WaterNSW Greater Sydney Expenditure and Demand Review

Final Report

IPART

March 2020

Contains *sensitive* information

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Glossary

Term	Definition
AIR	Annual Information Return
ANCOLD	Australian National Committee on Large Dams
ARK	Archiving and Record Keeping System
BAT	Burrawang to Avon Tunnel
BOM	Bureau of Meteorology
BOO	Build, Own and Operate
BSI	Business Systems and Information
Capex	Capital Expenditure
CARMS	Computer Aided River Management System
CBD	Central Business District
CDSS	Catchment Decision Support System
CEO	Chief Executive Officer
CIMS	Consolidation of Information Management Systems
CPI	Consumer Price Index
DAR	Development Asset Register
DRS	Drought Resilience Scheme
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment
DSC	NSW Dam Safety Committee
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
ERC	NSW Expenditure Review Committee
ERP	Enterprise Resource Planning
FOBOT	Fibre Optic Break Out Tray
FSL	Full Supply Level
FTE	Full Time Equivalent
GIS	Geographical Information System
GL	Gigalitre
HEPS	Hydro Electric Power Station
HR	Human Resources
ICT	Information Communications Technology
IPART	Independent Pricing and Regulatory Tribunal
ISO	International Organisation for Standardisation
IT	Information Technology
iWAS	Internet Water Accounting System
MCA	Multi-Criteria Analysis
MFP	Multi-Factor Productivity

Term	Definition
MLD	Megalitres per Day
MWP	Metropolitan Water Plan
NPV	Net Present Value
NRAR	Natural Resources Access Regulator
NSW	New South Wales
ODM	Overall Delivery Measure
OECD	Organisation of Economic Cooperation and Development
Ofwat	Water Services Regulatory Authority, England and Wales
OH&S	Occupational Health & Safety
Opex	Operational Expenditure
P_{50}	50th Percentile
P_{80}	90th Percentile
PRA	Portfolio Risk Assessment
RAB	Regulated Asset Base
RACS	Risk Assurance and Compliance System
RFP	Request for Proposals
RFS	Rural Fire Service
RWSA	Raw Water Supply Agreement
SaaS	Software as a Service
SAMP	Strategic Asset Management Plan
SCA	Sydney Catchment Authority
SCADA	System Control and Data Acquisition
SDP	Sydney Desalination Plant
SIR	Special Information Return
SOC Act	State Owned Corporations Act 1989
SW	State Water
WAMC	Water Administration Ministerial Corporation
WAO	Water Applications Online
WAS	Water Accounting System
WFP	Water Filtration Plant
WLS	Water Licensing System
WMS	Water Modelling System
WNSW	WaterNSW
WSAA	Water Services Association of Australia

Executive Summary

This report is based on our review carried out in 2019 to derive and recommend efficient expenditure assuming business-as-usual. It does not reflect the likely impact of bush fires and related emergency requirements which occurred in late 2019 and into 2020.

This report presents the findings of our review of the capital and operating expenditure for WaterNSW's bulk water services in the Greater Sydney area. It addresses the prudent and efficient expenditure in the current period from 2016 to 2020 and for the future Determination period 2021 to 2025.

We have based our findings on a submission dated June 2019, the annual and special information returns presented to IPART by WaterNSW in July 2019, eight days of structured interviews with the agency managers and staff, information provided by the utility and responses to subsequent written questions. A subsequent AIR submission in October 2019 provided actual expenditure for year 2019. Our findings are also informed by our review of the long-term investment and asset management processes. We reviewed functional activities and a representative number of capital projects in the current and future price paths.

Our view of efficiency is based on the concept of a frontier company competing in an open market where it has strong internal cost controls. The frontier company will continue to seek efficiencies from technological development and innovation. Other companies or agencies will seek greater efficiencies to catch up with the Frontier Company. This concept has been applied in previous efficiency reviews of Sydney Water in 2016 and previously in 2008 and 2012 and for Hunter Water in 2011 and State Water in 2009.

Operating environment

WaterNSW is responsible for the management and supply of raw water in NSW. It supplies raw water to Sydney Water and some local councils for treatment and distribution to more than 5 million people in Sydney and the Illawarra, Blue Mountains, Shoalhaven, Goulburn and Southern Highlands regions. WaterNSW also supplies water to approximately 60 raw water and unfiltered water customers. This is its Greater Sydney business and subject to this efficiency review. WaterNSW operates major water storage infrastructure, provides water infrastructure solutions to customers and stakeholders and is responsible for the protection of declared drinking water catchments in its area of operations.

