a proprietary limited company, formed on 1 July 2013. TasWater formed through the amalgamation of three Tasmanian water and sewage corporations (Ben Lomond Water, Cradle Mountain Water, Southern Water) which were owned by local governments within the state. It is currently owned by 29 local government councils of Tasmania, with an independent board of directors. The core business of TasWater is to provide two essential services to Tasmanians:

- The sourcing, treatment and reliable delivery of quality drinking water to customers; and
- The collection, transportation, treatment and safe return of wastewater to the environment.

TasWater delivers water and sewage services to approximately 500,000 Tasmanian residents through the utilisation of a network of assets representing a Regulated Asset Base (RAB) of \$3.09 billion at the end of FY17.

Table 1 Overview of TasWater assets

Water Assets	Quantity
Length of water mains	6,231 km
Water connections	202,478
Area serviced by water	2,144 km ²
Drinking water systems	70
Water supply reservoirs and mains	121
Water pump stations	219
Catchments	64
Sewage Assets	Quantity
Length of sewage mains	4,716 km
Sewage connections	177,899
Area serviced by sewage	492 km ²
Level 1 treatment plants	33
Level 2 treatment plants	79

1.2 Price and Service Plan 3

Regulatory arrangements are applied under three year Price and Service Plans (PSPs). The current PSP2 ends on 30 June 2018, and PSP3 follows.

1.2.1 Purpose

The Tasmanian Economic Regulator (Regulator) manages the economic regulatory framework that governs TasWater's operations. The framework is so designed to replicate competitive tension in a monopoly market, ensuring the best outcomes for consumers. Specifically, the Regulator has stated that the framework for the Tasmanian water and sewerage sector is focussed on ensuring that:

- the sector delivers competitive market outcomes in relation to both price and service;
- regulated entities are financially sustainable; and
- regulated entities have sufficient revenue to meet their regulatory obligations.

The third Price and Service Plan will act as a key instrument in the implementation of the regulatory framework, and will cover the period from 1 July 2018 to 30 June 2021. The plan will set the expected levels of capex and opex for TasWater in carrying out its water and sewerage obligations in line with compliance requirements, and will also inform the Regulator's price determination for water and sewerage services.

1.2.2 Scope

Arup was engaged by the Regulator to assess the prudence and efficiency of TasWater's proposed operating & maintenance, and capital expenditure. This includes examination of historical expenditures against past approved levels & projects/programmes (i.e. PSP2), and what it is proposing going forward (i.e. PSP3).

In conducting this assessment, Arup analysed TasWater's long-term strategic plan, its expenditure governance processes and ancillary planning documents, and its asset management practices, providing us an overview as to how TasWater examines and manages the prudence and efficiency of its expenditures. Arup also met with TasWater in a series of interviews at their head office in Hobart, covering their proposed strategies and productivity improvements in key categories of capex and opex.

Arup examined the outcomes of these processes and looked at the approaches used to improve the efficiency of service delivery. Also examined was the proposed avenues for future efficiency improvements, as well as the proposed future expenditures and how these seek to improve service performance, and hence meet the prudence requirement.

1.2.3 Approach

The approach Arup has adopted in undertaking this expenditure review was tailored in accordance to the Regulator's approach to regulation, namely in assessing the prudence and efficiency of TasWater's proposed expenditure. The Regulator included guidelines for consultants to assess each of prudence and efficiency in the Request For Quotation (RFQ) for this engagement. These guidelines are:

Prudence Test

Expenditure is considered prudent if it:

- could be reasonably expected or required by an operator exercising good industry practice; or

- was consistent with delivering the required service levels, outputs and obligations over the relevant regulatory period.

Prudent expenditure should also take into account a planning horizon that extends beyond the relevant regulatory period. The Prudence Test assesses whether, in the circumstances existing at the time, the decision to invest in an asset is one that a regulated entity, acting prudently, would be expected to make.

In assessing prudence, Arup was therefore required to assess whether, given the circumstances facing TasWater at the time the decision was made, a prudent operator would choose to undertake the program or project in a similar manner, in terms of size, scale or scope, having consideration for the opportunity cost of not investing in the program or project.

Efficiency Test

Efficient expenditure is considered to be the minimum level of expenditure that is required to deliver a desired outcome or result consistent with an operator exercising good industry practice. The Efficiency Test should examine whether TasWater's proposed expenditure represents the best and most cost effective way of meeting the community's need for the relevant services.

In assessing efficiency, Arup was therefore required to assess whether, given the circumstances facing TasWater at the time the decision was made, an efficient operator would have spent the same amount of money or used the same procurement processes to undertake the program or project.

Arup has used these guidelines as a reference point throughout out analysis in assessing the prudence and efficiency of TasWater's expenditure.

1.3 Challenges and Performance

Since its formation, TasWater has initiated an organisational transformation with the goal of improving water and sewage services in Tasmania to ensure that the quality of services align to Australian counterparts. Within the first three years of formation, TasWater has successfully merged four former corporations into a single state-wide entity. In its second year of operation TasWater delivered savings targets in addition to achieving significant improvements to safety, fault response times, sewage spill metrics and Ombudsman complaints.

However, TasWater is still maturing as an organisation, and it operates with the following challenges:

- TasWater serves between 2% to 5% of the Australian population, however owns over 35% to 40% of all related assets¹. This imbalance of assets per customer resulting from its traditional ownership structures and geographic coverage, has created diseconomies of scale, that result in higher costs in relation to similar water utilities;

¹ WSAA 2015 Benchmarking

- A large proportion of the infrastructure inherited by TasWater operated at a low compliance base, resulting in difficulties in quickly improving compliance to meet legislative obligations for water quality, environment and dam safety; and
- Affordability is a key issue for many Tasmanians which creates a need for a balance between improving service levels and keeping prices affordable.

TasWater has outlined its service standards achieved during PSP1 through to PSP2 in Table 2 highlighting that while the organisation has made some progress, there were areas where performance dipped from PSP1 to PSP2, and there are still further improvements to be made if PSP3 targets are to be met.

It should also be noted that in addition to the service standards listed below, TasWater has been unable to meet environmental guidelines related to wastewater discharge. Similarly, while the number of customers currently receiving non-potable water has decreased over PSP2, it remains above targets for compliance purposes. Further to this, TasWater also overspent against the Regulator's expectations in PSP1 and PSP2 in both opex and capex. While recognising the challenging environment in which TasWater operates and the relatively young age of the merged organisation, consistent overspend against the expected Opex and Capex – particularly given performance improvements have not been uniform throughout the business – are a cause of potential concern for both the Regulator and TasWater.

During the interview process TasWater indicated that it sought to operate within a capital constraint limited by its approved budget. The budget limits appear to be set through Board consideration of a balance of issues including, the large investment required to catch up with prior under investment (particularly related to meeting technical compliance requirements), the potential for adverse impacts on service price increases on customers, and the “commercially prudent level of debt”² supported on its balance sheet for operation of the business.

TasWater has used its FY16 actual expenditures as a base year for its forecast expenditure. While this base year represents previous years of overspend against the allowances, Arup broadly accepts it as a reasonable basis for forecasts given the extent of organisational change and compliance obligations faced by TasWater. However, Arup would also expect to see PSP3 targets achieved and improvements in TasWater's benchmarked performance, in part reflecting the overspend that can be observed through PSP1 & 2.

² TasWater, Proposal for PSP3, Customer feedback, page 24. Also TasWater indicates that it “will limit the target fixed and variable price increases to 4.6% per annum in PSP3 (rather than an average of 7.9% per annum if we were to fully recover costs)”, (see page 117 of its proposal), the primary difference according to TasWater being related to the under-recovery of income tax equivalents.

Table 2 TasWater's Service Standards for PSP1 and PSP2

Service Standard	PSP1	PSP2			PSP3
	FY15 (A)	FY16 (A)	FY17 (F)	FY18 (F)	Target
Water main Breaks (no. per 100km of water main)	28	33	No Target	No Target	35
Response times within 60 minutes to attend Priority 1 bursts and leaks (%)	N/A	87%	90%	90%	90%
Response times within 180 minutes to attend Priority 2 bursts and leaks (%)	N/A	98%	90%	90%	90%
Response times within 4320 minutes (3 days) to attend Priority 3 bursts and leaks (%)	N/A	91%	90%	90%	90%
Incidence of unplanned interruptions - water (no. per 1,000 properties)	166	167	No Target	No Target	170
Incidence of planned interruptions - water (no. per 1,000 properties)	32	14	No Target	No Target	20
Average duration of an unplanned interruption - water (minutes)	143	199	180	180	180
Average duration of a planned interruption - water (minutes)	292	130	180	180	180
Unplanned water supply interruptions restored within 5 hours	97%	93%	90%	98%	90%
Planned water supply interruptions restored within 5 hours (%)	95%	89%	85%	90%	90%
Number of customers experiencing repeat unplanned water supply interruptions in a FY	N/A	N/A	No Target	No Target	TBC
Non- Revenue Water (unaccounted for water)	24%	33%	12%	10%	28%
Sewage mains breaks and chokes (no. per 100km of sewer main)	57.00	61.00	98.00	93.00	65.00
Response times within 60 minutes to attend spills, breaks and chokes (%)	N/A	78%	90%	90%	90%
Sewage spills contained within 5 hours (%)	98%	100%	99%	99%	99%
Number of customers experiencing repeat sewage overflows (%) on private property in a FY	N/A	N/A	N/A	N/A	TBC
Total water and sewage complaints (no. per 1,000 properties)	12	14	9	9	9.
Water and sewage complaints (no. per 1,000 properties)	0.3	0.4	0.5	0.5	0.5
Calls answered by an operator within 30 seconds (%)	89%	88%	85%	85%	85%

1.4 Quoted numbers

Arup has undertaken its review of the TasWater capex and opex proposals by analysing the expenditures for the whole or total business. Unless stated otherwise in this draft report the dollar values provided are for the total business, being the regulated plus unregulated business segments. As indicated in the TasWater proposal the regulated business expenses are considered to be 96% of the total business expenses, based on a revenue allocation model³.

1.5 Disclaimer

This draft report (the "Report") was prepared by Arup Pty Ltd ("Arup") for the Tasmanian Economic Regulator ("the Client").

The Report has been developed using data and information from a variety of sources, including from TasWater, consultation with stakeholders, and from related public industry literature. Arup has not established the reliability or accuracy of those sources nor verified the information so provided. Within this context Arup has made a number of assumptions regarding this information to develop the Report which have been used to frame its comments on the prudence and efficiency of TasWater's proposed opex and capex. Every effort has been made by Arup to use the most reasonable assumptions in its analysis and in developing recommendations for the Client. Results should be seen in context of the terms of engagement, and any changes to the underlying assumptions used will have material impacts on this analysis.

Accordingly, no representation or warranty of any kind (whether express or implied) is given by Arup to any third-party as to the internal consistency or accuracy of the Report, its recommendations, nor any output derived from it.

³ TasWater, Proposal for PSP3, Unregulated cost allocation, section 7.9.4, page 101.

2 Strategic review

2.1 Summary of key findings and recommendations

TasWater has made significant improvements to its internal governance structure and processes during the initial period of PSP2, which over the PSP3 period should lead to improved delivery of capex in a timely manner and increased productivity in opex leading to improved performance metrics through to FY21. These improvements in performance will need to be a focus for the Regulator in its consideration of PSP4 proposed expenditures. Arup recommends continuance of the strategic development of the governance framework, with target completion dates for all detailed processes, including regional strategies, to be documented by TasWater.

2.2 Organisational structure

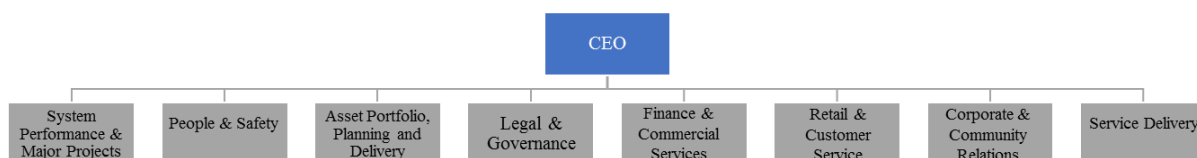


Figure 1 Overview of TasWater's organisational structure

TasWater's organisational structure comprises of 8 divisions shown in Figure 1. Each of these divisions and their functions are summarised below:

- Retail and Customer Service – overseeing direct customer interactions, including call centres, front office and field meter readings, trade waste agreement management and customer billing.
- Service Delivery – providing engineering design for all water and wastewater assets.
- Asset Portfolio Planning and Delivery – planning and delivering TasWater's capital programs in accordance to forecast demand and compliance responsibilities.
- System Performance and Major Projects – monitoring system performance and planning and designing high risk, high value water and sewerage infrastructure projects in relation to TasWater's key corporate objectives.
- Finance and Commercial Services – developing and implementing the corporate policies aligned with financial and accounting services.
- People and Safety – developing company-wide OH&S and HR policies and programs, as well as managing employee training, work place relations, workers compensation and rehabilitation programs.
- Corporate and Community Relations – developing TasWater's corporate, annual, strategic, and stakeholder management plans.

- Legal and Governance – developing policies to ensure TasWater’s compliance and auditing, as well as providing assurance services and advice to internal stakeholders and legal and governance matters. Responsible also for the Company Secretary.

2.3 Corporate planning

2.3.1 Strategic framework

TasWater’s overarching strategic framework was developed to align its activities and investment with the expectations of its customers, regulators and owners. Recently the strategic framework has been revised to better reflect the priorities of TasWater’s customers and communities. The revised strategic framework is outlined in Figure 2.

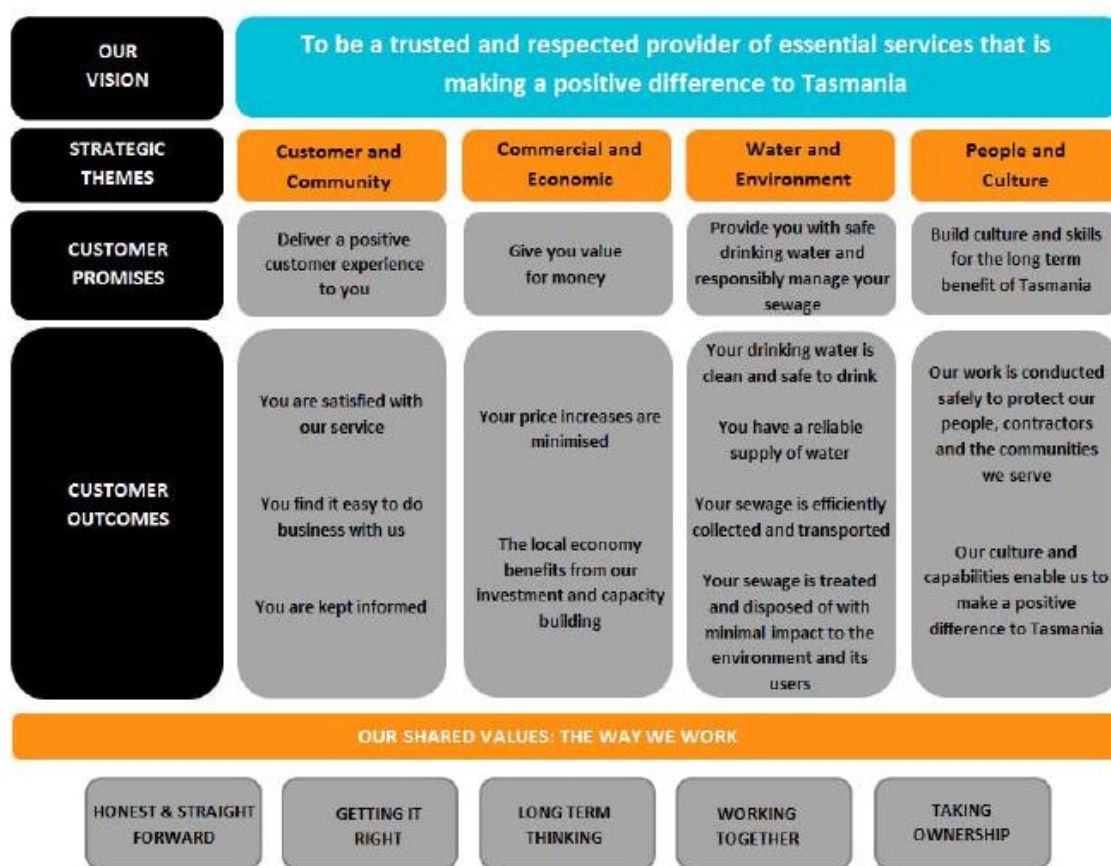


Figure 2 TasWater’s Strategic Framework⁴

2.3.2 Long Term Strategic Plan

In mid-2016 TasWater engaged Jacobs to co-design and develop a 20-year Long Term Strategic Plan (LTSP). The plan aims to set an outline for the investment necessary to meet the regulatory and compliance standards, as well as the trade-offs required to achieve such standards.

Overall, the LTSP provides direction for TasWater over the next 20 years, as well as acting as a focus point, reflective of the organisation’s targets, customer preferences and customer

⁴ TasWater’s Corporate Plan 2018-2020

support. The LTSP links strategic objectives with proposed works and improvements, and has been designed to guide ongoing capital planning and the development of all future Price and Service Plans (PSPs). Of particular relevance to this review; it formed the basis of developing the current PSP3 submission.

2.3.3 Corporate Plan

TasWater's Corporate Plan provides a short-term focus on what is going to be delivered from the LTSP over a 3-year period. The current Corporate Plan is for the years 2018 to 2020 and is guided by the revised strategic framework, aiming to maximise value for money by prioritising what matters most to the customer.

In order to deliver the 2018 to 2020 Corporate Plan, TasWater has developed strategic priorities for each of its customer promises outlined in the strategic framework, as outlined in Table 3 below.

Table 3 TasWater's strategic priorities for the 2018 to 2020 Corporate Plan

Customer promise	2018-2020 strategic priorities
Deliver a positive customer experience	<ul style="list-style-type: none"> Identify and close critical customer service gaps Improve customer engagement and understanding
Give value for money	<ul style="list-style-type: none"> Optimise and deliver Price and Service Plan outcomes Reduce the cost to serve
Provide safe drinking water and responsibly manage sewerage	<ul style="list-style-type: none"> Improve regulatory compliance Improve system reliability
Build culture and skills for the long term benefit of Tasmania	<ul style="list-style-type: none"> Continue Zero Harm program Develop organisation leadership

2.4 Business planning

2.4.1 Capital planning

TasWater's long-term capital planning is guided by the LTSP and the Strategic Asset Management Plan (SAMP), and feeds into the organisation's Price and Service Plan and Corporate Plan, both of which are 3-year forward planning documents.

TasWater has a number of regional strategies for its water and wastewater networks under development although none of these strategies are mentioned in the PSP3 Submission as part of TasWater's strategic framework, long term planning approach, or capital planning for PSP3. Nor are any regional strategies mentioned in the Drinking Water Quality Management Plan 2015-18, the Drinking Water Quality Strategy 2018-21, the Wastewater Management Plan 2015-18 or the Wastewater Strategy 2018-21. These regional strategies are critically important, particularly in the context of the current state and performance of major water and sewerage assets and the required asset consolidation process to optimise the water and sewerage networks.

Typically, these regional strategies would have been developed at a much earlier stage in the process to then inform the works proposed in recent submissions and with the benefit of

hindsight, should have been prioritised as early as PSP1, or at least fast-tracked in conjunction with the development of the Long Term Strategic Plan.

Some work is underway with an internal memo supplied by TasWater (dated 28 April 2017) titled the *Determination of Priority Growth and Capacity Asset Strategies / Management Plans* indicating that while all 189 water and sewerage systems operated by TasWater require the preparation of System Asset Strategies / Plans, there is a need to prioritise key strategies and plans. The memo provides a list of water and sewerage systems and identifies the status of any key strategies or plans relevant to that system. For sewerage, of the 114 total systems, only three have completed strategies / plans, while a further seven strategies are underway, leaving 104 individual systems without a completed or underway strategy / plan.

For water, of the total 70 drinking water systems⁵, six have completed strategies / plans while a further fourteen have strategies / plans underway, leaving 52 systems without a completed or underway strategy or plan. The memo does identify some larger scheme strategies that are either being developed or should be considered including the Hobart Sewerage Improvement Program (SIP) (underway), Launceston SIP (underway), Pardoe Sewerage (on hold), and the North Midlands SIP (pending approval). However these are predominantly focussed on growth areas. For water, the schemes identified for consideration include the Hobart Regional Water Supply (underway), Greater Launceston Water Supply (underway), Huon Valley Water Supply, Forth Water Supply, and the Cam/Burnie Water Supply⁶.

A significant proportion of works undertaken by TasWater in PSP2 and proposed in PSP3 involve the upgrade of major assets, however demonstrating that a regional perspective has been applied to the decision making but this is difficult to coordinate and assess with the regional strategies only having been recently commenced. A lack of regional perspective in undertaking major capital works can lead to suboptimal solutions, redundant, or stranded assets as decisions are made or arrived at after works are completed that could involve the decommissioning or consolidation of the asset that has just been renewed. A lack of regional planning can also lead to decision paralysis whereby decisions on major capital renewals or upgrades are postponed while waiting for the outcomes and recommendations of regional strategies. Therefore Arup believes a strong push to get the regional plans progressed and finalised is required, particularly in those areas where the LTSP has flagged projects need to be prioritised.

For shorter term capital planning, TasWater has implemented a Project Generation Framework that covers all phases of a projects lifecycle from strategic planning, scoping, business case, planning, tender, delivery & handover to project review and close. This framework has incorporated a gateway review process and has been mapped to a RACI model⁷ that highlights the roles and responsibilities of TasWater staff throughout the project lifecycle.

As part of the Project Generation Framework, a strategic business case is required before projects enter the Project Planning Phase. A Scoping Document with project recommendation is prepared for assessment at Gate 1 for a decision to proceed to business case development, and a full business case for endorsement or approval is required at Gate 2 so a project can proceed to the Project Planning Phase in which Asset Planning and Engineering & Design

⁵ OTTER, Tasmanian Water and Sewerage State of the Industry Report 2015-16, March 2017, page 14.

⁶ TasWater, Priority Growth & Capacity Asset Strategies / Management Plans, Memo, 28 April 2017, Doc035.

⁷ Definition: RACI is an acronym that stands for responsible, accountable, consulted and informed. A RACI chart is a matrix of all the activities or decision making authorities undertaken in an organisation set against all the people or roles. – Wikipedia, 22 December 2008.

activities will be undertaken. The business case considers the range of potential strategic interventions such as changing demand or improving productivity. The full business case defines the problem and assesses the range of options, recommending a preferred option to take forward.