WaterNSW's role is to provide services in accordance with the operating licence, water sharing plans, water supply agreements, Memoranda of Understanding with NSW Health and NSW EPA and relevant legislation including the WaterNSW Act 2014, WaterNSW Regulation 2013, Dam Safety Act 1978 and the Independent Pricing and Regulatory Tribunal Act 1992. In this role it is responsible for managing and operating an asset base including dams, raw water pipelines and associated infrastructure, protecting the catchment areas, monitoring water quality, quantity and environmental flows.

The Greater Sydney business is a continuation of the previous Sydney Catchment Authority with similar responsibilities and activities. While restructuring of the business has been carried out during the 2016 Determination period, the water supply, catchment management and similar activities continued as business-as-usual.

Business Structure

WaterNSW has nine operating departments covering its operational and support functions across all its Greater Sydney, rural valleys and WEMD businesses. The business is still developing as new systems and processes are being implemented; these should provide a good basis for driving future efficiencies. There was

little evidence of internal top-down efficiency challenges across both operating and capital expenditures although operating efficiencies are proposed for the 2020 Determination period.

Capital processes are at an early stage of maturity. Asset management processes improvements are being implemented. These processes will provide a sound basis for delivering capital efficiencies in the future.

Operating expenditure is substantially independent of raw water volumes delivered. The current pricing structure is an 80/20 split between fixed and volumetric charge. In the short run, with little volumetric-dependent expenditure, a 90/10 allocation may better reflect the WaterNSW cost structure although there is no pressing reason to change the current apportionment .

During the 2016 Determination period, WaterNSW has changed its accounting system from the previous legacy systems within its predecessor businesses to the current Microsoft Dynamics Enterprise Resource Planning (ERP) system, in April 2019. This has presented difficulties in deriving reliable cost data at disaggregated levels of the business. The new ERP system should capture cost data in a consistent manner with costs allocated to activities and businesses in a more robust way.

Asset Management

On the whole, WaterNSW has logical asset management processes in place to support the development of prudent and efficient expenditure proposals. However, there are some notable gaps in its processes, for example the Asset Class Strategies (which has a stated aim to of determining risk, performance and cost tradeoffs for each asset class). WaterNSW has had a strong focus on maintenance in recent years. A more strategic approach in future year supported by Asset Class Strategies should realise efficiencies for the scope and frequency of maintenance and the justification and scoping of capital expenditure.

We consider that some of WaterNSW's key processes, such as cost estimating, procurement and PowerPlan, are still in the early days of implementation and have not had the benefit of refinement and improvement. We consider that WaterNSW has focused its attention on improving its processes in time for this expenditure review but in that regard, there is still some time before the improved processes become part of business as usual and there are likely efficiencies that WaterNSW will gain in coming years as these processes are embedded.

Performance

WaterNSW is required to establish arrangements with Sydney Water under the WaterNSW Act, which include the standard of quality of the water supplied, the continuity of water supply and the maintenance of adequate reserves of water by WaterNSW. These arrangements are included in a Raw Water Supply Agreement (RWSA) with Sydney Water. The agreement covers raw water quality management as well as flow measurement, information management, operational changes, system configuration, strategic planning and maintenance planning. The maximum values of colour and turbidity are defined in the RWSA. raw water quality is defined. These are important to define treatment requirements and drive costs to Sydney Water. There is then an obligation that WaterNSW and Sydney Water work together to manage operating costs efficiently.

WaterNSW has complied with the operational licence requirements and the RWSA agreement with Sydney Water.

Outside the RWSA, the performance requirements are generally qualitative and relate to processes rather than the service provided by WaterNSW. Water quality is primarily a function of the catchments from which water is collected. Beyond this, WaterNSW has operational measures that it can undertake to improve raw water quality such as changing sources and blending different sources, but there are constraints on what can be achieved. There are no measures to confirm whether WaterNSW has met its qualitative obligations and it

is difficult to confirm whether these activities are efficient. There is a risk of over-provision or a low risk approach. A test should be considered to determine the level of benefits from these activities.

Demand projections

WaterNSW is the main supplier of water to Sydney Water. With average volumes of 563,434 Ml p.a., Sydney Water makes up 99% of WaterNSW's projected sales volumes for 2016 to 2020, with Wingecarribee Shire Council making up nearly 1% at 5,490 Ml p.a. Other customers provide average sales volumes of 302 Ml p.a. in the same period.

In 2020, WaterNSW expects total sales volumes to be 3.9% higher than assumed in the 2016 Determination, with the majority of the increase being in Sydney Water sales volumes, but also Wingecarribee Shire Council, whose sales volumes WaterNSW expects to by 27% higher than in the Determination. These are only slightly offset by lower than expected growth in Goulburn Mulwaree Council, raw and unfiltered water use.

We have reviewed Sydney Water's demands in the Sydney Water report, including the drivers for variance from the Determination, so have not commented on it in detail here. Sales volumes have been significantly higher than assumed in the Determination. This is the result of a number of factors including:

- Higher levels of new dwelling construction;
- Hot and/or dry weather, especially in 2018;
- "Densification" of non-residential consumption, with more high-rise development for example.

The impact of weather is particularly marked in 2018 when sales volumes were 11.4% higher than the Determination assumption.

For Sydney Water's projected sales volumes, WaterNSW relies on demand forecasts provided by Sydney Water. The sales volumes in WaterNSW's pricing proposal are based on the update provided by Sydney Water in April 2019. Sydney Water has confirmed that the demand forecast they provided relates to "*the forecast total system demand as per the outlet meters on the filtration plants*". However, except for Prospect WFP, WaterNSW's revenue meters are on the raw water supply (i.e. inlet) rather than outlet meters.

In general, raw water volumes entering into water filtration plants (WFPs) are greater than the volumes put into supply due to process losses such as backwashing, disposal of sludge, which contains water, and some evaporation/seepage. This suggests that WaterNSW's sales volumes should be greater than the demand at the outlet meters for all WFPs except Prospect. We have recommended a 2.2 Gl p.a. adjustment to projected sales volumes to take account of these potential water losses. We have also indicated the potential scale of impact of SDP operation on sales volumes.

Level 1 water restrictions were put in place in Sydney, the Blue Mountains and the Illawarra from 1 June 2019. It has been announced that Level 2 water restrictions will be effective from 10 December 2019.

It is not possible to forecast with confidence how long these restrictions will be in place or if deeper restrictions will be announced in the 2020 Determination period. However, we note that water restrictions were in place for nearly six years during the last major drought (2003-2009), suggesting that it is quite possible restrictions will be in place for all or most of the 2020 Determination period. Even if they are not, the savings may continue for some time once the restrictions are lifted.

We have prepared demand projections for representative 'drought' and 'non-drought' situations. The 'drought' demands assume a 15% saving relative to average conditions. There are a number of caveats around this figure such as the uncertainty in how the drought and associated responses will evolve, in the effectiveness of water conservation measures and communications, in the effect of changes in the customer base and in the rate of new development.

Output measures

2016 Determination period

Overall WaterNSW is making reasonable progress against its output measures. Ten capital projects were defined output measures at the 2016 Determination. WaterNSW have:

- 3 completed
- 4 underway with completion in current period
- 1 underway with completion in 2020 period
- 1 deferred
- 1 slipped to 2020 period

2020 Determination period

WaterNSW have proposed seven output measures which represent the major capital projects that WaterNSW is proposing to undertake during the 2020-24 Determination period. We have reviewed and updated the proposed completion dates of these to reflect our recommended adjustments to capital expenditure.

We further propose that WaterNSW's internal measure called the Overall Measure of Delivery (OMD) is included as an output measure. This would also assist in providing WaterNSW scope and flexibility to alter and prioritise projects within the capital program, especially in light of the ongoing drought situation where focus should be given to drought related projects to ensure swift implementation.

The is a further need for operational expenditure outputs which would cover catchment management activities and water operations. We suggest a risk-based approach should be developed.