Discussions with TasWater highlighted that the Project Generation Framework, the development of the LTSP and the preparation of cost estimates for PSP3 have all required TasWater to undertake more planning and design work earlier in the project lifecycle. Additionally, TasWater is in the process of developing a cost estimation framework to provide a more consistent methodology for cost estimates and to improve the accuracy of the estimates. A Consultancy Brief (dated April 2017) was supplied outlining a scope of works to develop a standardised approach to cost estimation and options analysis with an expected completion date by the end of Q1 2017-18. This work is likely to lead to consideration of more options relating to capex, opex, demand side management or operational changes, leading to the selection of a more efficient project path. It should also improve the accuracy of project cost estimation.

Arup comment:

While TasWater's approach to long term capital planning is relatively new to the organisation, it does provide a robust framework for future capital planning assuming that it the framework is fully utilised going forward.

The importance of both strategic planning and regional planning cannot be underestimated, with these approaches providing the essential long term and regional view of capital expenditure requirements to ensure that optimal solutions are implemented and that upgraded or renewed assets are not left stranded or made redundant after the fact.

Without such regional strategies in place, it is very difficult to objectively assess whether regional optimisation of assets, consolidation, or decommissioning of assets has been appropriately considered to avoid inefficient outcomes like redundant or stranded assets.

The recent move towards more design in the upfront planning phases, and with expected work on cost estimation methodologies and options analysis approaches; should increase the confidence in cost estimates.

Arup would also suggest TasWater needs to undertake more post project evaluations to confirm current cost outcomes against prior estimates, providing a valuable feedback loop, and should also look to incorporate more advanced methods of cost estimation such as the risk based Monte-Carlo analysis; an approach which is relatively standard across a range of other jurisdictions.

2.4.2 Capital prioritisation

The prioritisation of projects in the capital program is undertaken using the LTSP model which aims to align TasWater's capital program with its strategic framework by ranking proposed projects and programs based on the contribution towards customer outcomes based on the customer preferences, relative to the estimated investment required.

The LTSP model is an Excel™ based spreadsheet model tool developed by Jacobs that uses linear programming to calculate an optimal set of outcomes based on a budget constrained by TasWater's Board. The LTSP model was used to develop TasWater's PSP3 capital program

with the exception of the renewals programs, which are developed outside of the LTSP framework, but within other formal modelling tools.

The LTSP model provides a quantitative, evidence-based way of linking investment with customer outcomes. The model relies on qualitative or subjective assessment of priority looking to avoid internal or external stakeholders making a case for a 'big and important' project. The LTSP model prioritises the timing of projects on their contribution to achieving a customer outcome (the benefit of the project) relative to the cost of the project. Any projects designated as mandatory and any projects where 25% of total expenditure has already been incurred are automatically included.

The Launceston Sewer Improvement Plan (LSIP) is an example of a project that received a lower priority from the LTSP optimisation model than was previously the case, resulting in the project being deferred into the second 10 years of the LTSP given its cost and contribution to customer outcomes. However, with the high profile nature of the project and level of community interest in this project, TasWater has committed to delivering the project by the end of the first 10 years of the LTSP. As a result, the project timing has been made 'mandatory' to finish by FY2025/26 – which is a delay in timing based on original plans, but accelerates the timing relative to the pure underlying prioritisation process within the LTSP model.

Another example is the Cambridge Wet Weather Emergency Storage and Plant Process Improvements project. This project does receive a high priority in the LTSP to reduce the public health risk associated with overflows that impact shellfish in the receiving waters. Completion of the project was deferred one year to FY2019/20 by the model which is partly due to the implementation of a low cost, interim solution that was put in place to mitigate the risk while construction of the full project proceeded.

While the prioritisation process is important in determining the range of projects that will be completed, the capital constraint adopted by the TasWater Board for the total capital expenditure level during the regulatory period, has more influence over the delivery of customer outcomes. Arup notes the Regulator does not set a limit on the capital expenditure level during the regulatory period.

Arup further notes from Table 7.6 in the Regulator's SOIR⁸, that the net debt to equity (NDTE) ratio was 27.2% at the end of FY2015-16. Also that the "NDTE ratio is very low compared to the ratio for comparable mainland service providers where the ratio is typically around 70 per cent".⁹

Arup comment:

The LTSP model is an innovative approach to capital prioritisation and reflects good practice. The granularity of the model is sufficient to consider local and regional projects and assess these on an objective basis. There is some external information which suggests that the project / program capex profile proposed could be accelerated under alternative funding arrangements, however the ability for TasWater to effectively implement an accelerated capex profile, would need to be explored for the additional risks potentially arising particularly from an efficiency perspective.

⁸ OTTER, Tasmanian Water and Sewerage State of the Industry Report 2015-16, March 2017, page 56.

⁹ OTTER, ibid, page 57.

2.4.3 Operational planning

TasWater's Board members meet to set the direction of the LTSP and Corporate Plan, which in turn guide the organisations operational planning strategies. These strategies are implemented across all levels of the organisation, with responsibility assigned at divisional, departmental, team and individual levels for key customer outcomes.

Key areas of operations include the operation and maintenance of water and sewerage systems, with the Works Engine divisions responsible for the planning, design, delivery and operations of TasWater's systems to ensure KPIs in these areas are met. TasWater plans its resourcing to align with delivering these key customer outcomes. TasWater's other key areas of operations relate to those divisions – corporate and administrative – vital to supporting and enabling the Works Engine divisions in meeting their KPIs.

2.5 Asset Management System

TasWater has an Asset Management Policy that seeks to implement, maintain and continually improve an asset management system that is linked to TasWater's Corporate Plan and is consistent with the international standard for asset management systems, ISO55001. This plan was approved by the Board in March 2015 and is intended to be reviewed in March 2018.

In June 2015, TasWater developed an Asset Management System Approach that provided the framework required to deliver an asset management system aligned with the objectives set out in the Asset Management Policy. Together with the Strategic Asset Management Plan (SAMP), it allowed TasWater to meet the operating license requirement imposed by the Regulator to have an asset management plan in place.

An independent appraisal of TasWater's asset management plan was undertaken by GHD. This review found that collectively the Asset Management System Approach document and the Strategic Asset Management Plan generally addressed the requirements of ISO55001.

At that time, TasWater was still in its infancy as a merged organisation and was only in the early stages of its asset management journey. Since, the Asset Management Improvement Plan (AMIP) was developed and intended to provide the next step in TasWater's asset management journey by identifying gaps and outlining the projects to be implemented to close the gaps in the organisations asset management system.

The Asset Management Committee is meeting bi-monthly to report and review progress of TasWater's Asset Management System. While the Asset Management System is guided by ISO55001, TasWater has indicated during discussions that there is no push for certification to this standard.

Arup comment:

TasWater has made significant progress in the development of its Asset Management Systems in PSP2. The introduction of the AMIP in PSP2 provides the organisation with the next steps in its asset management journey. The next critical stage of TasWater's progress will be the implementation and delivery of the projects identified in the AMIP, as well as ensuring that the organisation continues to seek improvements in its asset management processes.

2.5.1 Strategic Asset Management Plan

In June 2015, TasWater developed a Strategic Asset Management Plan that set out the organisation's plan for its asset management system.

During discussions with TasWater, it was noted that the current SAMP is a hybrid of a Strategic Asset Management Plan and an Asset Management Plan, and that there is an intention to separate out the tactical aspects of the document into the Asset Management Plans.

While GHD's independent appraisal of the SAMP and Asset Management System Approach found that collectively these documented processes cover the requirements of ISO55001, during the development of the SAMP TasWater identified a number of strategic challenges that will need to be addressed in future revisions. These strategic challenges have been documented in TasWater's AMIP along with associated improvement projects to be implemented over the next three years.

2.5.2 Asset Management Plans

TasWater is still in the process of developing its Asset Management Plans that will provide the tactical actions as to how TasWater intends to manage its assets to achieve their target service performance level.

TasWater has indicated in its submission that it has made progress on the development of specific asset management plans and responses, which includes specific objectives and targets around asset management for each of the proactive and reactive asset groups of:

- Sewer Networks (including sewer pipelines and sewage pump stations);
- Water Networks (including water pipelines and water pump stations);
- Sewage Treatment Plants;
- Water Treatment Plants;
- Reservoirs; and
- Dams.

2.5.3 Asset Management Information System

TasWater implemented the software package Maximo to provide an Asset Management Information System (AMIS) that reflected the complexity and technological agility required for operating in PSP3, with a focus on improved interfaces for Service Delivery and data management. Poor data management, including significant levels of missing or poor quality asset data, has previously hindered TasWater's ability to effectively react to asset failures in both its immediate and long-term planning responses.

In addition to implementing Maximo, TasWater has embarked on other data improvement initiatives, including:

- Priority asset information needs and data quality assessment (PINaDQA);
- Data Quality Policy and Asset Data Strategy;

- Asset data improvement program; and
- Specifications and processes.

The new AMIS was implemented in 2017. TasWater believes it will be key in the effective operation of the Asset Management System, and encourage cultural change through supporting the adoption of the ISO55000 model.

Arup comment:

The implementation of TasWater's new AMIS represents a necessary action taken to address poor data quality and access in PSP2. Maximo also provides an ability for TasWater to develop field mobility type solutions to improve response times for reactive maintenance and to improve the efficiency of proactive / planned maintenance programs; with both leading to time and cost savings.

Getting 'buy-in' from all TasWater employees will be vital in achieving the stated goals from the new AMIS. Without cultural change TasWater will continue to face challenges in its immediate and long-term responses to asset failures, as well as in its ability to fully embed ISO55000. Early indications are that the new AMIS is being embraced within the organisation.

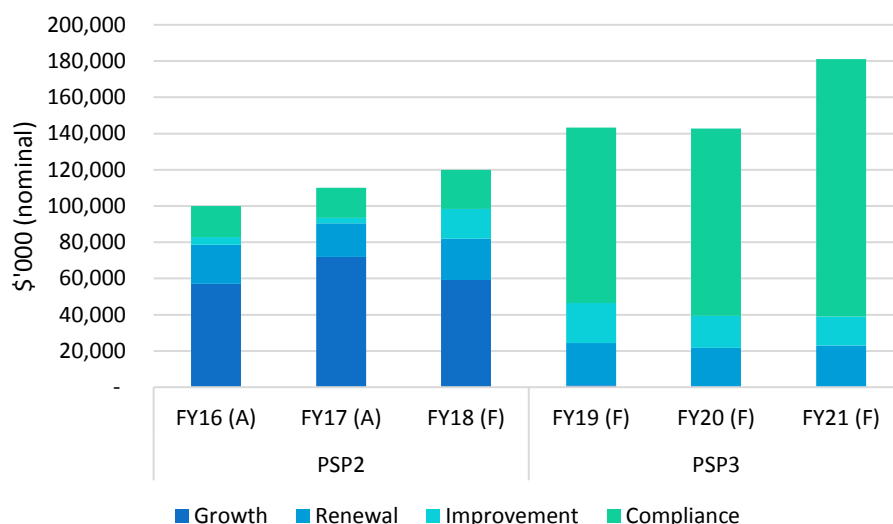
3 Capital expenditure review

3.1 Summary of key findings and recommendations

TasWater has spent more than the Regulator's expectations for in PSP2, and forecasts capex levels as greater than the PSP2 expenditure levels during PSP3. Refer Figure 3. While Arup's interview process identified a number of significant areas in which capex governance improvements during the early part of PSP2 have led to prudent and more efficient outcomes, improvements are needed by TasWater in timely project delivery, on budget and on time, and project status against targets needs to be clearly documented by TasWater to justify the ex-post review of actual capex outcomes for PSP3.

TasWater also indicated its approach to project cost estimation was also a focus for improvement, and Arup's review also highlighted this was an area requiring attention.

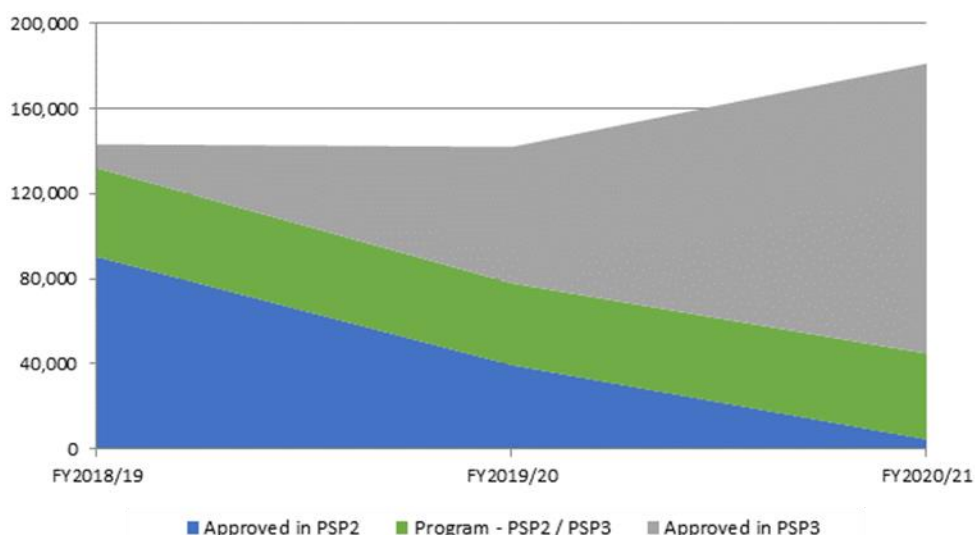
The LTSP has significantly changed the capex project and program priorities in moving from PSP2 to PSP3, and hence the cost drivers and capex profile for TasWater. Figure 3 shows the considerable change in focus by TasWater as a result of the LTSP.



Source : TasWater

Figure 3 TasWater's change in capex driver between PSP2 and PSP3

This means some higher priority projects now have insufficient detailed concept designs, options analysis and business case development, to allow them to progress prudently and efficiently through TasWater's expenditure governance approval stages. This makes them a priority for additional effort to accelerate the capital deployment. TasWater has also flagged that by the first year of PSP3, ie FY2018/19, more than half of its capex expenditure will still be associated with capex projects and programs approved internally in relation to PSP2. Figure 4 indicates the forecast position of capex during PSP3, with the objective to have all approved PSP2 capex done by end PSP3. Arup notes that a hangover of PSP3 approved capex will still remain in PSP4, and while this is expected to a certain extent (ie larger project lead times are 2 to 3 years), it would be better to accelerate capex so there is only a year's lag into the following regulatory period, assuming the regulatory period remains at 3 years.



Source : TasWater, Board approved for PSP2 and PSP3

Figure 4 TasWater's capex profile and governance position (\$'000 nominal)

In short additional techniques might be necessary to catch up on the new capex programme priorities, eg through a 'blended delivery' model using partial outsourced design and costing, and/or construction approaches.

Arup recommends TasWater accelerate its capex project delivery through a strong short-term focus on internal processes to accelerate project concept designs, project costing, options analysis and business case development, combined with a 'blended delivery' model to reduce the capex time to delivery.

3.2 Historical capital expenditure in PSP2

TasWater overspent against its regulated capex expectation in each year of PSP2, as illustrated in Figure 5.

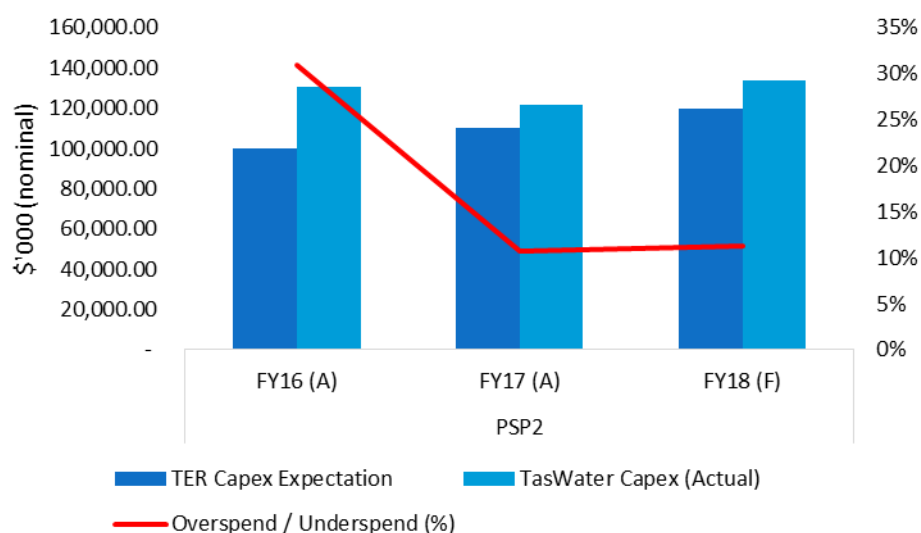


Figure 5 TasWater's PSP2 expected capex vs its actual capex and % overspend for PSP2

TasWater invested heavily in water and dual function projects, overspending against expectations by over 50% in PSP2, though this was partially offset by an underspend in

sewerage projects. TasWater has shown a record of poor project delivery in the PSP2, with projects such as the Kingsborough Sewage and Tolosa Dam Upgrade overrunning into the PSP3 period after a series of delays and overspending. The overspend in water projects of approximately ~\$46m was attributed by TasWater to improved cost estimates for managing dam safety, some PSP1 expenditure being carried over, and an increase in investment to improve drinking water quality. Similarly, dual function capex spending of ~\$60m over budget was largely due to investment in SCADA and asset management systems. TasWater's underspend of ~\$50m in sewerage capex was due to capex deferral.

3.2.1 Prudency and efficiency review of capital expenditure in PSP2

Arup has selected a small sample of capital projects undertaken (or proposed to be undertaken) across the PSP2 regulatory period. This sample included a number where expenditure was delayed, in part where capital prioritisation models have recommended deferral.

The projects in our sample were:

- Cambridge Sewer Emergency Storage;
- Direct to Asset and Opex to Capex programs;
- Kingborough Sewerage System Strategy;
- Small Towns Water Supply Strategy; and
- Tolosa Dam – Water Supply Upgrade.

The sample of projects was discussed at the Interviews with TasWater staff and supporting information for each project was submitted.

The following sections outline our review and general findings for each of these projects.

3.2.2 Cambridge Sewer Emergency Storage

Financials and Program

Previous Budget (\$'000s nominal):

\$18 (PSP2)

Previous Delivery Date:

FY17

Actual Forecast Budget (\$'000s nominal):

\$4,784 (PSP3)

Forecast Delivery Date:

FY20

Table 4 Capital expenditure for Cambridge Sewer Emergency Storage

Source: Table 33, *Draft Price and Service Plan*

	PSP2			PSP3			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital expenditure	18		-	3,781	1,093	-	18	4,784

Key Data

<u>Investment Driver</u>	Compliance – Shellfish and Public Waterways Health with secondary drivers of Improvement and Growth.
<u>Intended Outcome</u>	No wet weather bypass overflows / spills at Cambridge STP for a 1 in 5 rainfall event reducing spills to shellfish leases / public waterways.
<u>Current Project Status</u>	Expected to be under construction at start of PSP3 (FY19) with completion by FY20.

Project Details

Strategic Planning

STP currently experiences frequent wet weather bypass events where wastewater bypasses the treatment process and discharges in Pitt Water Bay having only received primary screening and disinfection. Bypass events are notified to the Tasmanian Shellfish Quality Assurance Program (TSQAP) and result in precautionary harvest closures, generally of 21 days; an action which results in significant financial and reputational damage to local shellfish growers. The discharge location is also adjacent to the Pitt Water - Orielton Lagoon, one of ten Ramsar listed wetlands¹⁰ in Tasmania.

The STP is currently non-compliant with EPA licence conditions and does not meet TasWater's Sewer Spills Management Policy, that is, system bypass events occur more frequently than the required 1-in-5 year event nominated for high sensitivity receiving waters. The current system also does not achieve the stated objective of TasWater's draft Shellfish Risk Mitigation Strategy to minimise economic impact on the shellfish industry.

Sewage spills management is outlined in TasWater's Sewage Spill Abatement Strategy (October 2015) which mentions the Cambridge STP as a current initiative and one of eight priority catchments that have high criticality / sensitivity receiving waters.

TasWater's business case for this project states that the Cambridge STP has been subject to speculation about decommissioning since it was first commissioned however the current plan is to decommission the plant sometime after 2025 subject to the outcomes of any regional strategies that might be developed over this time. As a result, the proposed works represent the minimum works required to comply with the relevant targets and conditions until such time as the plant is decommissioned.

There does not appear to have been much broader regional planning considered in the development of options for this project. The option to transfer sewage to either the Sorell or Rokeby STPs are the only regional integration options briefly considered however these options were dismissed as too expensive and too high a risk in the short term, particularly as TasWater is certain that the Sorell STP would require an upgrade, and are not certain that the Rokeby STP has sufficient process or hydraulic capacity to accept the diverted flows.

¹⁰ The Ramsar Convention recognises wetlands that are important for conserving biological diversity. These wetlands are added to the Convention's List of Wetlands of International Importance.

There is some reference in the Business Case to the Hobart Sewerage Improvement Program (HSIP) and the suggestion that a rationalisation of eastern shore STPs is likely but it is stated that this rationalisation investigation would follow the completion of the HSIP due to other priority projects and funding constraints. The business case identifies that the “*development of a strategy for treatment plants to the east of the current HSIP Strategy study area would identify the best long term option for Cambridge STP*”. TasWater previously agreed actions with the EPA in the 2015-18 Wastewater Management Plan which include the development of a Greater Pitt Water strategy that covers the Cambridge, Midway Point and Sorell STPs.

The suggested Greater Pitt Water strategy “*includes a review of the potential consolidation of Cambridge STP, Midway Point STP, Sorell STP, Barwicks Lagoons and Penna STP. One of the strategic options is to transfer flow to the existing Penna site with potential decommissioning of the existing Cambridge, Midway Point and Sorell STPs. If the strategy confirms this approach, it would build on the existing reuse scheme at Penna. The level of treatment required would depend on the ability of the expanded reuse scheme to consistently achieve 100% reuse*”. The LTSP model would normally dictate the priority and timing of the Greater Pitt Water strategy which indicated development of the strategy in FY2018/19.

“*However, the timing is now under review following recent discussions with the EPA and [TasWater is] looking to bring this forward to the latter part of FY2017/18 if possible*”.¹¹

The Cambridge STP was originally designed to provide 100% effluent reuse to nearby customers however this has not been possible due to the high salt loads coming from trade waste customers. TasWater agreed actions with the EPA in the 2015-18 Wastewater Management Plan which included the prioritisation of the progressing investigation of reuse options for the Cambridge STP in 2016. However at present, less than 5% of the wastewater effluent from the treatment plant is reused, with the majority being discharged to the Pitt Water Bay area which includes a Ramsar listed wetland. There do not appear to be any plans to increase the current level of reuse, nor are there immediate plans to accelerate a trade waste policy which would likely have a significant impact on salt loads as pricing signals are made clear to trade waste businesses.