Asset Lives

WaterNSW has proposed 16 asset life categories in its SIR plus land, which is not depreciated.[1] The capital projects in the SIR are mapped to one of these categories. WaterNSW propose the weighted asset life for new assets is 61.16 years. WaterNSW proposed significant expenditure in the future period on dams and pipelines, as well as IT expenditure which we consider has a longer asset life than proposed by WaterNSW. In Table 0-1 we provide the weighted average asset lives based on extending asset lives for dams, pipelines and IT and reporting any expenditure on [redacted] separately. On this basis we consider it appropriate to increase the average asset life proposed by WaterNSW.

[1] SIR June 2019 worksheet *Fixed asset lives hard code*

Table 0-1 Proposed weighted average asset lives

New assets – average asset life (years)	2021	2022	2023	2024	Weighted Average
Increasing dams to 200 years	57	90	89	77	81
Increasing pipelines to 120 years	53	87	90	58	76
Increasing IT to 10 years	46	68	69	52	61
Increasing dams, pipeline and IT	65	110	110	84	96
Increasing dams, pipeline [redacted]	70	110	110	84	**98**

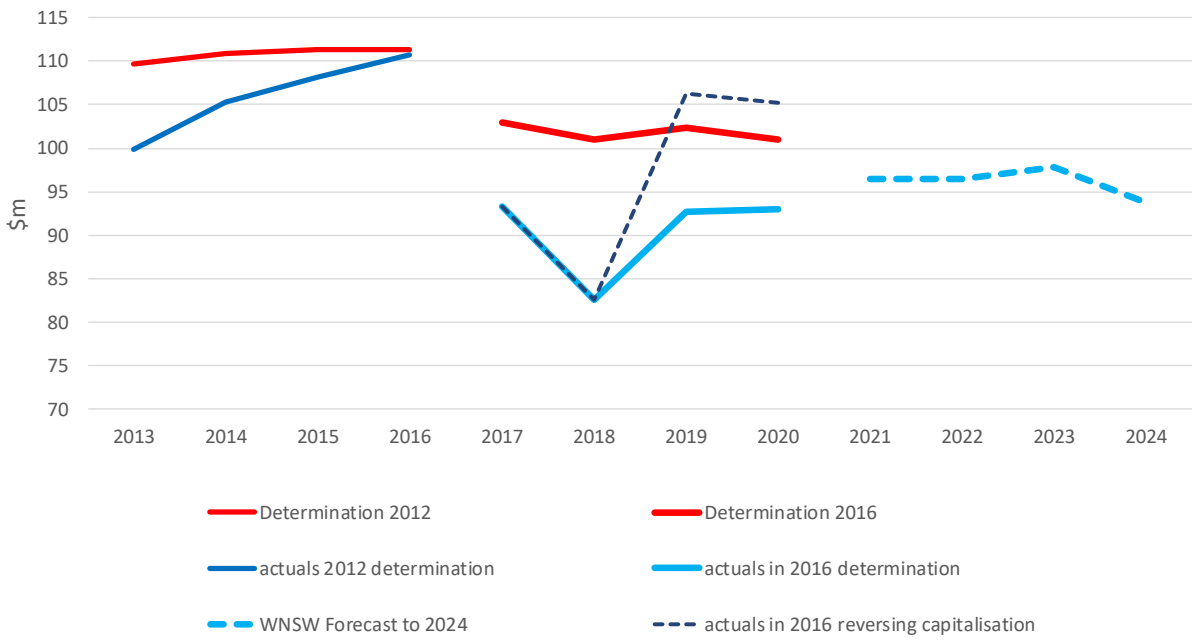
Operating expenditure

The 2016 Determination period

WaterNSW was established in 2015 from the previous Sydney Catchment Authority (SCA) and State Water Corporation. The completion of restructuring of the combined businesses which related more to the management structure than activities has taken some time. For example, the new ERP system which was implemented in 2019.

The 2016 Determination assumed a $27.5m reduction on the 2012 base; this was delivered from 2017. In 2018, expenditure was 19% below the Determination which WaterNSW attributes to a lower corporate allocation in the year and the impact of the restructuring of the business with lower headcount and a greater number of vacancies. There was then a significant increase in expenditure in 2019 and forecast for 2020 which exceeded the Determination for those years. Expenditure in 2019 was a 21% increase on the average of years 2017 and 2018. To affect such an increase over one year questions the efficiency of the business and the extent to which the long term efficiencies of the merger have been maintained.

Operating expenditure reported in the 2016 Determination period includes actuals for 2017, 2018 and 2019; forecast expenditure is included for year 2020. WaterNSW reports an overall under-expenditure of $45.8m. Figure 0-1 shows a comparison of actual expenditure against the 2016 Determination. We also show, for comparison, the actual expenditure against Determination for the 2012 period and the WaterNSW proposed expenditure for the 2020 Determination period. This comparison enables a long-term view to be taken on Determination allowances and actual expenditure.



Source SIR, IPART Determination report and Atkins Cardno 2016 report and analysis

Figure 0-1 Expenditure comparisons 2012, 2016 and 2020 Determination periods

There was a change to accounting assumptions during the Determination period. The capitalisation rules changed from 2019 resulting in a $25.9m reduction in operating expenditure. While there may be a good accounting reason to make this change, we question whether it is equitable to add these costs to the RAB when allowance has been made in operating expenditure. We have therefore reversed an equivalent amount from the RAB in 2019 and 2020 to reflect this double counting.

Corporate and support costs are allocated to the Greater Sydney, Rural Valleys and WAMC businesses. The methodology has changed from that assumed in the Determination with allocation now based on totex; that is the combination of operating capital expenditure. For some large projects, the allocation is based on one-off assessments. The impact is to reduce the allocation to Greater Sydney by $6.8m. This leaves a residual variance of -$13.1m. Actual operating expenditure was therefore an average 3.7% below the Determination after adjustments for capitalisation and corporate allocations.

Many of the activities of water operations, catchment management, maintenance and related activities for Greater Sydney are business-as-usual and continuing from the previous SCA; there are no significant changes to these activities in the current and future periods. Reductions in activity and expenditure were reported in these operating areas in 2018 although these have had no material impact on performance. Because of the qualitative nature of the performance measures, it is difficult to determine whether expenditure is efficient, or a low-risk is taken and some over-provision (or gold plating) is applied.

WaterNSW has changed its financial system during the period, from legacy systems.in the previous Sydney Catchment Authority and State Water Corporation businesses. The current system was fully implemented in 2019. These changes and the impact of applying different charts of account has made it difficult for WaterNSW to provide a robust estimate of some historic costs. There is no impact on forecast expenditures.

The lower actual expenditure is due mainly to reduced activity levels in maintenance, catchment management and water operations. A backlog in maintenance activity was identified by WaterNSW; it plans to resolve this in 2020 although some backlog is likely to be carried over into the 2020 Determination period. Monitoring activities have reduced because of drought conditions with lower inflows.

WaterNSW has continued its business operations under the Operating Licence requirements although in some areas at lower levels of activity. We consider that it has met these requirements although there is little

information to confirm that expenditure is efficient. The business does not appear to be focused on delivering efficiency and has not proposed any savings in the 2016 period through the Efficiency Incentive Mechanism.

The findings from the review of the 2016 Determination period on the 2020 period are that

- lower operating expenditure is expected from a higher level of capitalisation;
- the main activities have continued as 'business-as-usual' and there is flexibility in accommodating additional requirements through re-prioritising of activities;
- the qualitative nature of most of the performance measures makes it difficult to determine whether expenditure is efficient, or a low risk is taken with some over-provision;
- some form of risk-based measure should be considered to prioritise activities, promoting those activities with clear risk reduction and deferring others;
- WaterNSW costs are substantially independent of the volume of bulk water supplied.

We concluded that the reasons for the variance in operating expenditure in the 2016 Determination period was due to capitalisation of some expenditure, a change in the allocation of overheads to the Greater Sydney business and lower activity during 2018, rather than delivering efficiencies.

The 2020 Determination period

There are no material changes to the Operating Licence requirements to provide bulk water supplies to Sydney Water and local councils and operations follow established business-as-usual activities. There are a small number of exceptions in that Sydney Water has requested additional water monitoring activities and operational support has been given to drought management functions requested by Government. While dam safety legislation is changing, WaterNSW is well placed to manage this and the impact is mainly for capital expenditure. There is a new licence requirement to undertake more water quality science.