Options Analysis

TasWater has identified five main (including do nothing) options:

- Do Nothing.
- Option 1 - Storage Balancing at SPS and STP – wet weather flow buffer reservoirs at SPS and STP.
- Option 2 - Upgrade Transfer Capacity – upgrade pumps at SPS and STP and smaller buffer reservoir at SPS.
- Option 3 - Upgrade Transfer Capacity and Storage Balancing at STP – larger upgrade at SPS and larger buffer reservoir at STP.
- Option 4 - Upgrade Transfer Capacity (SPS and STP) and Storage Balancing – upgrade transfer capacity at SPS and STP and install smaller buffer reservoir at STP (preferred option).

A fifth and sixth option were identified in the Business Case (refer below) which is:

¹¹ TasWater email dated 9th October 2017 with updated details.

- Option 4a – same as Option 4 plus decommissioning of STP in 2029.
- Option 5 - The immediate decommissioning of the Cambridge STP, construction of a new SPS and rising main to deliver sewage to the nearby Rokeby STP, immediate upgrade of the Rokeby STP inlet works, and a future upgrade of the Rokeby STP capacity.

The sub-option Option 4a compares the preferred Option 4 to the new Option 5 over a longer period to 2029. An NPV analysis of Option 4a and Option 5 identified that Option 4a would be a lower overall cost over 30 years. As a result, Option 4 remained the preferred option.

TasWater has identified a low cost interim solution that has been implemented until the permanent solution is completed; installing 1 ML of temporary wet weather storage (steel tanks) at the site at a cost of approximately \$275,000. This provides a low cost mitigation option that improves available wet weather storage capacity at the STP, reduces the risk profile, and gives operational efficiencies and benefits, specifically in regard to the current practice of transporting sewage to alternate plants during wet weather events. Once the permanent solution is implemented in FY2019/20, the temporary steel tanks can be retained and/or redeployed at other sites.

Business Case

A Cambridge STP Wet Weather Overflow Abatement Business Case was developed in October 2015 and approved by the TasWater Board on 25 November 2015 with the preferred option being Option 4.

Cost Estimates

The Sewage Spill Abatement Strategy (Oct 2015) identifies estimated mitigation / intervention costs of sewage spills including an estimate for Cambridge of around \$1.7m out of an estimated state wide cost of around \$256m (including SPS upgrades, pipeline works, reactive maintenance and project related costs). The Strategy is clear that these are order of magnitude estimates with more detailed work required to fine tune estimates.

The Business Case provides an updated total cost estimate in seeking approval for a total project cost of \$4.57m (including a 30% contingency). The cost estimates, and the NPV model, were developed internally and do not appear to have been peer-reviewed. Some of the costs appear to have been derived from actual or reported costs from similar projects.

The proposed cash flow for the preferred option as outlined in the business case was:

- FY16 - \$1.25m.
- FY17 - \$3.32m.

These cost estimates were entered into the LTSP prioritisation model with works commencement being deferred one year to 2017/18 and were subsequently deferred a further year by the model. The outcome of the LTSP model optimisation is the following expenditure profile:

- FY19 - \$3.6m.
- FY20 - \$1.09m.

Project Delivery Process

The Business Case outlined a proposed Work Plan which, while now out of date, details the steps required from Business Case approval to completion of work. The steps are:

1. Business Case Approval and Handover to Works Delivery – October 2015
2. Procurement Plan Approval – December 2015 (2 months)
3. Detailed Design & Integration Planning Commence – January 2016 (3 months)
4. HIAPL Approvals Sought – February 2016 (4 months)
5. Early Procurement of Key Process Equipment – March 2016 (5 months)
6. Commence Onsite Construction Early Works Packages – April 2016 (6 months)
7. Inlet Works Commissioned – August 2016 (10 months)
8. Cambridge Park Drive Pump Station Upgrade Commissioned – August 2016 (10 months)
9. Membrane Replacement Commissioning – October 2016 (12 months)
10. New Emergency Storage Commissioning – November 2016 (13 months)
11. System Commissioning & Testing – November 2016 (13 months)

Based on a commencement date in 2018/19 (post 1 July 2018) and following the same program it would be expected that the project could be completed 2019/20 (after August 2019). This is consistent with the recommended expenditure profile from the LTSP model.

It is noted that the expected project completion date is some three years after the approved date in the Business Case however the LTSP prioritisation model determined that the project did not provide as good a value for money proposition compared to other projects and as a result it was deferred. This project did initially receive a high priority in the LTSP to reduce the public health risk associated with overflows that impact shellfish in the receiving waters. However, the implementation of a low cost, interim solution to mitigate the risk while construction of the full project proceeded has allowed the project to be deferred.

Summary

This project is new to PSP2 and has not previously been considered or reviewed. The works are needed to reduce the incidence of wet weather bypass overflows into a sensitive receiving environment, particularly affecting oyster growers. The current system does not meet EPA or internal standards set out in TasWater policy documents during wet weather flow events and results in local shutdowns of the oyster industry causing significant financial and reputational damage to growers.

The preferred option is a short to medium term solution as the intention is to decommission the Cambridge STP between 2025-2029. The proposed works have been designed to provide some certainty of meeting EPA and TasWater discharge quality requirements until at least 2025. While the timing of the project results in works completion some three years after the proposed date in the business case, an interim solution has been implemented by TasWater to reduce the risk of overflows in the short term until the preferred solution is constructed.

A regional wastewater strategy does not appear to have been developed for this area, and the lack of regional integration options considered reflects this. Work done on a regional integration strategy could result in different options being considered feasible, however given the timeframe for this specific project, it is possible that the works would not change. The risk is that the investment made becomes inefficient or that the assets installed become redundant once a regional approach is in place.

The proposed costs for the project have not changed significantly since the earliest estimates with the cost estimates appearing to be produced internally with no obvious independent review.

The timing of the project has changed with the expected completion of work now three years later than originally planned.

3.2.3 Direct to Asset & Opex to Capex

Financials and Program

Previous Budget (\$'000s nominal):

-

Previous Delivery Date:

-

Actual Forecast Budget (\$'000s nominal):

Direct to Asset - \$5,922 (PSP3)

Opex to Capex - \$3,873 (PSP3)

Forecast Delivery Date:

FY16

Table 5 Capital expenditure for Direct to Asset & Opex to Capex

	PSP2			PSP3			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Direct to Asset	5,922	-	-	-	-	-	5,922	-
Opex to Capex	3,873						3,873	

Key Data

Investment Driver

1. and 2. – Renewal

Intended Outcome

1. Covers small assets created from reactive maintenance program and directly entered into financial system.

2. Reallocation of small asset renewals undertaken as part of reactive maintenance from opex to capex.

Current Project Status

Both programs were discontinued from FY16.

Project Details

Strategic Planning

These programs represent efforts to improve and correct the allocation of assets created out of the Reactive Maintenance program. The program covers assets previously misallocated in the PSP1 period.

Options Analysis

Not applicable – no other options to correct this issue.

Business Case

This program corrects the misallocation of asset costs. TasWater has improved its financial systems and processes to ensure that these programs were not required post FY16. In particular, the implementation of Maximo will enable the correct allocation of new assets from reactive maintenance works directly to capex in real time.

Cost Estimates

Costs are actuals representing the value of assets entered or transferred from opex.

Project Delivery Process

Asset costs were transferred to capex by the Finance Department after applying TasWater's Capitalisation Policy to assets created during the PSP1 period.

Summary

These two programs sought to correct the misallocation of new assets created as part of reactive maintenance works. The misallocations occurred due to inadequate financial / asset management systems and processes, issues which were corrected during PSP2.

Whilst the quantum of expenditure for these two programs is relatively large, the programs were discontinued after FY16 with no further expenditure.

Arup is satisfied that the errors required correction and are unlikely to occur again.

3.2.4 Kingborough Sewerage System Strategy

The Kingborough Sewerage Project includes closing three underperforming treatment plants, constructing new sewage pipeline to transfer sewage from treatment plant catchments to Blackmans Bay Sewage Treatment Plant and upgrade of Blackmans Bay plant. An additional project was added in 2016, the Kingston Sewage Pumping Station E Rising Main, a connection from the SPS E Blackmans Bay to the Blackmans Bay STP.

Financials and Program

Previous Budget:

\$37m (approved 2012-2015)

\$44m (approved 2015-2018)

\$47m (approved Aug 2015)

Previous Delivery Date:

December 2017 (original business case in 2014)

June 2019 (Board Report Sep 2016)

\$51.6m (sought in Sep 2016) (includes an additional project – Kingston SPS E Rising Main - \$2.7M)

Actual Forecast Budget (\$'000s nominal):

\$23,031 (PSP2)

\$27,208 (PSP3)

Forecast Delivery Date:

Major construction by August 2018 plus designated operating period

Table 6 Capital expenditure for Kingborough Sewerage System Strategy

Source: Table 33, *Draft Price and Service Plan*

	PSP2			PSP3			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital expenditure	8,623		14,408	24,605	2,603	-	23,031	27,208

Key Information

Investment Driver

The Kingborough Sewerage Project was originally proposed in PSP1 to improve effluent quality for ongoing discharge to the Derwent Estuary and to accommodate increased growth in the Kingborough area. Local STPs within the project area had been classified as high priority Level 2 facilities for improvement as they are currently operating above their licence capacity and fail to achieve compliance with required effluent standards.

In PSP2, the Kingborough Sewerage Project was reclassified with a primary driver of growth and secondary driver of compliance.

Intended Outcome

The receipt of sewage flows from Electrona and Margate STPs, together with significant growth in the Blackmans Bay catchment will result in the average daily flow delivered to the Blackmans Bay STP increasing from 4.1 ML/day to 8.5ML/day (existing licence flow is 4.125ML/day). As well as catering for this growth, the upgrade will also improve the quality of the final effluent discharged to the Derwent Estuary, with seasonal nitrogen removal being proposed. This proposed effluent quality has been proposed to the Environment Protection Authority (EPA) and has received its in-principle support based on the information presented regarding the ambient water quality and environmental risks.

Current Project Status

As at September 2017, the project is in detailed design phase for some aspects with some construction work underway at Blackmans Bay STP and for the pipeline works, both of which are expected to be completed in August 2018.

Project Details

Strategic Planning

The Kingborough Sewerage Project was originally a combination of three key projects:

- Upgrade of Blackmans Bay STP to reflect growth and new service areas.
- Construction of pipeline (North West Bay Pipeline) to take sewage from Margate, Electrona and Howden to the upgraded Blackmans Bay STP.
- Decommissioning three existing STPs at Electrona, Margate (Dru Point) and the North West Bay Golf Club and pumping sewage via the new pipeline (above) to Blackmans Bay STP.

The need to upgrade the sewerage systems for Blackmans Bay and surrounds was originally identified by Kingborough Council as an important project prior to 2009, with a Wastewater Strategy highlighting a regional solution consolidating the Margate and Electrona STPs into an upgraded Blackmans Bay STP. TasWater took over operation of the sewerage system in 2011, commenced a community consultation process in 2013 however it was not until September 2017 that detailed designs are being completed and some construction works have finally commenced at the sites, some eight years after the project was first identified.

TasWater has indicated that the lengthy delays were a result of the extensive public consultation required, particularly around the pipeline routes; the level of complexity of the project (TasWater states that this project is their largest, most complex project to date), and the level of review required for the planning, cost estimates, designs, procurement model, and governance aspects of the project.

Further works were added to the overall project in 2016; the replacement of the Kingston SPS E Rising Main, a rising main which had experienced a major structural failure and, upon further investigation, was deemed to be at high risk of further failures. The rising main was identified as being able to connect to the North West Bay Pipeline, part of the original scope of works of the Kingborough Sewerage Project. The works were therefore suggested to be amalgamated in a Board reported update to the original business case for the Kingborough project.

Options Analysis

The seven main options considered for the Kingborough Sewage System Strategy are combinations of pipeline routes and treatment options, as set out in Table 7.

Table 7 Options Considered for Kingborough Sewerage Project

Option	Title	Pipeline Alternative	Treatment Alternative
1	Do Nothing	1a) Nil	1b) Existing
2	Option 2 – Channel Hwy / Algona Rd & MBR Treatment	2a) Channel Hwy / Algona Rd	3a) MBR
3	Option 3 – Peter Murrell Reserve & MBR Treatment	2b) Peter Murrell Reserve	3a) MBR
4	Option 4 – Alanwood Rd / Brightwater Rd & MBR Treatment	2c) Alanwood Rd / Brightwater Rd	3a) MBR
5	Option 5 – Channel Hwy / Algona Rd & SBR Treatment	2a) Channel Hwy / Algona Rd	3b) SBR
6	Option 6 – Peter Murrell Reserve & SBR Treatment	2b) Peter Murrell Reserve	3b) SBR
7	Option 7 – Alanwood Rd / Brightwater Rd & SBR Treatment	2c) Alanwood Rd / Brightwater Rd	3b) SBR

The combination of pipeline alternative 2c and process technology 3a which make up Option 4 was the recommended option.

TasWater indicated during the interviews that there was significant community opposition to the various pipeline routes proposed for the North West Bay Pipeline, however the TasWater recommended option represented a significantly cheaper option and ensures compliance with the relevant conditions.

TasWater indicated that 25 options of different pipeline routes were presented to the community in 2013. The routes were assessed using an analytical hierarchy procedure based upon environmental values, heritage values, social values, economic costs/benefits, as well as sub-criteria for threatened species and communities, and potential aboriginal and historic heritage issues; these were initially costed on a unit rates basis. Further reviews resulted in six options being presented at community meetings; these options were priced based upon data from recent tenders that TasWater had received. Additional community consultation and feedback led to the options being reconsidered and amended. Two sections of proposed pipeline were realigned as a direct result of concerns raised by the community.

Business Case

TasWater supplied the original business case for this project – Kingborough Sewerage System Strategy Business Case Version 0.3 (Second Draft for Board Approval) (13 June 2014) and an update to the business case in the form of a Board Meeting Report dated 27 September 2016. The latter Board Report sought procurement approval for a design and construct contract for the originally proposed works, an increase in the cost estimate for these works, and proposed the inclusion of an additional but related set of works into the Kingborough project – the replacement of the Kingston SPS E Rising Main.

Cost Estimates

Costs for the recommended option were extracted from preliminary design reports prepared by external consultants and escalated by CPI where required to bring the costs up to the current year (2014 for the business case). The costs were then entered into TasWater's standard Net Present Value (NPV) Calculator for analysis. It was noted that the membrane replacement frequency for the MBR option had been conservatively calculated, and this has led to a higher NPV for this option. However, if operated optimally then the life expectancy of the membranes will likely be extended, thereby reducing the life cycle cost of this option.

The total estimated project cost for PSP2 (as outlined in the Business Case) was \$44.0m inclusive of 30% contingency, which was approved in June 2014. The Board Report seeking procurement approval requested an increase in the project budget to include the additional works (Kingston E SPS costed at \$2.7m) and to reflect the higher than expected tender estimates received, underestimated land and site requirements, and more extensive stakeholder consultation and planning approvals required than was previously envisaged. The requested increase in the cost estimate was 10.5% to a total of \$51.6m. According to the LTSP model, the capital budget allocated to the project is \$49m.

As identified previously, this project has previously been included in PSP1 (\$37m), PSP2 (\$44m) and is now included in PSP3 (\$49m). Total costs incurred prior to 2017/18 are \$8.6m, with total forecast costs in PSP2 of \$23m (reported in the LTSP model) or \$18m (reported in the PSP3 submission).

Project Delivery Process

The Business Case provides a proposed Work Plan which details the steps required from the design process to completion of work and the estimated costs (based on the PSP2 estimate of \$44M). These steps are outlined in Table 5 below.

Table 8 Project Delivery Milestones for Kingborough Sewerage Project

Milestone Number	Milestone	Expected Month	Costs
1	Submission of DPEMP & Completion of Prelim. Design	February 2015	\$1.5M
2	Complete Detailed Design	July 2015	\$2.1M
3	Tendering & Contract Award	November 2015	\$0.05M
4	Construction Completed (North West Bay Pipe)	October 2016	\$12.2M
6	Construction Completed (STP Upgrade)	December 2016	\$26.2M
7	Commissioning /Handover to Operations & Maintenance	December 2016	\$0.55M
8	Decommission Margate, Electrona & Howden STPs	May 2017	\$1.4M
10	Kingborough Sewerage System Strategy completion	May 2017	-

The latest update available on the project progress (April 2017 on TasWater's Yoursay website) indicates that construction was commencing in April/May 2017 compared to the program above which indicated construction works would commence November 2015. Given the timelines for various stages outlined in Table 7 above, 18 months from contract award to completion, the expected completion date would be around November 2018. This completion date is relatively consistent with information supplied indicating a completion date in the second half of 2018, and with the expenditure profile include in the LTSP model which has the majority of expenditure in 2018/19.

Summary

The Kingborough Sewerage Project was developed to respond to the dual drivers of growth and compliance. The project is intended to decommission three under-performing STPs, provide a regionally based solution, and cater for the growth expected in a developing area of the greater Hobart area.

The project was first identified in 2009 and the preferred solution has essentially remained similar over the PSP1 and PSP2 submissions and to the proposed solution presented in PSP3; albeit with some additional works included in the project, and an increase in cost estimates. Whilst TasWater indicates that the level of complexity in this project is high, and the size of the project is one of the largest undertaken to date, the location of the works is reasonably isolated from the Greater Hobart network making a broader regional solution less likely.

There has been significant community opposition to the route of rising mains but the preferred option is significantly cheaper and ensures regulatory compliance.

3.2.5 Small Towns Water Supply

(Now Regional Water Supply Improvement Program [RWSIP] – Stage 2)

Financials and program

Previous Budget:

New to PSP2 (\$18.9m)

(Source: PSP3 Appendix 11)

Previous Delivery Date:

-

Actual Forecast Budget (\$'000s nominal):

\$75,826 (PSP3)

Forecast Delivery Date:

All stages by August 2018

Table 9 Capital expenditure for Small Towns Water Supply

	PSP2			PSP3			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital expenditure	22,100	25,951	27,775	-	-	-	75,826	-

Stage 1 and Stage 3 estimates (as per information available) are shown for reference purposes. No breakdown of the actual/forecast \$40.8m expenditure for either PSP2 or PSP3 has been provided however the expenditure is proposed falls almost entirely in 2017/18 with project completion by August 2018.

Key Information

Investment Driver

Compliance

Intended Outcome

Remove long term Public Health Alerts from 12 towns in TasWater operating area – Bronte Park, Colebrook, Conara, Cornwall, Epping Forest, Gladstone, Gormanston, Herrick, Judbury, Mathinna, Rossarden and Wayatinah.

Current Project Status

Stage 1 of program is currently being completed.

Stage 2 seeking funding approval and approval to award construction contracts – preferred contractors identified for WP1 and WP2 (refer below for work package details).

Previously referenced Stage 3 works (Fentonbury, Rocky Creek, Westerway, Maydena, and National Park) are not identified in the Business Case as further work is required before a separate business case is prepared for this stage.

Procurement Process

Stage 2 is to be delivered across four Work Packages:

- WP1 Bulk Water Supply WTPs;
- WP2 Bulk Water Supply Pipelines;

- WP3 Tranche 1 Water Network Investigations and Design, and Tranche 2 Water Network Works; and
- WP4 Strategic Partner Program Delivery.

The Business Case requests that authority be given to award contracts for Stage 2 – contracts have already gone out to tender and responses have been received.

Project details

Strategic Planning

The Small Towns Water Supply Strategy (now referenced as the Regional Water Supply Improvement Program) is a program of works designed to ensure that all towns across Tasmania are supplied with drinking water that meets the relevant drinking water quality guidelines. A special program “24 Glasses” was developed to ensure that the final 24 towns subject a Public Health Alert (PHA); either Boil Water Alert (BWA) or a Do Not Consume (DNC) alert, would be provided with drinking water that met the relevant guidelines.

The program has been underway in various forms since 2013 however the program became a major focus for TasWater after capital expenditure for the 2015-18 had been reviewed by the Regulator. The project has not gone through the regulatory review process and has also been fast –tracked through the normal project Gateway process (refer discussion on Business Case below for further details).

Options Analysis

The 24 towns which are the subject of this program vary in size but are generally less than 100 connections. The options available to each town vary depending on the town’s characteristics and existing source, but broadly, the options considered included asset based solutions (water treatment plants, bulk water pipelines and improved disinfection) and non-asset based solutions including rainwater tanks or subsidies for similar systems. The latter option (service replacement) has the effect of removing the town from TasWater’s regulated serviced land area. A process was developed to guide service replacements.

Business Case

A Business Case was developed in May 2017 for the RWSIP Stage 2 project which covers the 12 towns identified above and provides some basic detail on Stage 3 of the project. The Business Case developed covers Gate 2 (Business Case approval), Gate 3 (Project Plan) and Gate 4 (Contract Award), due to the urgency of completing the works (within the PSP2 period).

The Business Case was first developed on 20 May 2017 (Version 0.1), revised and approved by the CEO on 23 May 2017 (Version 0.2) and presumably submitted for Board approval however outcomes / dates have not been added to the version supplied. The Business Case supplied was version 0.2.

Cost Estimates

Cost estimates for this program of work were not reviewed as part of PSP2 as the program was introduced after the PSP2 regulatory period had commenced.

Costs for Stage 2 of the program have been based on tendered prices or internal estimates of costs – WP1, WP2, WP3 – Tranche 1, and WP 4 are based on submitted prices from competitive tendering process. WP3- Tranche 2, and the various overheads associated with the program delivery have been estimated internally.

There are significant cost estimate variations, in timing and quantum, between the three sources of information provided – the LTSP model, the Small Towns Financial Assessment, and the PSP3 Submission – as demonstrated in the summary table of costs estimates above.

From our review, the Business Case and the Financial Assessment are consistent in regards to the quantum of expenditure however the LTSP model still appears to reflect the original allocations of expenditure referenced in section 5.6.3 of the Business Case.

The LTSP model and the PSP3 submission are generally consistent for most projects although in this case, the forecast expenditure for Stage 2 (over the PSP2 period) as identified in the PSP3 submission totals \$18.9m (Source: PSP3 Appendix 11) while the LTSP model expenditure totals \$23.2m (over PSP2) plus a further \$5.1m in 2018/19, for a total program expenditure of \$28.3m (Source: LTSP model Sheet Output_real, column G under program Small Towns New Project).

Project delivery process

The information supplied by TasWater indicates that the Business Case has been submitted for approval to award contracts for construction of works. The project is to be delivered in Work Packages:

1. WP1 – Water Treatment Plants – preferred contractor has been identified and project is awaiting approval to award contract and proceed with works.
2. WP2 – Bulk Water Pipelines – preferred contractor has been identified and project is awaiting approval to award contract and proceed with works.
3. WP3 – Tranche 1 – competitive tendering process for design and investigation work to identify the works required and design the optimal solutions – two design consultants engaged (from ten EoI submissions and subsequent RFP) with each consultant awarded six towns.
4. WP3 – Tranche 2 – EoI and RFT process to engage contractors to deliver works identified in Tranche 1.
5. WP4 – Strategic Delivery Partner – engagement of a specialist service provider (via open Request for Proposals) with three submissions received, two respondents shortlisted and the preferred consultant identified (funding for consultant included in this Business Case).