WaterNSW is proposing an increase in operating expenditure of $23m (6.5%) above the 2016 period; this is after $3.9m (1%) efficiency is applied across the whole program. The main increases are in Catchment Management and Water Delivery. Corporate and support costs remain higher than comparators. Where a business is facing additional cost pressures, we would expect it to manage these, where possible, within existing budgets but adjusting priorities. We have derived an efficient level of expenditure based on adjustments to specific activities and programs to meet qualitative objectives. We have then applied catch-up and continuing efficiencies, taking into account the efficiencies proposed by WaterNSW. We have sought to benchmark WaterNSW's performance against bulk water supply comparators with limited success as the nature and operating environment of managed catchments is non-homogeneous.

- Catchment Management: we question whether some of the Catchment Management expenditure could be absorbed by changing priorities within existing budgets'
- Water Operations: We question whether some additional monitoring costs can be contained within existing budgets. We also question the need for additional water monitoring and testing to meet Sydney Water's request under the bulk water supply agreement. While there is good reason to increase the frequency of some water quality sampling and testing, these can be offset by avoiding duplicate sampling with Sydney Water.
- Corporate and Support expenditure: We compared the proportion of corporate and support expenditure to total expenditure for WaterNSW, Sydney Water and Central Coast Water. We found that the proportion of expenditure for the Greater Sydney area was significantly greater than these other utilities. We also considered the current business structure compared with other utilities and found that there is scope to rationalise the WaterNSW structure and catch up with a frontier company. We address this in the catch-up efficiency applied. Benchmarking of IT expenditure shows that WaterNSW is an outlier above the mean of other Australian utilities.

We then made adjustments to reflect catch-up and continuing efficiency, Catch-up reflects the efficiency need to be achieved over time to catch up with a frontier company. We responded to comments from WaterNSW

on the draft report and spread the catch-up efficiency over five years at 0.9%/a cumulative, offset in part by the efficiency proposed by WaterNSW. This is about half the efficiency applied to Sydney Water in 2016.

The continuing improvement element of efficiency, termed Frontier Shift, relates to the increased productivity derived from process innovation and new systems and technology that all well performing businesses should achieve. We have applied the results from an analysis of the Australian Productivity Commission Multi-Factor Productivity (MFP) data, proposed efficiencies from other water utilities in New South Wales and recent analysis for Ofwat, the water regulator in England and Wales, which has been applied to frontier water companies. We have applied a Frontier Shift of 0.8% per annum cumulative over the Determination period.

Our view of efficient operating expenditure is summarised in Table 0-2 below and shown in Figure 0-2.

Table 0-2 Efficient level of operating expenditure

WATERNSW EFFICIENT LEVEL OF OPERATING EXPENDITURE					
($m 2019/20) year ending June	**2021**	**2022**	**2023**	**2024**	**Total 2021 to 2024**
WATER NSW PRE-EFFICIENCY PROPOSED EXPENDITURE					
Total pre-efficiency expenditure	97.48	97.37	98.77	94.69	388.32
ATKINS SCOPE ADJUSTMENTS					
Total adjustment	-2.80	-2.80	-3.70	-3.60	-12.90
Expenditure post adjustments	94.68	94.57	95.07	91.09	375.42
ATKINS EFFICIENCY ADJUSTMENTS					
Efficiency applied	-1.61	-3.22	-4.85	-6.19	-15.87
ATKINS RECOMMENDED EFFICIENT EXPENDITURE					
Total	93.07	91.36	90.22	84.90	359.55