Summary

The importance of this project is unquestioned – the works are required to ensure that TasWater meets its minimum service obligations, that is, to provide drinking water which meets the relevant quality standards and guidelines.

The project has been fast-tracked through the normal project gateway process reflecting the urgency of the works to be completed. The urgency, however, is partly a result of a previous lack of investment and a lack of planning (short, medium and long term) by TasWater prior

to PSP2. The provision of reliable drinking water which meets minimum quality standards would be among the highest priorities for a water business.

While there is some significant variation in the cost estimates and therefore potentially the allocation included in the PSP3 expenditure, the program of works is essential and is being undertaken urgently. Some cost variation is therefore to be expected however the impacts of under-allocation of costs to programs may include deferral of other important projects, as actual expenditures unfold.

Nevertheless, Arup accepts the prudence of the program of works and accept the efficiency of the works noting the variations and accelerated nature of the capital planning process.

3.2.6 Tolosa Dam Water Supply Upgrade

Financials and program

Previous Budget (\$'000s nominal):

\$23,946

Previous Delivery Date:

June 2015

Actual Forecast Budget (\$'000s nominal):

\$9,961 (PSP2)

Forecast Delivery Date:

FY17

Table 10 Capital expenditure for Small Towns Water Supply

	PSP2			PSP3			Total	
\$'000 nominal	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital expenditure	1,594	8,367	-	-	-	-	9,961	-

Key data

Investment Driver

Compliance

Intended Outcome

Dam safety risk reduction and water quality improvement – through decommissioning of Tolosa Dam and replacement infrastructure

Current Project Status

Construction of tanks is complete. A dam decommissioning application has been submitted with plans to decommission by June 2018.

Procurement Process

The proposed procurement method outlined in the 2014 business case was a standard design and construction model with two packages of work. The first package to construct the required tanks and related infrastructure and the second package to decommission the dam.

Project details

Strategic Planning

The Tolosa water supply zone is the largest in Southern Tasmania supplying approximately 15,000 residents of Glenorchy, Moonah and surrounds including TasWater's largest industrial customer (equivalent to 6,000 residential connections). The zone is supplied with water from the Bryn Estyn Water Treatment Plant which delivers water to the Tolosa Dam.

The original Tolosa Dam was built in 1880, then raised twice, first in 1915 and secondly in 1922 and has a capacity of 414ML. The dam does not meet current safety standards and has been identified (through many investigations over the years commencing around 2005) as an Extreme Hazard (highest ranking) using the Level of Tolerability (LoT) approach.

Each investigation of the dam recommended works involving the decommissioning of the dam and construction of replacement water tanks and associated infrastructure. TasWater has been engaging with key stakeholder Glenorchy City Council to plan the decommissioning of the dam. Despite the fact that the Glenorchy City Council is currently in administration, TasWater has indicated that this is not impeding its engagement with Council staff and discussions are continuing around Council's proposed Master Plan for the site. There will likely be some ongoing uncertainty over the timelines for finalising this project as these discussions continue.

Options Analysis

Various options have been considered since 2005, however the predominant option was decommissioning of the dam and construction of replacement water tanks. As an interim measure to reduce risk, the operating level of the dam was lowered, initially by 0.5m, however the impact this lowered operating level had on the risk hazard rating of the dam was uncertain as no specific risk assessments had been conducted. The key alternative options considered involved reducing the dam operating level, covering the dam, and alternative sites for the replacement tanks.

In 2016/17, a risk assessment investigation was conducted for the dam which identified that, to adequately mitigate the risk of the dam, the operating level needed to be reduced by 5m. The dam level was subsequently lowered over the period from late 2016 to early 2017. Decommissioning of the dam was still scheduled to be completed by June 2018. TasWater has indicated that the primary reason for decommissioning is to reduce the number of dams that are above the ANCOLD limit of tolerability for societal risk (a high priority outcome for customers). Decommissioning enables TasWater to reduce the operational expenditure associated with managing the dam safety risk in the interim (e.g. monitoring and other compliance activities).

Business Case

The business case supplied by TasWater was version 01 which was developed during April 2014 and approved for acceptance by the Board on 15 April 2014. It does not appear that any further updates to the business case have been made since this time.

Cost Estimates

Cost estimates for the required works of \$23.95m were developed in the 2014 business case and set out in a supporting NPV assessment. The costs appear to have been developed internally based on unit rates, presumably from similar projects or an internal database of

rates. Costs for the replacement water tanks were extrapolated from budget quotes for larger tanks from a tank constructor.

No evidence of a peer or independent review of the costs was provided however the TasWater Finance team do provide sign off on NPV assessments.

The project does not appear in the LTSP model presumably given that there is no proposed expenditure in PSP3. The project is identified in the PSP3 submission (refer Appendix 11) as having no further expenditure allocated beyond 2016/17 for a total PSP2 expenditure of \$9.96m. Further, the project is listed (refer Table 22 of PSP3) as one of the largest deferrals of expenditure in PSP2 and asset disposals are registered in 2017/18 for the Tolosa Dam (refer Table 65 PSP3).

TasWater provided updated actual cost estimates in September 2017 indicating that the final cost was expected to be around \$13.7m depending on the remaining decommissioning costs.

Project delivery process

This project has been in planning for some time with the 2014 business case assuming full project delivery by June 2017 (2016/17) on the basis of the following program:

Land acquisition – September 2014	Statutory approvals – March 2015
Tender preparation – March 2015	Tender award – June 2015
Earthworks – March 2016	Tank 1 & related works – September 2016
Tank 2 – March 2017	Dam decommissioning – June 2017

A Dam Safety Management Plan Annual Progress Report FY2015-16 (dated April 2016) supplied by TasWater indicates that the replacement of tanks commenced in early Q3 2015/16 and proposed tasks for the 2016/17 year included developing a decommissioning / divestment strategy. This report also identifies that the decommissioning of the dam is yet to be approved.

A Dam Safety Improvement Program dated December 2016, however, states that the only works carried out from 2014-2016 (presumably between versions of the Improvement Program) was the risk assessment which led to the reduction in operating supply level of 5m over late 2016 to early 2017. Proposed decommissioning of the dam is scheduled for 2017/18.

TasWater advised during the interviews that design consultants had been procured during early 2017/18 and that construction contractors were to be procured during late 2017/18 to undertake required works. Further a project timeline was provided which indicates:

- Decommissioning planning and discussions – Dec 2015 to Jan 2017
- Decommissioning Plan – Jan 2017 to May 2017
- Contract scope bulk earthworks – Jun 2017 to Sep 2017
- Empty dam – Sep 2017 to October 2017 (from reduced level over Oct 2016 to Jan 2017)
- Dam removal final design – Oct 2017 to Nov 2017

- Tender process and award – Nov 2017 to Dec 2017
- Decommissioning works – Jan 2018 to Apr 2018
- Park rehabilitation – initial – Jan 2018 to Apr 2018 (Glenorchy City Council to take over works from Apr 2018)

TasWater's YourSay website provides updates on projects to residents and interested customers. The Tolosa Water Supply Upgrade Project site indicates that:

- Early November 2016 Tank construction well underway (photographs uploaded to site).
- February 2017 (the latest web update) construction of the two tanks was almost complete with finalisation of landscaping and painting works expected by March 2017.
- April 2017 (forecast completion) pipeline component of the works was expected to be completed.
- TasWater is working with Glenorchy City Council on a plan to decommission the dam.

As identified above, the expected decommissioning completion date is by June 2018.

Summary

This project is important to TasWater in reducing the risk hazard or Level of Tolerability of dams in urban areas. The project has been highlighted as a good example of where TasWater has identified that project solutions can be delivered for significantly lower expenditure than originally proposed. TasWater has indicated that the full decommissioning of the dam is part of a strategy to reduce the number of dams owned that are above the ANCOLD limit of tolerability for societal risk and to reduce the ongoing operational expenditure related to managing the dam safety risk.

There is some uncertainty across the documentation provided as to the level of works completed for this project. The most recent document provided indicates that the only works completed between January 2014 and January 2016 were that the operating supply level of the dam has been reduced by 5 metres to adequately mitigate the dam safety risk (lowering the risk below the Level of Tolerability). At the date of this draft report, the YourSay website project page for Tolosa Dam indicates that tank and pipeline construction works were expected to be completed by April 2017. TasWater provided an update to this review in September 2017 indicating that the decommissioning process remained ongoing with expected completion by June 2018. A further update in October 2017 indicated that the construction and commissioning of the tanks was complete. It would be helpful to bring TasWater's YourSay web site up-to-date on this project. There remains a defect liability issue to be resolved with the Berriedale pit expected to be addressed in mid-October, after which practical completion and commission will be achieved for all aspects of ancillary pipeline works.

Details of actual costs over PSP2 (as presented in Appendix 11 of PSP3) indicate that final costs were incurred in 2016/17 (no expenditure forecast for 2017/18, or beyond – as per LTSP model), however during the interviews it was indicated that procurement of designs was progressing with expected completion in November 2017 and final works completion in

April 2018. TasWater has indicated that the current estimated total cost of \$13.7m compares well with the original total cost estimate of \$23.9m.

3.3 Proposed capital expenditure in PSP3

TasWater's proposed capex for PSP3 shows an overall increase compared to PSP2 as highlighted in Figure 3 above. According to TasWater, this is driven by a significant shift in focus from growth related capex to compliance related capex in PSP3.

The rationale for the prioritisation of the capital projects included in PSP3 capex is driven by the LTSP model, which aims to deliver services in line with customer expectations. The forecasts PSP3 capex by activity stream is provided below:

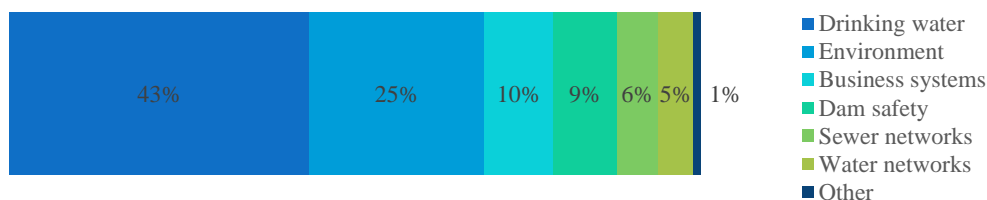


Figure 6 Forecast PSP3 Capex by Priority Stream

3.3.1 Prudence and efficiency review of capital expenditure in PSP3

Arup has selected a sample of capital projects proposed to be undertaken across the PSP3 regulatory period. This sample included a number where expenditure was delayed commencing, where capital prioritisation models have recommended deferral.

The projects in our sample were:

- Bryn Estyn WTP Upgrade.
- Facility, Fleet and Plant Renewals.
- Forth WTP Upgrade.
- Non Network IT Upgrades.
- Pardoe Sewer.
- Pet Dam Upgrade.
- SCADA Renewals Program.
- STP Renewals Program.
- Water Network Renewals Program.

The sample of projects was discussed at the interviews with TasWater staff and supporting information for each project was submitted.

The following sections outline our review and general findings for each of these projects.

3.3.2 Bryn Estyn WTP Upgrade

Financials and program

Previous Budget (\$'000s nominal):

-

Previous Delivery Date:

FY22

Actual Forecast Budget (\$'000s nominal):

\$108,431 (PSP3)

Forecast Delivery Date:

FY22

Table 11 Capital expenditure for Bryn Estyn WTP

Source: Table 32, *Draft Price and Service Plan 3*

	PSP2			PSP3			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital expenditure	-	-	-	5,922	6,307	96,202	-	108,431

Key Information

Investment Driver

Based on TasWater's catchment risk assessment, Bryn Estyn WTP has insufficient microbial treatment to mitigate the risk of a public health incident in accordance with the health based targets (HBTs) developed by the Water Services Association of Australia (WSAA). There have also been 46 *E. coli* detections in the Bryn Estyn system since 2010. The primary driver for this project is therefore compliance with the Public Health Act 1997 and associated Tasmanian Drinking Water Guidelines and Australian Drinking Water Guidelines

In addition, the age and condition of some of the infrastructure is nearing end of useful life.

Intended Outcome

An additional 23.7% of TasWater customers will receive water that is supplied by a system with acceptable public health risk based on the HBTs and fully compliant with the drinking water quality guidelines

Current Project Status

Construction forecast to commence 2020/21 with completion in 2021/22 (PSP4)

Procurement Process

A procurement review is currently underway to determine the optimal approach for this project

Project Details

Strategic Planning

The Bryn Estyn WTP services approximately 58,000 water connections. The plant was built in 1963 and has only been maintained since commissioning, that is, there have not been any significant upgrades to this plant.

TasWater is preparing a Greater Hobart Water Supply Strategy and Plan which states that:

There are business challenges where peak summer demands exceed capacity in some sections of the network, where major infrastructure such as Bryn Estyn Water Treatment Plant continues to age with inherent resilience issues, and where there are high risk dams.

The Bryn Estyn WTP upgrade is dependent on the outcomes of the Greater Hobart Water Supply strategy and further progression of the upgrade works are being deferred until the strategy is complete. Documentation supplied by TasWater indicates the following timelines for the Greater Hobart Water Supply Strategy:

- Gate 0 Capital Project Prioritisation Bid – 1 May 2016 – seeking funding for engagement of consultant to develop the strategy with expected completion in 2015/16.
- Greater Hobart Water Supply Strategy & Plan – Project Brief – Version 1.0 dated 28 July 2017 with no updated forecast completion date (originally prepared 2 March 2016 with expected completion by 30 December 2016).
- Bryn Estyn WTP upgrade – project status and next steps – briefing note dated 26 June 2017 – references Greater Hobart Water Supply Strategy currently underway with expected completion date in early 2018 (2017/18 end of PSP2).

Options Analysis

Three options presented in concept design report:

- Option 1: Organics removal with intermediate ozonation;
- Option 2: Organics removal with pre- and post ozonation; and
- Option 3: Organics removal with pre- and post ozonation (with MF/UF).

The options identified in the concept design report represent the scope of most likely options that would be investigated further once the project progresses (given current knowledge about the plant and its operation and excluding any potential recommendations of the Greater Hobart Water Supply Strategy (which is not yet complete). The objective of the concept design report is to provide a slightly more detailed cost estimate for inclusion in PSP3 than the simplistic \$/ML cost curve approach previously applied.

Business Case

The project remains in Phase 1 (Project Scoping) of the Project Generation Framework and will remain so until the Greater Hobart strategy is completed and the outcomes of the strategy are assessed in relation to the Bryn Estyn system. The project would then progress through Phase 1 to a Gate 1 Strategic Business Case, however the timing of these actions is unclear.

Cost Estimates

The estimated cost of the project in the LTSP Optimisation Model was initially based on a simple cost curve (\$ / ML from similar projects). This led to a high level cost estimate of \$140.7m.

Jacobs were then commissioned to undertake a high-level concept design and to develop costs for the construction components. Additional costs were taken from the Launceston Sewerage Improvement Program (LSIP) as this project had originally been developed to a reasonably advanced stage. A project cost of \$147.2m was estimated which represents an increase of \$6.5m from the original high level cost estimate.

The cost profile for the project was then adjusted to bring forward approximately \$25m from 2021/22 (PSP4) into 2020/21 (PSP3). This cost profile reflects the profile reported in Table 32 of PSP3 but not the profile reported in Appendix 12 of PSP3 or the LTSP model provided by TasWater, both of which report the original cost estimate of \$140.7m.

Given the relatively small increase in the project cost from the high level concept design report (4.6%) and the uncertainty around the timing of both the Greater Hobart Water Supply strategy completion and the investigation of actions arising out of the strategy, Arup is inclined to recommend that the cost profile currently included in the LTSP model supplied and reflected in Appendix 12 of the PSP3 submission remain as the approved profile.

Project Delivery

The next steps presented at the interview comprise:

- Completion of the Greater Hobart Water Supply Strategy (currently underway and expected to be completed in early 2018).
- Increasing water quality sampling (data gathering) and confirmation of the log removal requirements to meet HBTs.
- Gate 1 documentation (strategic business case).
- Gate 2 documentation (final business case including design and refined cost estimate for preferred option).
- Procurement, construction, operation and post-implementation review.

Summary

The Greater Hobart Water Supply System provides water to a population of 220,000 via a 6,500 km water infrastructure network. The system has served the Greater Hobart community well but is now experiencing issues. The Bryn Estyn project seeks to address some of these issues, particularly given water quality issues arising at this plant.

The Bryn Estyn project is at a relatively early stage of development with the outcomes of the Greater Hobart Water Supply Strategy likely to have a significant impact on the project and potentially adjust the options that are considered feasible.

Given the uncertainty around the timing and likely outcomes of the strategy, and the actions required to reassess the Bryn Estyn project as a result of the strategy outcomes, Arup is inclined to recommend that the current cost profile identified in the LTSP model supplied and as outlined in Appendix 12 of the PSP3 submission.

3.3.3 Facility, Fleet and Plant Renewals

Financials and Program

Previous Budget (\$'000s nominal):

\$15,180 (PSP2)

Previous Delivery Date:

Ongoing

Actual Forecast Budget (\$'000s nominal):

\$13,535 (PSP3)

Forecast Delivery Date:

Ongoing

Table 12 Capital expenditure for Facility, Fleet and Plant Renewals

Source: Table 34, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	5,780	5,300	4,100	4,686	4,369	4,480	15,180	13,535

Key Information

Investment Driver

Replacement / renewal, improvements or disposal of TasWater's facility, fleet, and plant related assets including:

- Fleet, plant and equipment renewal – ensure assets are fit-for-purpose and safe to operate
- Minor plant and equipment – replace and improve (newer technology) where needed
- Buildings and facilities – renewal of fixed plant, access roads, ground maintenance and security

Intended Outcome

Ensure assets are fit-for-purpose and safe to operate

Current Project Status

Ongoing

Project Details

Strategic Planning

The Facility, Fleet and Plant renewals program contains funding for three main areas, that is:

- Fleet – passenger vehicles, utility vehicles, and trucks (representing 60% of budget).
- Minor Plant and Equipment (representing 10% of budget).
- Building and Facilities – keys and locks, property, buildings (representing 30% of budget).

Options Analysis

While TasWater has forecast a requirement for more vehicle renewals than has historically been spent on this program, it has limited the budget available for these renewals to enable an

increased overall focus on water quality, dam safety and environmental compliance. Given this limited budget, expenditure is prioritised to the areas of greatest risk (e.g. health and safety compliance). This appears to be a prudent approach to the vehicle renewal program.

The risks of not proceeding with the renewals expenditure have been identified by TasWater and include:

- delays in replacing vehicles and plant increase the risk of operational failures, increased vehicle downtime and increased operating costs.
- potential non-compliance of building code & regulations if facilities issues are not addressed – potentially resulting in closure of business critical facilities affecting customer service.

TasWater provided documentation indicating that it had begun the process of a business wide fleet review (a scope of work was submitted dated 10 May 2017) which has the following objective:

'to examine whether non-executive passenger and operational fleet is operationally justified, efficiently managed and in turn to develop an industry standard policy and guideline with a view to improving efficiency and reducing operating costs where appropriate and sustainable.'

This fleet review would therefore be expected to inform the options analysis for fleet replacement and to suggest a suitable fleet size. It is noted that the proposed scope of works identifies a rapid reduction plan targeting a 5-10% reduction of the passenger fleet within 60 days of commencing the review.

Information supplied by TasWater indicated that the current fleet consists of approximately 760 vehicles, which includes both larger trucks, work utility's (4WD and 2WD) and passenger vehicles. This is a relatively large number of vehicles for the number of staff within TasWater. Information on staff numbers provided as part of this review indicates that there are approximately 912 FTE (refer section 7.3.1 PSP3). A quick calculation reveals that TasWater currently has 1 vehicle for every 1.2 FTEs, which is a very high ratio, particularly when considering that a large proportion of staff will not have positions that require the use of a car.

The 2015 WSAA benchmarking study of other utility organisations indicated that the average proportion of vehicles to staff was around 1:3 FTE. More detail of the WSAA benchmarking study will be discussed in Section 4.3.3 of the operating expenditure review. If TasWater were to move to a similar ratio of vehicles to staff, the resulting reduction in fleet would be approximately 456 vehicles to a total of 304 vehicles. Whilst this scenario is unlikely (in the short term at least), a move to a ratio of 1:2 would likely be more achievable in the upcoming regulatory period. This ratio of one vehicle for every two staff would result in a fleet reduction of 304 vehicles to a total of 456 vehicles, equating to a reduction in fleet of approximately 60% total. This suggested reduction per year is consistent with the proposed fleet review scope, which identified the potential for a 5-10% reduction in the first 60 days.

The specific approaches to options assessment for other elements of this renewal programme are not clear from available information. The exception to this is property disposal for which options were listed in a briefing note, albeit these options were simply different real estate vendors to use for auction.

Business Case

No original business case for this ongoing program was supplied however expenditure has been generally steady or decreasing for this program over the past few years.

The various renewal elements of the programme are usually initiated via a capital program definition form, several examples of which were provided for review.

Cost Estimates

As with other renewal programs, the Facility, Plant & Fleet renewals budget is directly entered in the LTSP model. Applying the same prioritisation approach to these renewals is difficult as they are unlikely to directly contribute to increasing compliance with service targets. As a result, there is no expenditure specified in the LTSP model for this program apart from the costs to date and some expenditure identified in 2026/27-2028/29. However, Arup would have expected that the proposed expenditure for this renewals program be directly entered into the LTSP model as per all the other renewals programs like the Sewer and Water Treatment Plant programs.

The PSP3 submission also does not identify any forecast expenditure on fleet replacement, even though the size of the program across PSP2 made it one of the top 10 projects Arup reviewed. It is therefore difficult to directly assess the cost estimates of the program without a definite program of expenditure identified. TasWater is planning to undertake the second stage of their Fleet Review that will focus on the immediate and ongoing savings and how best to prioritise investment to address saving issues. The review is expected to take 4-6 weeks, with the quantum of savings to be confirmed in November 2017.

An undated Capital Program Definition Form was supplied by TasWater for the Fleet Renewal Program, however given that the cost profile reported is in \$2014/15, this form is out of date for the next regulatory period.

Project Delivery

A number of the program activities of the ongoing renewal program are delivered via the minor works process whilst others proceed via the overarching program. Evidence has been provided of capital program definition forms being completed to progress these activities though this provides limited evidence of the project delivery process per se.

Summary

This program of renewals is important as it contributes to the health and safety of TasWater staff particularly those located in field based operational roles. TasWater's policy of ensuring their fleet is moving towards vehicles with ANCAAP 5 star ratings is sound and will contribute to increased staff safety and comfort. In addition, the renewals, decommissioning or disposal of assets including under-utilised property contributes to more efficient operations and lower ongoing operational costs.

The number of vehicles within TasWater's current fleet is high by comparison to other utilities. The scope of works for the Fleet Review notes that a 5-10% reduction in fleet could potentially be achieved within 60 days. Given the benchmark comparisons, this reduction may be significantly higher in the medium-term.

Considering that TasWater has not completed its fleet review there is an opportunity to set a fleet reduction target in PSP3. Arup proposes a reduction in TasWater's fleet from 760 vehicles to approximately 456 vehicles, representing a fleet reduction by 40% in vehicle numbers over PSP3 and equivalent to an end point of one vehicle for every two staff.

This proposed reduction in fleet would have the following impact on expenditure:

- Assume business as usual for PSP3 reflects TasWater's proposed expenditure in PSP3 = \$13.54m.
- TasWater identified that 60% of program cost goes to fleet = \$8.12m.
- Proposed reduction by 40% of proposed PSP3 fleet capex = \$4.87m reduction.

Table 13 Summary of facility, fleet and plant renewals capex for PSP3 (\$'000 nominal)

Facility, Fleet and Plant Renewals	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater	4,686	4,369	4,480	13,535
Arup	2,999	2,796	2867	8,662
Proposed adjustment	-1,687	-1,573	-1,613	-4,873

3.3.4 Forth Water Treatment Plant (WTP)

The Forth WTP was built in 1981, with the only refurbishment works since commissioning being a filter refurbishment in 2010. This project involves an upgrade of the plant and dependencies to ensure compliance.

Financials and Program

Previous Budget (\$'000s nominal):

\$3,373 (PSP2)

Previous Delivery Date:

N/A

Actual Forecast Budget (\$'000s nominal):

\$72,542 (PSP3)

Forecast Delivery Date:

FY21

Table 14 Capital expenditure for the Forth Water Treatment Plant (WTP)

Source: Table 32, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	-	-	3,373	3,910	45,934	22,698	3,373	72,542

Key Data

Investment Driver:

Forth WTP has insufficient microbial treatment to mitigate risk of a public health incident. There have also been seven *E. coli* detections in the Forth System since 2010. The primary driver for this project then is compliance with the Public Health Act 1997 and associated Tasmanian Drinking Water Guidelines and Australian Drinking Water Guidelines.

Intended Outcome

Upon completion, an additional 7.5% of TasWater's customers will receive water that is supplied by a system with acceptable

public health risk based on the HBTs and fully compliant with the drinking water quality guidelines.

Current Project Status Based on the Preliminary Findings Report the project is in Phase 1 (early planning) moving to Gate 1 Strategic Business Case. Commencement in 2018/19 with completion by 2020/21 (end of PSP3).

Project Details

Strategic Planning

The Forth WTP sources raw water from the Mersey/Forth River downstream of Lake Palooka. A catchment assessment has not been fully developed at this stage. Until this is completed the Mersey river source has been assessed as an unprotected catchment and assigned a category 4 under the Health Based Target (HBT) guideline developed by the Water Services Association of Australia (WSAA).

The Forth WTP upgrade project has been classified as a high priority in the LTSP. The project aligns with the expectations of the drinking water quality regulator, the Department of Health and Human Services (DHHS).

The project helps to deliver TasWater's customer promise to 'Provide you with safe drinking water and responsibly manage your sewage'. In particular, this project aligns with the customer outcome of 'Your drinking water is clean and safe to drink' by contributing to the following measure of success: Percentage of customers where a tolerable health based target (HBT) has been achieved.

The development of this option is highly dependent on the outcomes of the Greater Launceston Water Supply Strategy, but the linkage between this strategy and a regional Forth Water Supply Strategy is unclear.

TasWater is currently preparing a regional study covering the Fourth WTP. The Forth WTP project is currently in Phase 1 of the Project Generation Framework.

Options Analysis

The two options presented in the high level concept design report:

- Option 1: Organics Removal with Immediate Ozonation; and
- Option 2: Organics Removal with Pre - and Post Ozonation.

From the concept design report it appears that Option 2 has been selected from the concept design. However, there are no clear steps which identifies which option has been selected, as the costing presented is not for a specific option. The objective of the high level concept report, however, is to identify and represent the scope of most likely options that would be investigated further once the project progresses (given current knowledge about the plant and its operation and excluding any potential recommendations of the Greater Launceston Water Supply Strategy (which is not yet complete). The objective of the concept design report is to provide a slightly more detailed cost estimate for inclusion in PSP3 than the simplistic \$/ML cost curve approach previously applied.

Business Case

The project remains in Phase 1 (Project Scoping) of the Project Generation Framework and will remain so until the Greater Launceston Water Supply strategy is completed and the outcomes of the strategy are assessed in relation to the Bryn Estyn system. The project would then progress through Phase 1 to a Gate 1 Strategic Business Case, however the timing of these actions is unclear.

Cost Estimates

The estimated high level cost of the project in the LTSP Optimisation Model was initially based on a simple cost curve of \$/ML treated.

When Jacobs were commissioned to complete a high-level concept design to develop costs, integrating indirect costs from similar projects, the cost assessment changed quite significantly. They estimated a project cost of \$67.2m representing a decrease of \$25.9m from the original cost estimate.

However, more work is scheduled to be completed as a high priority to refine the problem statement, options identification / assessment and design for the Forth WTP upgrade project. The estimated cost will be refined as these activities are progressed.

Project Delivery Process

The cash flow for the project is based on the following deliverability and timeframe:

- Investigations and planning culminating in an indicative preferred option and Gate 1 documentation (strategic business case) - FY17 into FY18.
- Planning, design and selection of a procurement strategy culminating in Gate 2 documentation (final business case). Under our Capitalisation Policy, most activities after identification of a preferred option can be capitalised - FY18 into FY19.
- After approval of the business case, complete tendering, contractor engagement and contract negotiation - FY19.
- Construction (year 1) - FY20.
- Construction (year 2), commissioning and post-implementation review - FY21.

Summary

The Forth WTP services approximately 18,000 water connections in Forth, Devonport, East Devonport, Latrobe and Port Sorell. The Forth WTP also supplements the Gawler WTP during the summer peak demand periods.

Although this project is early in the planning phase, it is a high priority project, with internal and external resourcing allocated accordingly.

The final scope of works for the project is highly dependent on the outcomes of the Greater Launceston Water Supply Strategy, the status of which is unclear. Given this uncertainty and the potential reassessment of the Forth project required after the outcomes of the Greater Launceston strategy have been established, there is the possibility that the current capital expenditure profile might be deferred and re-profiled to reflect a potential change in the timing of works.

3.3.5 Non Network IT Upgrades

Financials and Program

Previous Budget (\$'000s nominal):

\$6,027 (PSP2)

Previous Delivery Date:

Ongoing

Actual Forecast Budget (\$'000s nominal):

\$7,439 (PSP3)

Forecast Delivery Date:

Ongoing

Table 15 Capital expenditure for the Non-network IT upgrades

Source: Table 34, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	4,001		2,026	2,130	2,621	2,688	6,027	7,439

Key Information

Investment Driver

Renewals of essential ICT infrastructure including equipment and minor software (excluding SCADA). The project is driven by the strategic objective to implement ICT solutions that assist TasWater achieve their business outcomes, improve operational efficiencies and reduce the cost to serve clients.

Intended Outcome

Maintenance of the essential ICT infrastructure supporting core business systems and processes. The project aims to enable business productivity.

Current Project Status

This is an ongoing program of renewals.

Project Details

Strategic Planning

Program includes funding for IT equipment renewal and minor software upgrades (except SCADA). Although this program does not align with the TasWater focus on water quality, dam safety and compliance, it has been included in the LTSP. The program supports the delivery of TasWater's Customer Promises and Customer Outcomes, aiming to provide value for money as well as minimising price increases, as stated in the 2018-2020 Corporate Plan. TasWater is currently developing a comprehensive ICT strategy in order to align ICT investment with immediate, medium and long term business objectives.

TasWater's IT team have developed a strategy document that includes an IT roadmap. PSP3 program includes data centres, data storage, area networks, upgrading SCADA communications network (separate from the corporate network), telephone systems, robust communications systems, key software implementation including Maximo, LTSP model and PARMS, and cognitive computing / AI decision making being near term items to assess.

Options Analysis & Business Case

TasWater has recently received proposals from consultants to assist in the development of a future-proof ICT strategy. The contract is expected to be awarded in November, and the strategy to be developed by the end of December 2017. Thus at this stage the development of an options analysis has been limited and there's no business case for Arup to assess.

Cost Estimates

Cost estimates for the ongoing program are based on a broad IT strategic plan and roadmap.

Program expenditure is variable with decreasing expenditure each year of PSP2 and PSP3. Proposed expenditure in PSP3 is approximately 10% lower than actuals in PSP2. TasWater's annual IT expenditure per user is relatively low when benchmarked against its peers – an average of \$6,000 per user per annum vs Australian average of around \$16,000 (based on WSAA benchmarking).

IT expenditure is directly entered into the LTSP model and is therefore not prioritised within the model. The project budget has been limited to enable overall TasWater focus to be on water quality, dam safety and environmental compliance. Hence, only IT issues of high risk, or those that have the potential to increase productivity have been prioritised. This appears to be a prudent approach.

Project Delivery Process

This is an ongoing program of renewals of ICT related assets.

Summary

The Non-Network IT renewals is a program of ongoing renewals with the purpose of supporting TasWater's core operations as well as improving overall productivity.

This project is not prioritised within LTSP optimisation model, as TasWater's focus is to make inroads on the drinking water system reliability and compliance over the PSP3 period. The level of expenditure will be reviewed in PSP4 and beyond in accordance with the outcome of the strategy expected to be completed in December 2017.

3.3.6 Pardoe STP Upgrade

The Pardoe Sewerage Treatment Plant (STP) is a primary treatment plant, with an offshore oceanic discharge. This project focuses on the required improvements to the Pardoe STP to ensure compliance.

Financials and Program

Previous Budget (\$'000s nominal):

\$0 (new project in PSP3)

Previous Delivery Date:

N/A

Actual Forecast Budget (\$'000s nominal):

\$24,702 (PSP3)

Forecast Delivery Date:

FY23

Table 16 Capital expenditure for the Pardoe STP
Source: Table 33, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	-	-	-	533	9,611	14,558	-	24,702

Key Information

Investment Driver

The primary driver for this project is compliance with the environmental conditions for this plant specified as a legal instrument by the EPA.

Effluent compliance performance at Pardoe has normally been described by TasWater in reference to non-compliance with maximum permissible limits for BOD5 and suspended solids (SS), with 59% compliance reported for the period July 2015 to June 2016 and 43% compliance reported for the 2014–15 period.

However, the greatest quantitative absolute non-compliance within this period is associated with the median (50 percentile) Oil & Grease (O&G) limits, for which plant compliance is 42 per cent for 2015-16 and 0 per cent for 2014–15.

In fact the STP's compliance is lowest across all records when measured in relation to the median and 90 percentile O&G limits.

Intended Outcome

Upon completion, an additional 3.113% of the state wide effluent volume will comply with EPA requirements.

Current Project Status

Project is in Phase 1 (early planning) moving to Gate 1 Strategic Business Case. Commencement is expected in FY19 with completion by FY23 (middle of PSP4) but approximately 71% of costs are within the PSP3 period.

Project Details

Strategic Planning

As Pardoe is a primary treatment plant, one of TasWater's 'Big 13' sewerage plants, it has been investigated by the Sewerage System Optimisation Program work group. After reviewing the long term plan, the inclusion of this project has been confirmed. The group has made a number of process optimisation recommendations and suggestions for future improvements. Further improvement in plant compliance is reasonably expected following commissioning of the proposed sewerage system optimisation capital works. The LTSP modelling includes these works as a separate project (outside the scope of this project), and has set the Pardoe Sewer Improvement Plan to a high priority.

The project helps to deliver the customer promise to 'Provide you with safe drinking water and responsibly manage your sewage'. In particular, this project aligns with the customer outcome of 'Your sewage is treated and disposed of with minimal impact to the environment

and its users' by contributing to the following measure of success: Treated wastewater volume compliant with EPA requirements (percentage).

Options Analysis

The concept design report only presented one option which was outlined and subsequently costed. However, more work is scheduled to be completed as a high priority to refine the options identification.

As part of the options assessment, two nearby (and non-compliant) plants will also be assessed for rationalisation and transfer of flow to Pardoe STP. If this proves to be economically efficient, it will improve compliance by an additional 0.627% (Port Sorell) and 0.457% (Latrobe).

Business Case

No business case provided. Note: Gate 1 documentation (strategic business case) listed under the next steps was presented at the interviews.

Cost Estimates

The original costs based on simple cost curve (\$/ML) from similar projects. In-direct costs calculated as a percentage of direct costs in line with estimates from Launceston Sewerage Improvement Project.

When Jacobs was commissioned to complete a high-level concept design to develop costs in order to improve the accuracy of the cost estimate and identify a pragmatic delivery timeframe. Jacobs estimated a real project cost of \$31.4m (FY 17) and a nominal project cost of \$34.7m. These represented decreases of \$4.9m and \$5.7m respectively from the original real and nominal cost estimates.

However, the project is early in the planning process and some more work is required to refine the problem statement, options identification and assessment, design, cost estimate and business case (including NPV analysis of options), thus the decrease in cost estimation can change.

Project Delivery Process

The cash flow for the project is based on the following deliverability and timeframe:

- Completion of the regional strategic work. Investigations and planning, culminating in an indicative preferred option and Gate 1 documentation (strategic business case) - FY18 into FY19.
- Planning, design and selection of a procurement strategy culminating in Gate 2 documentation (final business case). Under TasWater's Capitalisation Policy, most activities after identification of a preferred option can be capitalised - FY19 into FY20.
- After approval of the business case, complete tendering, contractor engagement and contract negotiation - FY2019/20.
- Construction (year 1) - FY21.
- Construction (year 2) - FY22.

- Finalise construction, commissioning and post-implementation review - FY23.

Summary

The Pardoe STP serves about 10,500 tenements and 23,000 customers in Pardoe (14 ML/day ADF). Non-residential flows account for about 60% of the total flow to the plant and include large trade waste customers.

Although this project is in its early stages it has been given as high priority.

The options assessment presents a clear gap, with only one option identified and costed. It is clear the options and costing needs to be refined in the following stages of the project.

3.3.7 Pet Dam Upgrade

Pet Dam is a key component of the water supply system for the city of Burnie, located south of Burnie on the Pet River. This project will aim to ensure that the Pet Dam meets safety requirements, as it has been identified as high risk.

Financials and Program

Previous Budget (\$'000s nominal):

\$0 (new project in PSP3)

Previous Delivery Date:

N/A

Actual Forecast Budget (\$'000s nominal):

\$100 (PSP2)

\$7,730 (PSP3)

Forecast Delivery Date:

FY20

Table 17 Capital expenditure for the Pet Dam
Source: Table 32, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	-	-	100	3,728	4,002	-	100	7,730

Key Information

Investment Driver

A dam safety review (DSR) undertaken in 2015 by Entura (Neupane, 2015) indicated that the risks associated with Pet Dam were not tolerable. Societal risk and individual risk were above the limits recommended by ANCOLD (2003). Entura estimated in 2015 that the annual probability of dam failure was 1.3×10^{-2} , posing a financial risk of \$437,000 per annum¹². The DSR recommended upgrades to the dam and spillway to reduce the risks to tolerable limits.

¹² The ANCOLD Guidelines approach to measuring dam risk looks at societal risk (probability of lives lost pa), individual risk (or personal probability of death pa) and financial risk (potential cost pa) from the probability of a dam failure under flood, earthquake and other causes, and provides minimum acceptable or tolerable levels of risk which should be accepted through approaches to dam design and/or maintenance.

TasWater noted that while few people are at risk, Pet Dam is one of their highest risk dams, falling within the second highest consequence category, Category C.

Intended Outcome

TasWater plans to reduce the risks posed by Pet Dam to tolerable levels as recommended by ANCOLD (2003).

Current Project Status

Business case was approved in August 2016 and TasWater are currently preparing a RFT with design specs. Construction is planned to commence in FY19 and conclude in FY20.

Project Details

Strategic Planning

The Pet Dam sits within the dam safety improvement program. The program is based on the following requirements and plans:

- Water Management Act 1999;
- Water Management Regulations 2015 (referencing ANCOLD Guidelines);
- The Corporate Plan FY2018/20; and
- Long Term Strategic Plan Report.

The Pet Dam project is part of the top 28 major capital projects in the FY2018-2020 Corporate Plan. The plan outlines that the objective of the PSP3 for the third regulatory period 1 July 2018 to 30 June 2021 is to deliver funding for improved drinking water, environmental performance, safer dams and ongoing customer service improvements. Dam safety projects have also been identified in the Long Term Strategic Plan as a priority.

Options Analysis

The four main options presented in the Options Assessment conducted by Entura are:

- Option 1: Do nothing;
- Option 2: Full dam upgrade in accordance with Pet Dam – Dam Safety Review;
- Option 3: Lowering the Full Supply Level (FSL) and Maximum Flood Level (MFL) of Pet Dam to achieve dam safety requirements and supplement the loss of storage capacity by utilising supply of water from Guide Dam; and

If Option 3 does not meet the demand, Option 4 needs to be analysed.

- Option 4: Lowering the FSL and MFL of Pet Dam to achieve dam safety requirements and raise Guide Dam to supplement the loss of storage capacity at Pet Dam.

If Option 4 also does not meet the demand, then Option 4A needs to be analysed:

- Option 4A: Lowering the FSL and MFL of Pet Dam to achieve dam safety requirements and source additional supply from nearby water resource (e.g. Guildford Dam) to supplement the loss of storage capacity at Pet Dam.

An NPV analysis was conducted for Option 2 and 3. Since Option 3 using the Guide Dam as supplementary source of supply met the demand, Options 4 and 4A were not analysed. The results identified Option 2 as the most financially attractive option, providing room for future growth in demand, whereas Option 3 with targeted intervention will require more water to be drawn from Guide Dam to meet the growth in demand. As a result, Option 3 has been recommended.

Business Case

The TasWater Board approved the Pet Dam Upgrade Project, with the preferred option being Option 2.

Cost Estimates

The cost estimates and NPV analysis for each option are based on the project being completed by 30 June 2019. The Entura Options report identified that the total estimated cost of the project would be \$5.48m, with the upper and lower limit suggested as \$7.13m and \$3.84m respectively.

The Business Case provides an updated total cost estimate seeking approval of \$7.26m (including a 30% contingency). However, the total funding requested and approved for the project as part of the Business Case is \$7.71m. Timing of expenditure has not been outlined in the documents provided, having been only documented from the interviews in the Preliminary Findings Report.

Project Delivery Process

The Business Case outlines a proposed Work Plan which, while now out of date, details the steps required from Business Case approval to completion of work. The steps are:

1. Business case approved by Board - August 2016
2. Preliminary design and assessment - January 2018 (16 Months)
3. Obtain DPIPWE (ACDC) Terms of reference - January 2018 (16 Months)
4. DPIPWE (ACDC) application and preparation for submission - April 2018 (19 Months)
5. Detailed Design - September 2018 (21 Months)
6. Tender preparation - November 2018 (23 Months)
7. Go to market - December 2018 (24 Months)
8. Tender Award - February 2019 (26 Months)
9. Construction and Commissioning - June 2020 (46 Months)

Based on the commencement date in FY18 proposed in the business case (starting with detailed design), the project should be completed in FY20 (June 2020).

Summary

Pet Dam is located 13km south of Burnie on the Pet River. It is a key component of the water supply system for the city of Burnie. This project is essential to ensure that the Pet Dam

meets safety requirement, with project appearing to be prudent as it has been identified as high risk.

The preferred option is for the full dam upgrade as recommended in the Dam Safety Review. This looks to be efficient considering the lowest cost option was accepted as the preferred option.

3.3.8 SCADA Renewals Program

This project aims to deliver operational excellence through the Supervisory Control and Data Acquisition (SCADA) and telecommunications systems. The SCADA and telecommunication systems provide remote monitoring and control of most water and sewerage systems, system analysis, automation of key process, fault location and response.

Financials and Program

Previous Budget (\$'000s nominal):

\$13,568 (PSP2)

Previous Delivery Date:

N/A

Actual Forecast Budget (\$'000s nominal):

\$9,239 (PSP3)

Forecast Delivery Date:

FY23

Table 18 Capital expenditure for the SCADA Renewals Program

Source: Table 34, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	8,568	3,000	2,000	3,377	2,905	2,957	13,568	9,239

Key Information

Investment Driver

The role of the SCADA and Telecommunication systems is to optimise asset and system performance delivering real time data which can assist to manage TasWater's infrastructure in a dynamic environment. This is achieved through the use of remote monitoring and control of most water and sewerage systems to allow for improved predictive maintenance planning, system analysis, fault location and response.

An additional driver is to reach a SCADA system which enables the development of a central operations centre for TasWater.

Intended Outcome

The project intends to contribute to reduced operational risk and delivery of operational excellence as well as achieving a sewerage and water system that delivers customer value and choice as part of the operational strategy.

Current Project Status

Ongoing.

Project Details

Strategic Planning

SCADA Strategic Plan 2015-2018 published. This document is reviewed and updated every 3 years in line with the IMS documents Control Procedure.

TasWater considers that, as part of the SCADA Strategy 2015-2018 (the Strategy), it is prudent to continue the core network upgrades, legacy system migration and development of new control system interfaces to deliver better long term outcomes for both TasWater and its customers.

Future requirements for SCADA are considered in the strategy and it was deemed that the future SCADA systems will comprise the following elements:

- Endpoints;
- Telemetry communication network
- Gateways;
- SCADA servers;
- Head End master station;
- Integrated Alarm Management see ref [12];
- Data communications network;
- Historian; and
- Engineering and asset management toolsets.

Options Analysis

SCADA Strategic Plan 2015-2018 includes an options assessment which focuses on the gaps between current capability and future requirements. An options assessment sub-section identifies options for each element (these options are typically a replace on failure option, business as usual option and a varying number of investment options); however, the basis for choosing a preferred option is not made clear in the strategic plan.

A business case for the state-wide SCADA consolidation program continuation also contains an options analysis of four options which comprise:

- Option 1: Continue with current Strategic plan and implement the full SCADA program functionality and standardisation including Enterprise Historian Stage 1 Costs;
- Option 2: Suspend programme on completion of current commitments at a logical point;
- Option 3: Reduce number of SPS unmonitored sites, limit extent of standardisation of existing ClearSCADA sites, limit upgrade of non-communications infrastructure, includes Enterprise Historian Stage 1 Costs; and

- Option 4: Implement full SCADA program functionality and standardisation but limit upgrade of non-critical communications infrastructure and include the Enterprise Historian Stage 1 Costs.

Option 1 is the recommended options to complete the State-Wide consolidation of SCADA systems.

Business Case

Business case completed in 2017 which details the program to date, gaps and risk analysis and critical assumptions and constraints. Also includes an options assessment (see above) with consideration of targeted outcomes and related projects.

The business case reaches the following recommendation:

The Acting Chief Executive Officer approves the continuation of the SCADA program targeted at the consolidation of SCADA systems across TasWater to the State-Wide Head End SCADA system at an estimated capital cost of \$8.62 Million that is to be spent in the years FY18 \$2.8 Million, FY19 \$3.17 Million and FY20 \$2.63 Million with an expected ongoing indexed OPEX increase of \$0.46 million.

Cost Estimates

As with other renewal programs, the SCADA budget is directly entered in the LTSP model. However, unlike the bulk of the asset renewal programs, the SCADA program is funded at 100% of its bottom-up estimated budget. This budget has subsequently been refined slightly based on the recently developed business case.

Project Delivery Process

The business case includes the following work plan:

Milestone	Milestone	Expected month
1	Funding approved	May 2017
2	Project Team Established	June 2017
3	Project Management Plan	June 2017
4	Finalisation of Scoping documents completed for FY18 works milestones 6 – 10	July 2017
5	SCADA Panel Established	July 2017
6	Rollout of Communications Racks South in conjunction with activity 7	June 2018
7	Southern Area Citect Systems Migrated to the State-Wide Head End	June 2018
8	Southern Area WTP and STP sites to ClearSCADA Head-End	June 2018
9	50 unmonitored SPS now monitored on the State-Wide Head End	June 2018
10	Southern region Telemetry and RTU renewals Report completed	June 2018
11	Scoping documents preparation completed for FY19 works milestones 12 - 15	June 2018
12	Rollout of Communications Racks North in conjunction with activity 13	June 2019
13	Northern Citect and Rockwell Site Migration to State-Wide Head-End	June 2019

14	Northern Corporate and SCADA WAN Segregation Collapsing of the legacy Next IP network and x 3 3G devices moved to the Jasper M2M network. Migration of the Rocherlea, Tree STP, Newnham STP, Norwood STP and the Hobblers Bridge STP to the SCADA network from legacy networks.	June 2019
15	Northern ClearSCADA Migration to Head-End	June 2019
16	Scoping documents preparation completed for FY20 works Miles Stones 17 - 19	June 2019
17	North Western Citect and IFix sites migrated to ClearSCADA Gawler WTP, Pardoe STP, White Hills WTP and Zone 7 migrated to ClearSCADA	June 2020
18	NW Corporate and SCADA WAN Segregation Collapsing of the legacy Next IP network and all 3G devices moved to the Jasper M2M network.	June 2020
19	NW ClearSCADA Migration to Head-End	June 2020

Summary

TasWater has a vision of developing a “Smart Water and Sewerage Network”, delivering real time data to assist in the management of our infrastructure in a dynamic environment. The SCADA platform and technology is a key enabler of realising this vision.

The preferred option for the program is to continue with current Strategic plan and implement the full SCADA program functionality and standardisation including Enterprise Historian Stage 1 Costs.

A thorough business case has been prepared for the SCADA consolidation program which includes options analysis, risk analysis and an implementation strategy.

The current cost estimate is somewhat unclear as the business case figures differ from the figures provided in the interview notes with the business case having a detailed cost breakdown but without timing of capex (note: opex is profiled).

3.3.9 STP Renewals Program

The STP renewal program covers the renewal / replacement of assets located within the sewerage treatment plant facilities, including:

- Proactive STP asset renewal (60% of budget) – developed using STP Criticality Framework tool assessing asset criticality at process level (Inlet, PS, Treatment, etc).
- Reactive STP asset renewal (20% of budget) – identified through daily operations and inspections and response to faults.
- Condition assessment (20% of budget) – approximately 25 STPs have been fully condition assessed (out of 111 total STPs).

Financials and Program

Previous Budget (\$'000s nominal):

\$10,187 (PSP2)

Previous Delivery Date:

On-going

Actual Forecast Budget (\$'000s nominal):

\$11,664 (PSP3)

Forecast Delivery Date:

On-going

Table 19 Capital expenditure for the STP Renewals Program
Source: Table 33, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	5,476	3,301	1,410	3,860	3,871	3,933	10,187	11,664

Key Data

Investment Driver Renewal and compliance

Intended Outcome The STP renewal program covers the renewal / replacement of assets located within the sewerage treatment plant facilities.

Current Project Status On-going

Project Details

Strategic Planning

There does not appear to be a clear link between the STP renewal program budget and how it impacts on the level of service (LoS). TasWater notes that its ability to identify projects based on LoS, asset criticality, asset condition or performance is limited by data accuracy and availability.

The introduction of the STP Program Management Tool to facilitate the renewals program throughout the entire lifecycle of renewal activities from identification to delivery, will help coordinate a number of TasWater's systems and frameworks such as the AMIS, Asset Criticality Framework (ACF), PSP3, annual planning and long-term planning.

The recent development of the STP Asset Criticality Framework, will help prioritise STP expenditure in PSP3 to those assets which have a high consequence of failure, and those which are the most important for delivering the organisation's corporate, customer, and service management objectives.

Additionally, TasWater are currently in the process of developing an STP asset class life-cycle strategy that aims to deliver a renewals and maintenance program that is appropriately funded and correlates to an agreed LoS with customers and regulators.

Options Analysis

There does not appear to be options analysis for individual projects within the program. At a program level, expenditure is intended to be prioritised to areas of greatest risk reduction per dollar spend.

Business Case

There does not appear to be business cases for individual projects within the program.

Cost Estimates

Before a project is fully scoped, the preliminary cost estimations are chosen from simplistic cost ranges, based on previous, similar projects. The level of confidence in the preliminary cost estimations is generally low due to the limited understanding of the required scope of works before a business case or memorandum is developed. The cost estimation accuracy should improve as the project is progressed.

The STP renewal program is entered directly into the LTSP model and is therefore not prioritised within the model.

Project Delivery Process

No details of the project delivery process have been provided for this project. However, it is notable that the STP program information provided, which is dated July 2017, lists 81 separate projects and thus is clearly a key program.

Summary

The STP renewal program is prioritising investment to focus on water quality, dam safety and environmental compliance while the program benefits are generally related to the avoidance of risk of service failure to customers.

A key issue with the program appears to be the ability to take an evidence led approach to prioritising investment given that TasWater notes that its ability to identify projects based on LoS, asset criticality, asset condition or performance is limited by data accuracy and availability.

3.3.10 Water Network Renewals Program

The water network renewal program covers the replacement of pipes within the water supply network, including:

- Proactive water main renewal (70% of budget) – identified through risk assessment (including from PARMS renewal model) possibly 2-3 months earlier and added to program.
- Reactive water main renewal (25% of budget) – identified on site from other works (repairs, faults) and added into program.
- Condition assessment (5% of budget) – program of work to assess wall thickness, visual inspections, cathodic protection checks.

Known projects exceed the program budget and thus the focus is on water quality, dam safety and environmental compliance.

Financials and Program

Previous Budget (\$'000s nominal):

\$13,126 (PSP2)

Previous Delivery Date:

On-going

Actual Forecast Budget (\$'000s nominal):

\$11,669 (PSP3)

Forecast Delivery Date:

On-going

Table 20 Capital expenditure for the Water Network Renewals Program
Source: Table 23 & Appendix 12, *Draft Price and Service Plan*

	PSP2 (actual)			PSP3 (proposed)			Total	
\$'000 (nominal)	FY16	FY17	FY18	FY19	FY20	FY21	PSP2	PSP3
Capital Expenditure	5,156	4,200	3,770	3,863	3,872	3,934	13,126	11,669

Key Data

Investment Driver

Renewal and compliance

Intended Outcome

The program involved the replacement of pipes within the water supply network as needed.

Current Project Status

On going

Project Details

Strategic Planning

The water network renewal program does not comprise of a fixed project pipeline, instead it is an on-going program with projects being added as they are identified. As such, the below sections will provide an overview of the planning and assessment for projects considered to be included as part of the water network renewal program.

No overarching strategic planning documentation was provided for the water network renewals program.

Options Analysis

A water asset criticality framework tool is used which builds up criticality impact area scores in terms of financial; WHS and staff wellbeing; public health; customer service; compliance and legal; reputation and management effort categories. Weightings between these categories are defined which allow overall criticality scores to be reached on a scale of one to five with one being very low and five being very high. It is unclear whether the criticality framework tool relates to proactive renewal or reactive renewal. There is also no indication that option analysis is undertaken on a project by project basis.

Business Case

Evidence has been provided of business cases being undertaken for activities progressed as part of the Water Main Renewals Program. The example documentation focuses on the strategic fit of the project together with the costs and benefits of the project. Similar, albeit slightly higher level, documentation examples have been provided of Water Mains Renewal activities completing a 'Gate 1 – Activity Definition Form' which appears to be a short form business case which focuses on project aims and objectives, asset criticality, benefits and costs, funding requirements and risks of not proceeding with the project.

Cost Estimates

Cost estimates for the renewal program are developed by models including PARMS (from 2017) and are based on the kilometres of pipes recommended for renewal (to meet set service performance / KPI levels) and unit rates for pipe renewals. The Gate 1 cost estimates include a 30% contingency.

Project Delivery Process

No details of the project delivery process have been provided for this project. However, it is notable that the water main renewal program provided lists 50 separate projects and thus is clearly a key program.

Summary

The Water Mains Renewal program is prioritising investment to focus on water quality, dam safety and environmental compliance while the program benefits are generally related to the avoidance of risk of service failure to customers.

It is unclear how the renewal budget is reached and how a budget split of 70% proactive, 25% reactive and 5% condition is followed as intuitively TasWater has limited ability to control reactive maintenance.

4 Operating expenditure review

4.1 Summary of key findings and recommendations

TasWater's opex over PSP2 (both actual and forecast) are higher than expected under the prior regulatory decision process for PSP2. The primary reasons for overspend relate to additional staff numbers leading to a higher salary cost, a significant change to procurement procedures with an initial net increase in costs, and additional chemical costs which relate to additional chemical costs and volumes.

The proposed opex for PSP3 (forecast) are relatively stable at levels similar to the actual outcomes in PSP2. While there are some additional productivity savings in PSP3, these are small and offset by a staged small uplift in IT spend, and a moderate uplift due to increased customer demand.

The changes made to the original approved opex forecasts for PSP2 appear prudent, given the long-term aim to improve customer performance. The approach to PSP3 opex is also prudent as it seeks to extend the benefits arising from implementing the compliance related capex projects identified in the LTSP, and the capex replacement programs identified through the parallel planning process.

Arup has identified additional efficiency savings which could be targeted by TasWater in the latter two years of PSP3 and has recommended some reductions to opex to reflect the potential for continuing productivity and operational improvement. The proposed adjustments represent an approximate 2% reduction on TasWater's projected opex for PSP3. The breakdown of the proposed adjustments are detailed in Section 4.3.

4.2 Historical operating expenditure in PSP2

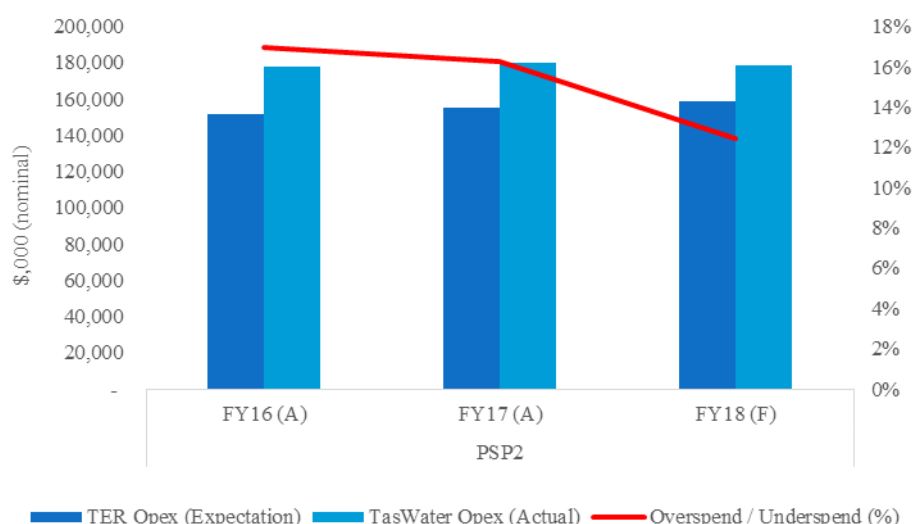


Figure 7 TasWater's expected opex vs actual opex and % overspend for PSP2

In TasWater's *Final Price and Service Plan 2015-18*, TasWater and the Regulator forecast efficient operating costs of approximately \$155m per year, effectively holding opex constant in real terms throughout the PSP2 regulatory period.

This figure was based on opex levels from the previous PSP1, and factored in a number of productivity initiatives that were expected to arise from the merging of the regional water and sewerage corporations, predominately from the following four categories:

- Salaries and related personnel expenditure through removal of duplicate management roles.
- Governance, including Board costs and regulatory fees, moving from 3 to 1 Board.
- Materials and services through more efficient procurement practices.
- Administration, including IT costs.

Efficiencies were also expected to be realised from a range of other initiatives, including:

- Mapping and standardisation of processes and systems.
- Investigation of more efficient capital works procurement and delivery processes.
- Development of Field Service Mobility Solution (FSMS).
- Purchase and implementation of an Asset Management Information System (AMIS).

TasWater's *Final Price and Service Plan 2015-18* provides a breakdown of forecast opex by major category for the base year (FY16) of forecasts in FY15 dollars. Salaries, Materials & Services and Chemicals, Power & Royalties are the major opex components.

Table 21 Base year (FY16) forecasts of Opex by activity area within each business segment (real \$'000 FY15)¹³

Opex Category	Water	Sewer	Total	Proportion
Salaries & Related Personnel Expenditure	34,191	34,549	68,740	45.9%
Materials & Services	10,517	16,402	26,919	18.0%
Chemicals, Power & Royalties	10,420	9,291	19,711	13.2%
Administration Other	3,830	3,434	7,264	4.9%
Facility Management	3,393	3,042	6,435	4.3%
Motor Vehicle	2,057	1,844	3,900	2.6%
Information Systems	1,835	1,646	3,481	2.3%
Water Sampling	549	2,700	3,249	2.2%
Governance	1,530	1,372	2,902	1.9%
Customer Collection Expenses	1,251	1,113	2,364	1.6%
Consultancy	1,173	1,052	2,225	1.5%
Insurance	1,053	943	1,996	1.3%
Community Relations	296	263	558	0.4%
Total	72,094	77,652	149,746	100%

In reality, TasWater's opex increased by approximately 7% in FY16 compared to the previous year, and is projected to stay relatively constant through the remainder of PSP2. TasWater explains the initial jump in opex was due to increased wage expenses and higher costs for raw materials compared to FY15. Wages costs grew by 8.4% and raw materials and consumables costs grew by 8.5% from FY15. TasWater explained that this was due to increased capital investment in new treatment plans and a focus on improving capability in asset management.

Our analysis of data provided by TasWater in their proposed PSP3 submission on the three largest opex categories shows the level of overspend in FY16 compared to forecasted levels. The majority of overspend does occur in these categories, aligning with TasWater's explanation of the source of overspend above, as seen in Table 22 with values adjusted to FY17 dollars.

¹³ TasWater, Final Price and Service Plan 2015-18, Table 5, page 23.

Table 22 TasWater key opex categories, Base Year PSP3 forecast versus actual (\$'000 nominal)

Opex Category	FY16 Forecast	FY16 Actual	Overspend
Salaries	69,943	86,643	23.9%
Materials & Services	27,390	31,371	14.5%
Chemicals, Electricity and Royalties	20,056	22,325	11.3%
Other	34,978	37,421	7.0%
TasWater Opex	152,367	177,760	16.7%

Jacobs has compiled a report titled *PSP3 Opex Justification papers* for TasWater, that in turn has provided Arup with a copy of version 6 of the draft report. The paper explores key opex categories for TasWater, including in some instances the efficiency of historical expenditure, providing a linkage of PSP2 outcomes to the base expenditures used to forecast PSP3, and inform the following comments on historical opex.

Table 22 shows that Salaries were the largest opex category and an understanding of changes in staff numbers assists the analysis of prudence in focus and productive efficiency. There were 48 employee positions removed because of duplication & restructuring following the merger that created TasWater in FY14, leading to 876.9 total FTEs established for the FY15 budget. TasWater added 10 FTEs to 886.9 in FY16 due to the need to support the growth in its capital program. There were another 36 FTEs added in FY17 to 922.9, for a number of roles including part-time roles to implement the Maximo asset management system. This led to an increase in salary costs and other employee related expenditures beyond CPI, and beyond the base levels set by the TER in FY15 from which relatively minimal real growth in costs was expected over PSP2 from the regulatory decision. The increase in FTE numbers above those originally forecast has been the primary reason for overspend as seen in Figure 7.

The next highest opex category was the Materials & Services category. The historical trend analysis of the sub-categories provided in nominal dollars between FY14 and FY16 underlying the Services category suggests:

- a slight increase in Service Management by 8% with a service order (associated with outsourced service delivery moving to stronger procurement oversight);
- a large reduction in Service Management without a service order of -58% (moving away from local procurement practices); and
- a large increase in Private Works Reimbursement by 267%.

This suggests an improvement in the management and the control of outsourced services, to address the myriad of performance issues across the network, noting no evidence of procurement improvements were provided but would likely be important from a customer point of view, as the Private Works Reimbursement services are largely charged to customers for services delivered.

The other Services expense showing a large increase of between FY14 and FY16 was Biosolids Transport of 114% and Biosolids Disposal of 155%. Information provided during the interview process indicated these were to address compliance issues and to ensure better

treatment through transport to more modern treatment facilities, and the need to de-sludge lagoon systems which were at capacity.

The next highest category was the Chemicals, Power & Royalties opex category. The sub-category of Chemicals showed this cost to TasWater increased by 47% between FY14 and FY16, particularly due to the increase in taste and odour complaints received by TasWater, and attributed to changes in catchment conditions (presumably from the conditions resulting from lower rainfall). The relatively significant increase in opex in the Chemicals, Power and Royalties opex category can largely be attributed to the increase in chemical costs, as TasWater's electricity costs actually fell marginally over the same period. This reduction in electricity costs was due in part to productivity initiatives including undertaking competitive tender processes, validating electricity invoices and reviewing plant and equipment.

Arup comment:

The Regulator, TasWater, and consultant Jacobs were ultimately largely in agreement that opex from the previous PSP1 represented a reasonable baseline for opex allowances for PSP2. TasWater has overspent against this opex allowance by between approximately 12% and 17%. This overspend can be mostly attributed to increases in staff levels and hence salary costs, and increases in materials and consumables including chemical costs.

Figure 7 shows that overspend has been falling between FY16 and FY17, and is projected to fall further in FY18. These reductions should be treated as minimum levels of productivity improvement and achievement of cost reductions beyond the FY18 forecast level will demonstrate a willingness to comply with the economic regulator's mandate, at the same time as improving customer centric performance.

Note that while the categories in which opex increased beyond regulated levels can be isolated, it is challenging to comment on the prudence of this historical overspend based on the evidence available. However our analysis of TasWater's opex drivers, their benchmarked performance against their peers, and the relatively recent formation of TasWater points to there being additional material efficiency gains possible in key opex categories during PSP3.

Despite overspending against its regulated opex allowance, there is evidence of prudence and efficiency in TasWater's approach to opex in PSP2. As an example, prudence was exhibited in PSP2 by filling 17 temporary roles for implementation of the Maximo system and contractor safety training in FY16, knowing that these were roles which would cease in FY17 once these projects were complete, rather than taking on permanent staff with skills which could not easily be redeployed elsewhere in the business. Evidence of the completion of this project and reduction in temporary FTEs by the end of PSP2 would confirm the prudence of this approach.

Given the above, Arup does not propose any adjustments related to TasWater's PSP2 opex, even though there is evidence of an overspend. However, Arup would expect that consecutive regulatory years of opex overspend are reflected in improved compliance and benchmarked performance by the end of PSP2, and going forward, the spending levels must be rigidly maintained within the final regulated allowance in PSP3. Should this not occur during PSP3, the TER would likely be justified in imposing significant sanctions for non-compliance by TasWater.

4.3 Proposed operating expenditure in PSP3

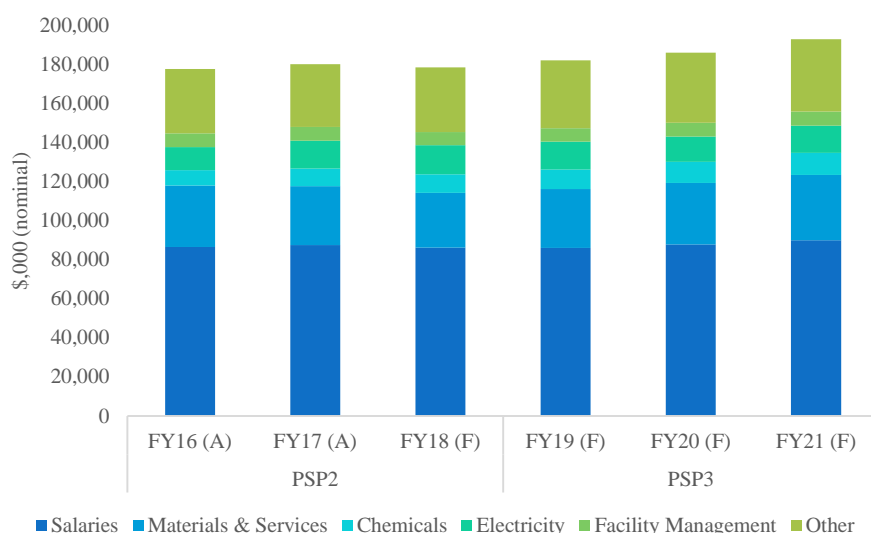


Figure 8 TasWater's Actual and proposed PSP2 and PSP3 operating expenditure

TasWater's proposed total operating expenditure in real terms remains relatively constant across the PSP3 period at approximately \$178.4m per annum (refer Figure 8). The proposed average annual opex for PSP3 at \$175.0m per annum is marginally lower than the average operating expenditure for PSP2 incurred to date.

Given the slow growth in population forecast¹⁴ from 525,501 (A) in FY16 to 540,732 (F) in FY21, a 2.90% increase, the slight increase in opex in nominal terms proposes a slight overall improvement in operational efficiency over PSP3, highlighted by the following observations:

- A proposed increase in nominal salary costs from an average of \$86.8m per annum in PSP2 to \$88.0m for PSP3, a 1.39% increase, the proposed efficiency improvements relating primarily to productivity gains.
- a small increase in Facility Management from \$7.1m in FY16 to \$7.2m in FY21.
- An increase in Electricity costs from \$11.9m in FY16 to \$14.0m in FY21, for per annum costs in nominal terms.

These are positive signs of improved efficiency and improving service delivery, albeit with very gradual improvements implied.

TasWater has broken operating expenditure down into the categories outlined in Table 6 for its PSP3 draft submission. The top 5 opex categories make up over 80% of the proposed operating expenditure for PSP3, which include:

1. Salaries;
2. Materials and services;
3. Electricity;
4. Chemicals; and

¹⁴ TasWater PSP3 Proposal

5. Facility Management.

Expenditure towards salary represents 45-50% of total opex in PSP3, presenting itself as the largest opex category. To highlight the magnitude, the second largest opex category is materials and services, which represents 16-18% of the total opex.

Other costs include items such as motor vehicles, IT, each contributing to generally less than \$5m p.a. to opex.

Table 23 TasWater's proposed operating expenditure for PSP3 (Nom.\$'000)

Opex category	FY19 (F)	FY20 (F)	FY21 (F)	PSP3 Total
Salaries	86,106	87,901	89,994	264,001
Materials & Services	30,123	31,577	33,507	95,207
Chemicals	10,131	10,702	11,305	32,138
Electricity	14,196	13,023	13,966	41,185
Royalties	2,669	2,729	2,797	8,195
Facility Management	6,830	6,969	7,155	20,954
Information Systems	4,654	4,729	4,803	14,186
Administration other	4,573	4,703	4,846	14,122
Motor vehicle	4,124	4,155	4,186	12,465
Water Sampling	2,569	2,621	2,691	7,881
Consultancy	5,681	5,797	5,951	17,429
Regulatory costs	2,738	2,799	3,538	9,075
Customer Collection	2,715	2,785	2,875	8,375
Insurance	1,605	1,639	1,673	4,917
Governance	1,163	1,144	1,174	3,481
Community Relations	807	800	814	2,421
Impact of new capex	1,507	2,170	1,831	5,508
Total	182,191	186,243	193,106	561,540

4.3.1 Assessment of PSP3 operating expenditure

The approach adopted for assessing TasWater's PSP3 operating expenditure has been to look in detail at the five largest opex categories proposed for PSP3 to examine whether the proposed expenditure is prudent and efficient.

In the documentation provided by TasWater, its consultant Jacobs has provided guidance to TasWater on the development of an opex proposal for PSP3 adopting this approach. TasWater has therefore provided justification on the opex categories (and sub-categories) which have formed the basis for its proposal for PSP3.

The following comments are made on TasWater's five largest opex cost categories and the primary drivers of each. Additionally, commentary has been provided on TasWater's Information Systems opex due to its importance at this stage of the organisation's maturity.

Salaries

From the initial formation of TasWater in July 2013, it was expected that savings of approximately \$5m would be generated per annum¹⁵. Following its formation,¹⁶ changes in staffing resulted in a net reduction of 48 FTE staff positions to a total of 876.9 FTEs budgeted for FY15, achieving marginal savings in salary expenditure.

For FY16, 10 additional FTEs were budgeted to 886.9 but 36 were appointed, of which 17 were short-term roles to conclude in FY17. The budgeted FTEs for FY17 rose again by 33 to a budget of 922.9 FTE.

While FY17 was to form the base year for opex forecasts, FY16 was the last full actual year prior to the start of the PSP3 regulatory process, and therefore FY16 actuals were adjusted to form a FY17 base year. The adjustments included an increase of 6.8 FTEs and a reduction of 17 FTEs, leaving a net reduction of 10.2 FTEs for the base year for PSP3.

TasWater proposes that in PSP3 salary expenditure will increase in nominal terms from approximately \$86.8m per annum in FY16 to \$88.0m in FY2021.

TasWater noted that the main cost driver for opex spend on salaries is escalation, of 2.25% per annum in PSP3 (rather than FTE increases). The enterprise agreement, which is set to expire at the end of June 2018 provides fixed wage increases of 2.0% per annum. As reported by TasWater, Deloitte Access Economics has forecast utilities labour price increases of 2.0% p.a., which is in line with the current EBA and slightly below TasWater's forecast CPI.

Table 24 Salaries actual and projected costs (nom. \$)¹⁷

Driver (nom. \$)	FY16 (A)	FY17 (A)	FY18 (F)	FY19 (F)	FY20 (F)	FY21 (F)
Base	86,643,464	86,643,464	87,525,932	86,208,625	86,105,870	87,901,230
One-off adjustment	-	-	-993,415	-	-	-
Productivity	-	-991,309	-2,098,273	-2,171,351	-232,617	-
Demand	-	157,583	142,989	291,011	141,542	143,178
Escalation	-	1,716,195	1,631,391	1,777,585	1,886,435	1,949,661
Total	86,643,464	87,525,932	86,208,625	86,105,870	87,901,230	89,994,069

Table 24 shows the one-off adjustment for the reduction in FTEs related to the short-term opex projects to support the implementation of the Maximo asset management system and the safety training for contractors. It also indicated the considerable productivity savings projected to flow from continuing plant optimisations and take-up and better use of mobility solutions and automatic data gathering and remote equipment monitoring and control.

Arup comment:

TasWater has forecast significant efficiencies in productivity of around \$2.1m in FY18 and \$2.2m in FY19, the majority of which appear to be the release of short-term roles following completion of deployment and integration of the Maximo asset management system and

¹⁵ Source: TasWater Corporate Plan 2015-17

¹⁶ The merger of Ben Lomond Water, Cradle Mountain Water, Southern Water and their shared services arm Onstream.

¹⁷ Extract from Jacobs Justification Papers, June 2017

completion of contractor safety training. These improvements will see salary costs remain relatively constant through FY19-21 in real terms.

Arup suggests that further efficiency could be achieved if TasWater adopts a 2% forecast escalation for total salary costs rather than 2.25% in salary costs for FY19-21, reflecting the current EBA.

While additional savings on salary costs should be possible, of primary concern for the PSP3 period will be a need and expectation from its customers and stakeholders for a significant lift in measured staff productivity. This should be achievable as the benefits of the integrated asset management systems, and a capex project focus of integrating treatment plants and updating technology provide the opportunity for staff to be re-deployed to undertake other roles to speed the capex and maintenance programs, leading to much improved compliance to technical standards and regulatory requirements.

To assist in reviewing TasWater's performance in its largest cost category related to salaries and salary on-costs, Arup recommends that the Regulator require the development of and delivery of a Labour Force Plan. This plan updated on a 3 yearly cycle, should have a 5-year horizon which spells out the management plan for the number and skill sets of the FTE's within TasWater. It should itemise the role and utilisation of insourced and outsourced FTE resources and plans for skill development and productivity improvements.

Table 25 Summary of salaries opex for PSP3 (\$'000 nominal)

Salaries	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater	86,106	87,901	89,994	264,001
Arup	84,466	86,160	88,194	258,821
Proposed adjustment	-1,639	-1,740	-1,799	-5,179

Materials & Services

In developing its FY17 base year TasWater has indicated that it achieved a once off productivity saving of \$0.7m in FY17 and is planning for a \$2.6m saving in FY18. The demand related opex is reasonably stable, but as seen in Table 26 there is a step change increase between PSP2 and PSP3 of roughly 3 times the opex associated with escalation.

Table 26 Materials & Services actual and projected costs (nom. \$)¹⁸

Driver (nom. \$)	FY16 (A)	FY17 (A)	FY18 (F)	FY19 (F)	FY20 (F)	FY21 (F)
Base	31,370,835	31,370,835	30,200,015	28,167,969	30,122,917	31,577,150
One-off adjustment	-	-	-	-	-	-
Productivity	-	-732,450	-2,562,140	-	-	-
Demand	-	137,132	111,812	283,659	122,697	122,769
Escalation	-	-575,502	418,281	1,671,289	1,331,536	1,807,063
Total	31,370,835	30,200,015	28,167,969	30,122,917	31,577,150	33,506,981

¹⁸ Extract from Jacobs Justification Papers, June 2017

The main cost driver for an increase in opex spend on Materials and Services in PSP3 is the step change in escalation.

TasWater indicated that the Materials expenses are driven by the large number of disparate pipeline types and mechanical equipment which it inherited from its predecessors. Because of this lack of standardisation the organisation is required to keep a large inventory of stock types and levels across various regional locations to ensure that equipment is available when necessarily. Service levels would likely be negatively affected if these inventory levels were not held. While this approach is prudent, a future focus on standardisation will likely bring cost savings over time.

In a general sense there is a slow increase in the real cost of providing Materials & Services as shown in Table 27, but considerable changes in the way the opex is spent. This suggests improvement in way services are delivered, and hence the potential for efficiency improvements. The investment in new SCADA and monitoring equipment has also improved the efficiency of delivery of services, but additional metrics should be adopted (or extracted from systems) to show whether or not there is an increase in service volumes (throughput) which is leading to improved customer service. Data provided on water bursts and sewage block/choke clearance for FY15 and FY16, appears to be increasing demonstrating the potential for service delivery improvements.

Arup comment:

TasWater has identified ~\$3.3m in productivity improvements in materials and services to be realised over FY17 and FY18. Base expenditure is forecast to grow relatively slowly, although there is a step increase in the escalation driver throughout the forecast period. Arup suggests that a lower escalation rate than the forecast ~4.6% step change in FY19 (a real FY17 \$1.3m increase) could be used to define the opex in FY19 to FY21, unless a clearer reason for the step change in escalation can be provided. Such description needs to cover where the funds will be focused and how service delivery will be improved as a result. The proposed step change is lower at ~1.7% (a real FY17 \$0.4m increase).

Table 27 Summary of materials & services opex for PSP3 (\$'000 nominal)

Materials & Services	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater	30,123	31,577	33,507	95,207
Arup	29,288	30,912	32,604	92,804
Proposed adjustment	- 834	- 664	- 902	- 2,402

Chemicals

TasWater's expenditure on chemicals has been steadily increasing since FY16 and is expected to continue increasing by approximately 5% per annum in PSP3.

TasWater has an obligation to appropriately treat potable water and sewage through the utilisation of chemical treatment. The following regulatory requirements drive the necessity for chemical usage:

Water treatment:

- Australian Drinking Water Guidelines;
- Public Health Act 1997;

- Tasmanian Drinking Water Quality Guidelines 2011 (TDWQG); and
- Department of Health and Human Services issuance of a Tasmanian Code of Practice for the Fluoridation of Public Water Supplies. Based on the Fluoridation Act 1968 and the Fluoridation (interim) Regulations 2009.

Sewage treatment:

- Environmental Management and Pollution Control Act 1994 (EMPCA) and the State Policy on Water Quality Management 1997 (SPWQM).

The following table shows that there is an expectation of a step increase in chemical costs in FY17 and then a continual escalation of costs through PSP3.

Table 28 Chemicals actual and projected costs (nom. \$)¹⁹

Driver (nom. \$)	FY16 (A)	FY17 (A)	FY18 (F)	FY19 (F)	FY20 (F)	FY21 (F)
Base	7,889,812	7,889,812	9,017,595	9,527,233	10,131,367	10,702,332
One-off adjustment	-	700,000	-	-	-	-
Productivity	-	-56,000	-	-	-	-
Demand	-	52,738	51,640	108,666	51,273	51,256
Escalation	-	431,045	457,998	495,467	519,692	551,480
Total	7,889,812	9,017,595	9,527,233	10,131,367	10,702,332	11,305,068

The main driver for chemical related opex in PSP3 is escalation of 5.02% per annum, reflecting the 10-year historical average of chemical prices in Australia and Jacobs's high forecast for PSP3. TasWater's has adopted the higher escalation forecast as it has been informed by chemical suppliers to expect substantial increases in chemical prices. The chemical cost trend analysis is shown in Figure 9.

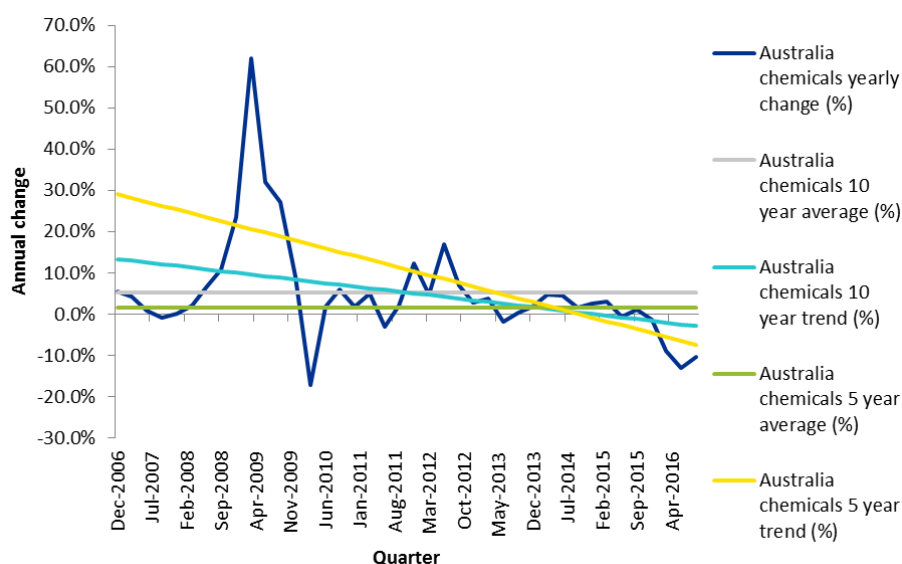


Figure 9 Historical Chemical Price Escalation (Jacobs/ABS)

¹⁹ Extract from Jacobs Justification Papers, June 2017

Arup comment:

The 10-year historical average of chemical prices in Australia adopted by TasWater includes a significant outlier in 2009, which skews the long-term average. This excursion is likely related to impacts of the global financial crisis (GFC) resulting from a combination of factors including changes in exchange rate and the costs of raw material inputs for chemical processing. The data indicates that from late 2015 the annual cost data has been trending downwards as illustrated in Figure 5. While there is a kick-up in mid-2016, the continuation back to an average increase of 5.02% per annum has not been demonstrated.

Without any indication of what information has been more recently provided by suppliers it is not possible to verify that claimed future volatility is likely to result in substantial price increases against the current trend.

Given the volatility in historical prices and uncertainty over the future trajectory of chemical prices, it would be prudent for TasWater to explore long-term price contracts with suppliers – to either ensure price certainty or establish a practical forward price assumption.

If the basis for the significant future price rises can be verified by correspondence with chemical suppliers, the recommended cost escalation could be proven to be efficient. In lieu of this, however, a PSP3 escalation assumption in line with a 5-year average would be more efficient, and from Figure 9 this appears to be around 1.5% per annum.

Table 29 Summary of chemicals opex for PSP3 (\$'000 nominal)

Chemicals	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater	10,131	10,702	11,305	32,138
Arup	9,645	10,192	10,763	30,601
Proposed adjustment	- 485	- 509	- 541	- 1,536

Electricity

Electricity is TasWater's third largest opex category, accounting for 7.3% of the proposed total PSP3 opex. The majority of TasWater's electricity usage relates to pumping, followed by treatment and lastly ancillary needs, and therefore increases in customer demand services will increase the consumption of electricity over the forecast period.

Table 30 Electricity actual and projected costs (nom. \$)²⁰

Driver (nom. \$)	FY16 (A)	FY17 (A)	FY18 (F)	FY19 (F)	FY20 (F)	FY21 (F)
Base	11,907,552	11,907,552	14,225,594	14,911,392	14,196,495	13,023,303
One-off adjustment	-	-	-	-	-	-
Productivity	-	-1,168,000	-	-	-250,000	-
Demand	-	56,688	55,522	118,212	48,496	53,848
Escalation	-	3,429,354	630,276	-833,109	-971,688	888,925
Total	11,907,552	14,225,594	14,911,392	14,196,495	13,023,303	13,966,076

²⁰ Extract from Jacobs Justification Papers, June 2017

While energy sources for pumping other than electricity are available (gas or diesel power plants), TasWater points out that electricity offers the most “economical, practical and sustainable for of energy” given it’s sourced from Tasmanian hydroelectric power networks.

Despite an expected increase in demand, TasWater has forecast that expenditure on electricity will materially decrease in real terms in PSP3 from \$14.5M in FY18 to \$12.7M in FY21 (refer Table 31). This is principally due to efficiency and productivity initiatives implemented in a three-stage process. The first stage being a staggered tendering process which has the effect of smoothing the volatility in unit charge rates over time. The second stage uses new online systems to track cost savings against a business as usual baseline, allowing tracking of the impact of cost saving initiatives. The third stage has yet to be implemented but will use additional online systems to focus on plant operating procedures, and optimising the timing of pumping and treatment operations.

TasWater has indicated that the two largest components of its electricity costs relate to the network charges and energy costs. The current regulatory period for TasNetworks has been shortened and runs from 1 July 2017 to 30 June 2019. The AER’s decision for TasNetworks saw a drop in revenue allowance by 21.5% for the FY18 year. The two-year revenue profile has minimal growth, and therefore the smaller increase in TasWater’s escalation driver for FY18 compared to FY17 can be partially explained by the AER’s decision on the electricity network revenue. The next regulatory period for TasNetworks will run from 1 July 2019 to 30 June 2024 according to the AER, and the decision making process will kick off with a submission by TasNetworks to the AER by 1 January 2018. As such, the large increase in escalation in FY21 is unlikely to be network charge driven.

Arup comment:

The proposed reduction early in PSP3, as seen in the escalation numbers, is a positive result from a focus on procurement, tariff classification and administrative initiatives. The forecast outcomes are a reasonable reflection of anticipated changes to the components that comprise TasWater’s cost of electricity. Based on current energy price forecasts, it is unlikely that prices will fall materially below this escalation profile for the PSP3 period.

TasWater has flagged it will through a pilot study seek to gather more online data on water volume and chemical dosing data to allow better management of pumping dispatch and risk management. The ability to optimise pumping and treatment timing to reduce electricity costs without a degradation in service and product quality, or compliance metrics, should be the next focus for efficiency savings in this opex category.

There is limited explanation by TasWater for the significant drop in the escalation in FY19 and FY20, and for the significant increase in FY21. While additional information might explain the volatility over the PSP3 period, the forecast for PSP3 is accepted as an efficient outcome over the period.

Table 31 Summary of electricity opex for PSP3 (\$’000 nominal)

Electricity	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater	14,196	13,023	13,966	41,185
Arup	14,196	13,023	13,966	41,185
Proposed adjustment	-	-	-	-

Facility Management

TasWater spend 12-15% less than their benchmarked counterparts on facility management once the age and number of facilities under management by TasWater is taken into account. TasWater states that this is not a reflection of efficient facility management per se, but rather a shortfall in the funding required for facility management in both capex and opex.

Benchmarking did reveal a number of efficiencies that could be realised in facility management, and consequently TasWater has forecast a one-off cost saving of \$500,000 in 2018. This cost saving relates to a move from multiple to a state wide single vendor cleaning contract entered in mid-2015 with the initial saving reflected in the actual FY16 results in Table 32. This contract enshrined uniform standards of service with KPIs and a service level agreement (SLA). Notwithstanding this decrease, facility management opex is forecast to stay relatively constant through to FY21, due to a combination of increases in base spend, demand, and general cost escalation.

A similar contract rationalisation approach is being implemented for Facilities Maintenance Services and for Ground Maintenance Services state wide.

Table 32 Facility Management Costs actual and projected costs (nom. \$)²¹

Driver (nom. \$)	FY16 (A)	FY17 (A)	FY18 (F)	FY19 (F)	FY20 (F)	FY21 (F)
Base	7,073,565	7,073,565	7,125,359	6,704,780	6,830,346	6,969,125
One-off adjustment	-	-	-505,000	-	-	-
Productivity	-	-	-	-	-	-
Demand	-	2,263	1,900	4,698	2,051	2,052
Escalation	-	49,531	82,522	120,867	136,728	183,467
Total	7,073,565	7,125,359	6,704,780	6,830,346	6,969,125	7,154,644

While the new procurement process has provided considerable savings in opex categorised as Facility Management, new initiatives will be required to identify and secure additional opex savings prior to the next tendering round for these services.

Arup comment:

Various legislative requirements have warranted an increase in facility management spend for TasWater, though they remain under the benchmarked average for expense in this area once the number and age of the facilities under management are taken into account. Their forecasts represent a significant one-off cost saving in the PSP3 period in conjunction with modest escalation rates, and appear to represent a reasonable level of forecast opex for facility management. Arup does not propose any changes in this opex category for PSP3.

Table 33 Summary of facility management opex for PSP3 (\$'000 nominal)

Facility Management	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater	6,830	6,969	7,155	20,954
Arup	6,830	6,969	7,155	20,954
Proposed adjustment	-	-	-	-

²¹ Extract from Jacobs Justification Papers, June 2017

Information systems

Prior to the merger into TasWater, there was a significant under investment in IT technology and systems compared to other equivalent Australian operators in the water sector, which would have supported continuing improvement in operations and investment efficiency. TasWater's IT opex through PSP2 reflects the ramp up of investment in IT systems, triggering an increase in supporting opex costs. Opex rose from nominal \$2.0m in FY14 to \$4.4m in FY16. As shown in Table 34 it has remained reasonably stable since then with small overall escalations.

TasWater's current IT spending is still relatively low on a benchmarked basis. Specifically:

- IT spend per staff is low, relative to both Australian and Asia Pacific comparators; and
- IT FTE as a percentage of employees is low.

TasWater has proposed an annual increase in IT expenditure below CPI for PSP3, resulting in a minor net reduction in nominal terms as shown in Table 34. Although IT expenditure should typically lead to cost reductions associated with increased efficiency, as the business continues to mature and further invests in IT, there are costs to be considered associated with expanding its services, training, maintenance of systems.

Table 34 Information Systems Costs actual and projected costs (nom. \$)²²

Driver (nom. \$)	FY16 (A)	FY17 (A)	FY18 (F)	FY19 (F)	FY20 (F)	FY21 (F)
Base	4,426,399	4,426,399	4,502,311	4,577,734	4,654,184	4,728,705
One-off adjustment	-	88,528	88,528	88,528	88,528	88,528
Productivity	-	-	-	-	-	-
Demand	-	1,384	1,409	2,961	1,532	1,584
Escalation	-	-14,001	-14,514	-15,039	-15,540	-16,047
Total	4,426,399	4,502,311	4,577,734	4,654,184	4,728,705	4,802,770

TasWater has invested in its SCADA systems with a state-wide imperative to improve operational efficiency and effectiveness. It is also investing in cloud and 'X as a Service' services which will see the ratio of opex to capex costs increase for IT systems. TasWater is using increased investment in IT to drive improvements in its business and service delivery, in line with its stated customer centric focus.

TasWater has included a constant positive cost adjustment to its base IT costs to reflect the increasing use of these systems over the mid-term, and in recognition of its low under-invested starting cost, and strong benchmarking against peers in cost terms. It is noted a specific justification for the increase in base costs has not been submitted at this time, but the continued roll out of data acquisition and mobility solutions provide some support. The offsetting reduction in its costs through the Escalation terms relates to the declining cost of IT systems factored in at minus 0.31% per annum.

Arup comment: TasWater's opex in IT systems is relatively low when compared to their benchmarked peers. There appears to be scope for TasWater to increase their spending so as to capture the benefits of improved IT systems, which should include subsequent cost savings

²² Extract from Jacobs Justification Papers, June 2017

elsewhere in opex and capex. However, Arup cautions that while the base opex increase through the constant One-off Adjustment is accepted for the PSP3 period, its continued existence cannot necessarily be accepted without robust justification.

Table 35 Summary of information systems opex for PSP3 (\$'000 nominal)

Information systems	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater (Draft)	4,654	4,729	4,803	14,186
Arup (Draft)	4,654	4,729	4,803	14,186
Proposed adjustment	-	-	-	-

Motor vehicles

Adjustments made to Facility, Fleet and Plant Renewal in Section 3.3 of this report have a consequential reduction in the variable component of fleet opex. TasWater's strategy on fleet reduction is under development, but should be considered in the Regulator's adjustments to opex for PSP3.

Table 36 Summary of motor vehicle opex for PSP3 (\$'000 nominal)

Motor vehicles	FY19 (F)	FY20 (F)	FY21 (F)	Total
TasWater (Draft)	4,124	4,155	4,186	12,465
Arup (Draft)	3,530	3,557	3,583	10,670
Proposed adjustment	-594	-598	-603	-1,795

Arup comment:

Arup recommends adjustments made to Facility, Fleet and Plant Renewal opex consequential to the reduction in the fleet size. TasWater's strategy on fleet reduction is under development, but we consider there is further room for improvement from what has been published in the PSP3.

4.3.2 Productivity improvement program

Figure 10 shows the sum of the productivity improvements TasWater has achieved in PSP2 and expects over the PSP3 period.

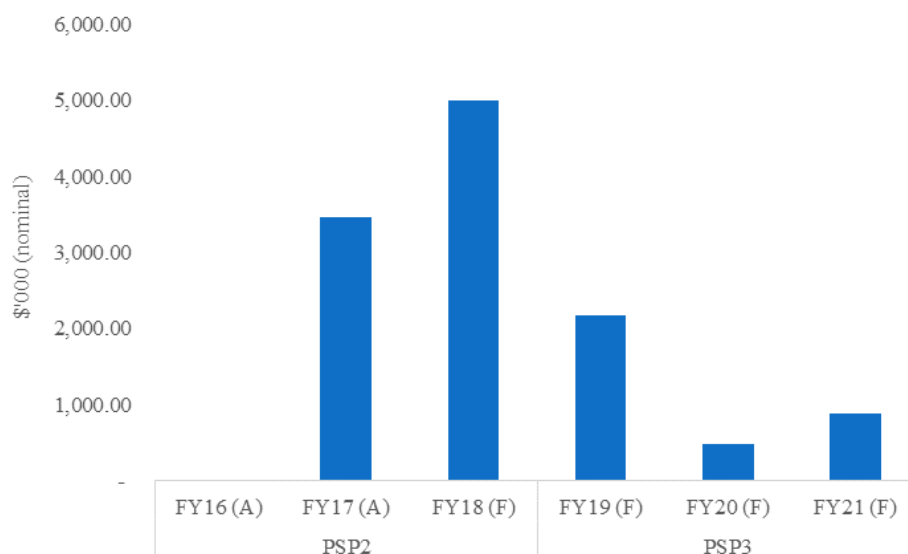


Figure 10 Productivity improvement summary (\$'000 nominal)

TasWater expects to achieve \$8.5m of savings in PSP2 through a range of cost savings initiatives, including:

- Consolidation of the northern and southern laboratories, and tendering of external laboratory service contract;
- Labour savings in the Service Delivery division field workforce; and
- A review of electricity tariffs.

As shown in Figure 10, the majority of the productivity savings will be achieved in FY18 with diminishing savings thereafter.

TasWater is projecting a further \$3.5m of savings in PSP3, primarily from release of short-term contract positions following the implementation of the Maximo asset management system.

Arup comment:

TasWater has identified the bulk of productivity savings to occur within the next two financial years, with minimal savings thereafter. Arup would encourage TasWater to revisit their forecasts throughout this period as advancements in technology and processes adopted by their benchmarked peers allow for further scope in opex optimisations in the last two years of PSP3.

4.3.3 Opex benchmarking

For the purpose of assessing TasWater's prudent and efficient operating expenditure, benchmarking has only been used as a guide to examine where the organisation sits relative to other water utilities within Australia. While benchmarking does not take into account structural differences between organisations, it can provide an insight into potential areas of improvement.

A benchmarking study undertaken by WSAA in 2015, found TasWater to be in the 3rd quartile for Total Water Supply. Total Water Supply includes all costs associated with the operations and maintenance of water treatment plants, including electricity, chemicals and sludge disposal. The diseconomies of scale associated with the large number of small plants is the driver behind TasWater's poor performance in comparison to its peers. The opex associated with all elements of water treatment, except for sludge disposal is above that of TasWater's counterparts. TasWater does spend less on network operations and maintenance per km of pipeline when compared to its counterparts, though this does not include electricity and mechanical and electrical maintenance spend, which was not benchmarked as a part of the study.

Wastewater treatment contributed 34.8% of TasWater's total direct opex in FY15. The costs associated with wastewater treatment plants include operations and maintenance activities, electricity, chemicals and sludge/bio-soil disposal. The high operations and maintenance cost reflects TasWater's belief that operating expenditure is excessive is due to the large number of assets that require servicing. In terms of wastewater treatment, the only element where spend is at a median level in comparison to peers is electricity, whilst the chemical and sludge disposal costs are well above that of TasWater's counterparts. Again the latter likely reflects the poor economies of scale available to TasWater from its legacy assets.

The following table summarises TasWater's performance in these two key opex categories.

Table 37 TasWater's benchmarking results relative to other Australian water utilities²³

Cost Category	Measure	TasWater	Median	Quartile
Total Water Supply	\$ / ml	477	401	3 rd
	\$ / connection	170	135	3 rd
	\$ / pipeline	5,419	5,334	3 rd
Total Wastewater Treatment	\$ / ml	232	133	4 th
	\$ / connection	802	621	4 th
	\$ / pipeline	9,424	7,064	4 th

The WSAA benchmarking study also examined TasWater's performance over a number of other opex categories, in which TasWater generally was found to perform below the industry median. TasWater performs quite poorly in comparison to its counterparts with regards to total wastewater network spend per connected property. The study found that the cost per connected property at \$54.9, was 39.9% higher than the median spend. With regards to costs associated with the operations and maintenance of wastewater transfer, TasWater performs below the industry average, with the operating expenditure at \$2,231/km of wastewater pipeline, it is 17.5% higher than the industry average. It should be noted that the WSAA

²³ WSAA Benchmarking Study (2015)

study has indicated that customer density has a relatively weak impact on wastewater network costs. Thus, the dispersed nature of the Tasmanian population should not be a core driver behind the relatively high wastewater network spend.

Arup comment:

Although the WSAA report is outdated, being from FY15, it clearly indicates that TasWater's operating costs are significantly higher than its counterparts. TasWater anticipates that its opex will increase as it tries to improve compliance levels, however this can have a magnified effect on opex if TasWater is seeking to improve compliance across the large number of assets it owns and operates. This poor performance in comparison to its counterparts as well as the necessity to improve compliance suggests that a consolidation of assets is essential to reduce TasWater's opex average costs and improve its benchmarks against its peers.

Appendix A

PSP2 Project Summary & Source Documents

A1 Cambridge Wet Weather Emergency Storage and Process Improvements

The Cambridge STP is a modern MBR process plant located within the Hobart International Airport site. It receives an average flow of 330 kL/day of predominantly commercial /industrial wastewater. This project aims to improve the compliance of the plant, with a focus to minimise the economic impact on the shellfish industry.

A1.1 Summary

This project is needed to reduce the incidence of wet weather bypass overflows into a sensitive receiving environment. The current system does not meet EPA or internal standards set out in TasWater policy documents during wet weather flow events.

The preferred option is a short to medium term solution as the intention is to decommission the Cambridge STP. The proposed works are designed to provide some certainty of meeting EPA and TasWater discharge quality requirements until around 2025-2029.

A regional wastewater strategy has not yet been developed for this area, and the lack of regional integration options considered reflects this. Work done on a regional integration strategy could result in different options being considered feasible.

The proposed costs for the project have not changed significantly since the earliest estimates however the cost estimates appear to have been produced internally with no obvious independent review.

The timing of the project has changed with the expected completion of work now three years later than originally planned.

A1.2 Key Documents Reviewed

- 018 - TAMSTR01+-+Sewage+Spill+Abatement+Strategy+-+v1.PDF
- 031 - TASPOL31+-+Sewer+Spills+Management+Policy+-+v2.PDF
- 037 - Cambridge Wet Weather Emergency Storage and Plant Process Improvements - Business Case.docx
- 038 - Cambridge Wet Weather Emergency Storage and Plant Process Improvements - NPV Assessment.xlsx
- 079 - Wastewater Management Plan 2015-18.PDF
- 080 - Wastewater Management Strategy - Meeting Regulator Expectations for PSP3.docx

A2 Direct to Asset & Opex to Capex

This program corrects the misallocation of asset costs. TasWater has improved its financial systems and processes through implementation of Maximo which will enable the correct allocation of new assets from reactive maintenance works directly to capex in real time.

A2.1 Summary

These two programs sought to correct the misallocation of new assets created as part of reactive maintenance works. The misallocations occurred due to inadequate financial / asset management systems and processes, issues which were corrected during PSP2.

Whilst the quantum of expenditure for these two programs is relatively large, the programs were discontinued after FY16 with no further expenditure.

Arup is satisfied that the errors required correction and are unlikely to occur again.

A2.2 Key Documents Reviewed

- 37 - Opex to Capex - Example - Journalled as GJ100414 3902 19th to 27th June.xlsx
- 38 - Direct to Asset purchase - example.JPG
- 12 - Arup PSP3 Interview - Day 3 - Interview 2, 3 and 4 - Capex Projects - Detailed Review (2).PPTX

A3 Kingborough Sewer

The Kingborough Sewer project includes closing three underperforming treatment plants, constructing new sewage pipelines to transfer sewage from treatment plant catchments to Blackmans Bay Sewage Treatment Plant and upgrade of Blackmans Bay plant.

A3.1 Summary

The Kingborough Sewer strategy is a review undertaken of high profile rising main failures located in highest growth area in state (compliance and growth drivers). Broader options considered as part of review.

There has been significant community opposition to route of rising mains but option significantly cheaper and ensures compliance. Broader options to be reviewed to ensure all available options were considered.

Since the initial business case there is no updated cost estimates or progress of construction. Timing of Capital Expenditure outlined in the LTSP does not align with dates in the Work Plan provided in the Business Case. It should be noted that there was no mention of the project specific business case in the strategic business case.

A3.2 Key Documents Reviewed

- 13 - Kingborough Sewerage System Strategy - Business Case
- 14 - Kingborough Sewage Strategy - NPV Assessment
- 15 - Kingston E Sewage Pump Station Rising Main - Business Case
- 16 - Kingston E Sewage Pump Station Rising Main - NPV Assessment
- 026 - Jacobs Long Term Strategic Plan Report - 3 July 2017
- Preliminary Findings Report 20170803 Draft V0.1

Appendix B

PSP3 Project Summary & Source Documents

B1 Bryn Estyn

The Bryn Estyn Water Treatment Plant (WT) has served the Greater Hobart community since 1963, however requires significant upgrades to ensure that it is maintained. The Bryn Estyn project seeks to address issues which have arisen, in particular, those associated with water quality.

B1.1 Summary

The Greater Hobart Water Supply System provides water to a population of 220,000 via a 6,500km water infrastructure network. The system has served the Greater Hobart community sufficiently but is currently experiencing issues. The Bryn Estyn project seeks to address some of these issues, particularly given water quality issues arising at this plant.

The Bryn Estyn project had not been identified in previous strategies and is at a relatively early stage of development.

A key gap at present in the options assessment is how option 3 was established as the preferred option. Arup assumes this will form a key component of the forthcoming strategic business case.

B1.2 Key Documents Reviewed

- 4 - Bryn Estyn WTP upgrade - project status and next steps
- 5 - Summary of Bryn Estyn Concept Design_09_06_2017
- 6 - Bryn Estyn WTP upgrade total cost estimate
- 12 - Arup PSP3 Interview - Day 3 - Interview 2, 3 and 4 - Capex Projects - Detailed Review (2)
- 68 - Greater Hobart Water Supply Strategy & Plan - GATE 0 - 0.1
- 69 - Greater Hobart Water Supply Strategy & Plan - Project Brief - 1.0 - COMMERCIAL-IN-CONFIDENCE

B2 Forth Waste Treatment Plant (WTP)

The Forth WTP was built in 1981, with the only refurbishment works since commissioning being a filter refurbishment in 2010. This project involves an upgrade of the plant and dependencies to ensure compliance.

B2.1 Summary

The Forth WTP services approximately 18,000 water connections in Forth, Devonport, East Devonport, Latrobe and Port Sorell. The Forth WTP also supplements the Gawler WTP during the summer peak demand periods.

Although this project is early in the planning phase, but is a high priority project, with internal and external resourcing allocated accordingly.

A key existing gap in the options assessment is a clear identification of which has been selected. It has been outlined that this will be a key component of the forthcoming strategic business case.

B2.2 Key Documents Reviewed

- 7 - Forth WTP upgrade - project status and next steps
- 8 - Summary of Forth Concept Design_09_06_2017
- 9 - Forth WTP upgrade total cost estimate
- 12 - Arup PSP3 Interview - Day 3 - Interview 2, 3 and 4 - Capex Projects - Detailed Review (2)
- 026 - Jacobs Long Term Strategic Plan Report - 3 July 2017
- Preliminary Findings Report 20170803 Draft V0.1

B3 Pardoe Sewer

The Pardoe Sewer is a primary treatment plant, with an offshore oceanic discharge. This project focuses on the required improvements to the Pardoe STP to ensure compliance.

B3.1 Summary

The Pardoe STP serves about 10,500 tenements and 23,000 customers in Pardoe (14 ML/day ADF) – with primary treatment & oceanic discharge. Non-residential flows account for about 60% of the total flow to the plant and include large trade waste customers.

Although this project is in its early stages it has been allocated as high priority.

The options assessment presents a clear gap, with only one option identified and costed. It is clear the options and costing needs to be refined in the following stages of the project.

B3.2 Key Documents Reviewed

- 10 - Pardoe Sewer Improvement Plan - Project status and next steps
- 11 - Summary of Pardoe Concept Design_14_06_2017
- 12 - Pardoe Sewer Improvement total cost estimate
- 026 - Jacobs Long Term Strategic Plan Report - 3 July 2017
- Preliminary Findings Report 20170803 Draft V0.1

B4 Pet Dam

Pet Dam is a key component of the water supply system for the city of Burnie, located south of Burnie on the Pet River. This project will aim to ensure that the Pet Dam meets safety requirements, as it has been identified as high risk.

B4.1 Summary

Pet Dam is located 13km south of Burnie on the Pet River. It is a key component of the water supply system for the city of Burnie. This project is essential to ensure that the Pet Dam meets safety requirement, with project appearing to be prudent as it has been identified as high risk.

The preferred option is the solution is for the full dam upgrade as recommended in the Dam Safety Review. This looks to be efficient considering the lowest cost option was accepted as the preferred option.

B4.2 Key Documents Reviewed

- 003 - Corporate Plan FY2018-20 FINAL
- 026 - Jacobs Long Term Strategic Plan Report - 3 July 2017
- 31 - Pet Dam Upgrade - Business Case
- 32 - Pet Dam Upgrade - Consulting Report - Options Assessment
- 33 - Pet Dam Upgrade - NPV Assessment
- 61 - Dam Safety Management Plan - Annual Progress Report FY2015-16
- 62 - Dam Safety Management Plan - Annual Progress Report FY2014-15
- 63 - Dam Safety Improvement Plan - Edition 2 Draft 23 12 2016

B5 SCADA Program

This project aims to deliver operational excellence through the Supervisory Control and Data Acquisition (SCADA) and telecommunications systems. The SCADA and Telecommunication systems provide remote monitoring and control of most water and sewerage systems, system analysis, automation of key process, fault location and response.

B5.1 Summary

TasWater has a vision of developing a “Smart Water and Sewerage Network”, delivering real time data to assist in the management of our infrastructure in a dynamic environment. The SCADA platform and technology is a key enabler of realising this vision.

The preferred option for the program is to continue with current Strategic plan and implement the full SCADA program functionality and standardisation including Enterprise Historian Stage 1 Costs.

A thorough business case has been prepared for the SCADA consolidation program which includes options analysis, risk analysis and an implementation strategy.

The current cost estimate is somewhat unclear as the business case figures differ from the figures provided in the interview notes with the business case having a detailed cost breakdown but without timing of capex (note: opex is profiled).

B5.2 Key Documents Reviewed

- 1 - State-Wide SCADA Consolidation Program Continuation Business Case
- 2 - TasWater SCADA Strategic Plan 2015-2018
- 3 - Operational Control Centre (OCC) Roadmap Strategic Paper
- 12 - Arup PSP3 Interview - Day 3 - Interview 2, 3 and 4 - Capex Projects - Detailed Review (2)

B6 Facility Fleet Plant

While TasWater has forecast a requirement for more vehicle renewals than has historically been spent on this program, it has limited the budget available for these renewals to enable an increased overall focus on water quality, dam safety and environmental compliance. Given this limited budget, expenditure is prioritised to the areas of greatest risk (e.g. health and safety compliance). This appears to be a prudent approach to the vehicle renewal program.

B6.1 Summary

This program of renewals is important as it contributes to the health and safety of TasWater staff particularly those located in field based operational roles. TasWater's policy of ensuring their fleet is moving towards vehicles with ANCAAP 5 star ratings is sound and will contribute to increased staff safety and comfort. In addition, the renewals, decommissioning or disposal of assets including under-utilised property contributes to more efficient operations and lower ongoing operational costs.

The number of vehicles within TasWater's current fleet is high by comparison to other utilities. The scope of works for the Fleet Review notes that a 5-10% reduction in fleet could potentially be achieved within 60 days. Given the benchmark comparisons, this reduction may be significantly higher in the medium-term.

Considering that TasWater has not completed its fleet review there is an opportunity to set a fleet reduction target in PSP3. Arup proposes a reduction in TasWater's fleet from 760 vehicles to approximately 456 vehicles, representing a fleet reduction of 60% over PSP3 and equivalent to an end point of one vehicle for every two staff. Arup has suggested that the fleet reduction is achieved by applying a 20% reduction per year from business as usual over the upcoming regulatory period.

B6.2 Key Documents Reviewed

- 39 - Facility, fleet and plant upgrades - capital program definition form
- 40 - Example Program Activity - Fleet - Fleet Replacement (FW848)
- 48 - TasWater Fleet Review scope of work
- 49 - Example Program Activity - Minor Works - Facilities - Fencing Replacement (J15012)
- 52 - Example of surplus property sale - Caroline Street Briefing Note

B7 Sewerage Treatment Plant (STP) renewals

The STP renewal program covers the renewal / replacement of assets located within the sewerage treatment plant facilities, including:

- Proactive STP asset renewal (60% of budget) – developed using STP Criticality Framework tool assessing asset criticality at process level (Inlet, PS, Treatment, etc)
- Reactive STP asset renewal (20% of budget) – identified through daily operations and inspections and response to faults
- Condition assessment (20% of budget) – approximately 25 STPs have been fully condition assessed (out of 111 total STPs).

B7.1 Summary

The STP renewal program is prioritising investment to focus on water quality, dam safety and environmental compliance while the program benefits are generally related to the avoidance of risk of service failure to customers.

A key issue with the program appears to be the ability to take an evidence led approach to prioritising investment given that TasWater notes that its ability to identify projects based on LoS, asset criticality, asset condition or performance is limited by data accuracy and availability.

B7.2 Key Documents Reviewed

- 21 - Example - Bicheno STP inlet works Condition Assessment(26July16)
- 22 - STP Program Information July 2017
- 23 - TasWater_STP Condition Assessment Reports_2015_04_14(Final)
- 25 - STP Renewal Program Notes for LTSP
- 27 - Sewerage Asset Criticality Framework Tool(Examples)
- 67 - Example - DRAFT STP Asset Class Lifecycle Plan - work in progress
- 12 - Arup PSP3 Interview - Day 3 - Interview 2, 3 and 4 - Capex Projects - Detailed Review (2)

B8 Water Main Renewals Program

The water network renewal program covers the replacement of pipes within the water supply network, including:

- Proactive water main renewal (70% of budget) – identified through risk assessment (including from PARMS renewal model) possibly 2-3 months earlier and added to program
- Reactive water main renewal (25% of budget) – identified on site from other works (repairs, faults) and added into program
- Condition assessment (5% of budget) – program of work to assess wall thickness, visual inspections, cathodic protection checks

Known projects exceed the program budget and thus the focus is on water quality, dam safety and environmental compliance.

B8.1 Summary

The Water Mains Renewal program is prioritising investment to focus on water quality, dam safety and environmental compliance while the program benefits are generally related to the avoidance of risk of service failure to customers.

It is unclear how the renewal budget is reached and how a budget split of 70% proactive, 25% reactive and 5% condition is followed as intuitively TasWater have limited ability to control reactive maintenance.

B8.2 Key Documents Reviewed

- 18 - Draft Water Main Renewal Program
- 19 - Example GATE 1 – Activity Definition Form - Deviot Road water main renewal
- 20 - Example GATE 1 – Activity Definition Form - Evandale Road stage 4 water main renewal
- 21 - Example GATE 1 - Activity Definition Form - King Street Stages 1 2 water main
- 24 - BC Options Burnie Cam 110114
- 25 - Burnie Cam Linkmain Business Case review
- 26 - Water Asset Criticality Framework Tool(Examples)
- 12 - Arup PSP3 Interview - Day 3 - Interview 2, 3 and 4 - Capex Projects - Detailed Review (2)

B9 Non-Network IT

TasWater is required to upgrade or replace IT equipment/ systems to ensure productivity is maximised. This program is for the renewal of Non-Network IT (excluding SCADA) in order to maintain an efficient and effective business.

B9.1 Summary

The non-network IT program focuses on all IT element with the exception of SCADA; as such, it is a major program. However, limited information is available as to how the program budget is reached and how projects are prioritised.

B9.2 Key Documents Reviewed

- 12 - Arup PSP3 Interview - Day 3 - Interview 2, 3 and 4 - Capex Projects - Detailed Review (2)
- 53 - Non-network IT - capital program definition form
- 54 - Business Systems IT Strategy and Budgeting FY2017-18
- 55 - TW FY18-20 Corporate Plan Strategic Initiative Project Plan - ICT Strategy – Overarching
- 56 - TW FY18-20 Corporate Plan Strategic Initiative Project Plan Business Systems Domain remediation
- 57 - TW FY18-20 Corporate Plan Strategic Initiative Project Plan Business Systems End User Device Refresh Program
- 58 - TW FY18-20 Corporate Plan Strategic Initiative Project Plan Business Systems ICT program of work
- 59 - TW FY18-20 Corporate Plan Strategic Initiative Project Plan Business Systems ICT Security and BC
- 60 - TW FY18-20 Corporate Plan Strategic Initiative Project Plan Business Systems ICT strategy