Source: Atkins analysis

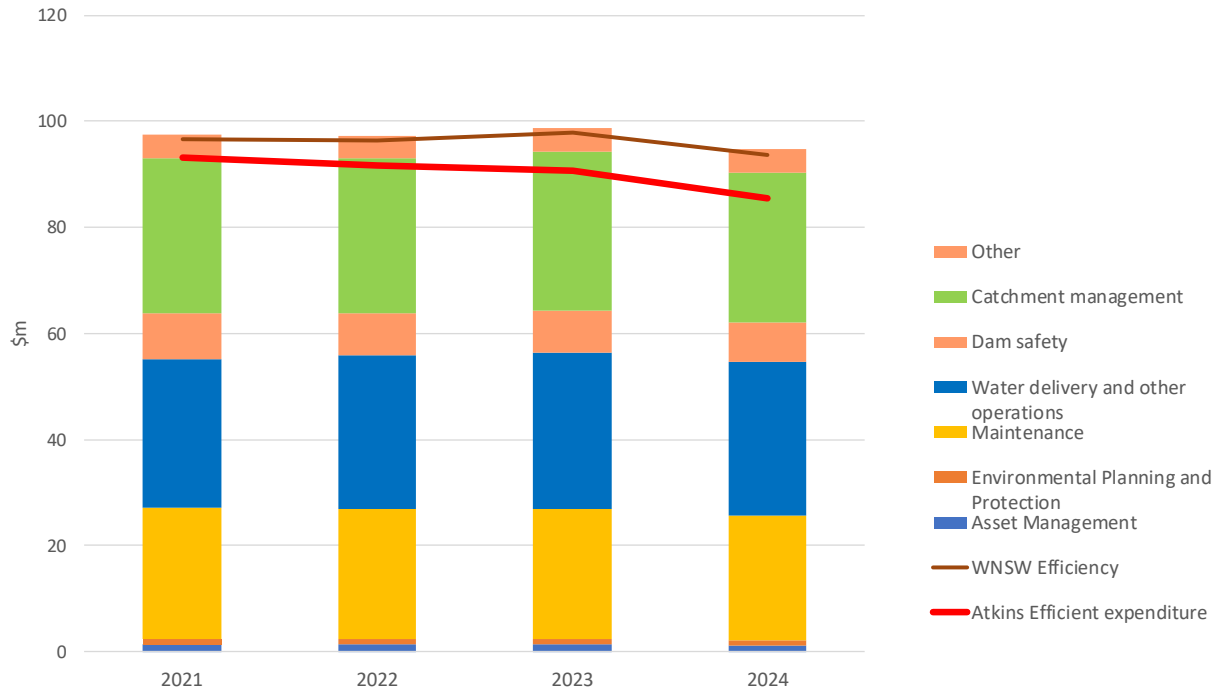


Figure 0-2 Efficient level of operating expenditure

Drought response measures

Greater Sydney is currently experiencing a significant drought, especially in the inland areas which act as the watershed for the water supply of Greater Sydney. In early November 2019 dam storage levels were at just over 47% compared to approximately 62% a year before and approximately 82% at the start of 2018. This rapid drop in storage levels has led WaterNSW and NSW Government to put in place a number of drought response measures.

The options study was completed in short timescales. It does not incorporate sophisticated economic optimisation or set out a clear process of options identification and evaluation. However, our view is that the first two Tranches of interventions it proposes are reasonably sensible and robust. We consider it would be useful for a more sophisticated study to be undertaken to examine the justification of the third Tranche of interventions.

Having reviewed the drought supply options study, including the potential timescales by which measures may need to be in place under certain drought scenarios, we are satisfied that the early commencement of drought response planning works by WaterNSW is prudent.

The Avon Deep Water Access Project is the only drought response scheme for which WaterNSW has included construction costs in the submission. We consider that, if the drought continues, this is likely to be prudent expenditure. However, the trigger point for commencement of construction will require significant consideration and the construction contracts will need to be structured to take account of the potential for the decision to be reversed if the drought breaks. It will also need to be subject to confirmation of treatment capacity.

In its submission, WaterNSW has also included the costs of planning (but not construction) for four drought response schemes. We consider that these are prudent but have recommended adjustments to take account the halt of [redacted] and updated cost estimates for [redacted].

We have separated out the expenditure on the planning for [redacted] as we consider that there is significant uncertainty over who should own any future assets and whether these costs should be borne by WaterNSW customers in the meanwhile.

Capital expenditure

2016 Determination Period

Capital expenditure reported in the 2016 Determination period includes actuals for 2017, 2018 and 2019; forecast expenditure is included for 2020. WaterNSW is forecasting a total overspend for capital expenditure of $72m in the period compared to the 2016 IPART Determination. $56m of the overspend has been attributed unforeseen expenditure on drought response schemes and in particular the planning costs which are identified within ‘new projects’ in Figure 0-3. Capital expenditure was significantly below IPART’s capital expenditure allowances in the first two years of the period before the onset of the drought.

Throughout our project reviews we noted a number of instances of underspending compared to the previous IPART Determination. WaterNSW is a project orientated business with the capital program largely made up of specific one-off projects. These by their nature are harder to draw on historical comparable unit cost estimates. Unlike linear assets the majority of WaterNSW projects tend to be bespoke in time, location and scope which may also have been a contributing factor to the underspending compared to the IPART Determination.

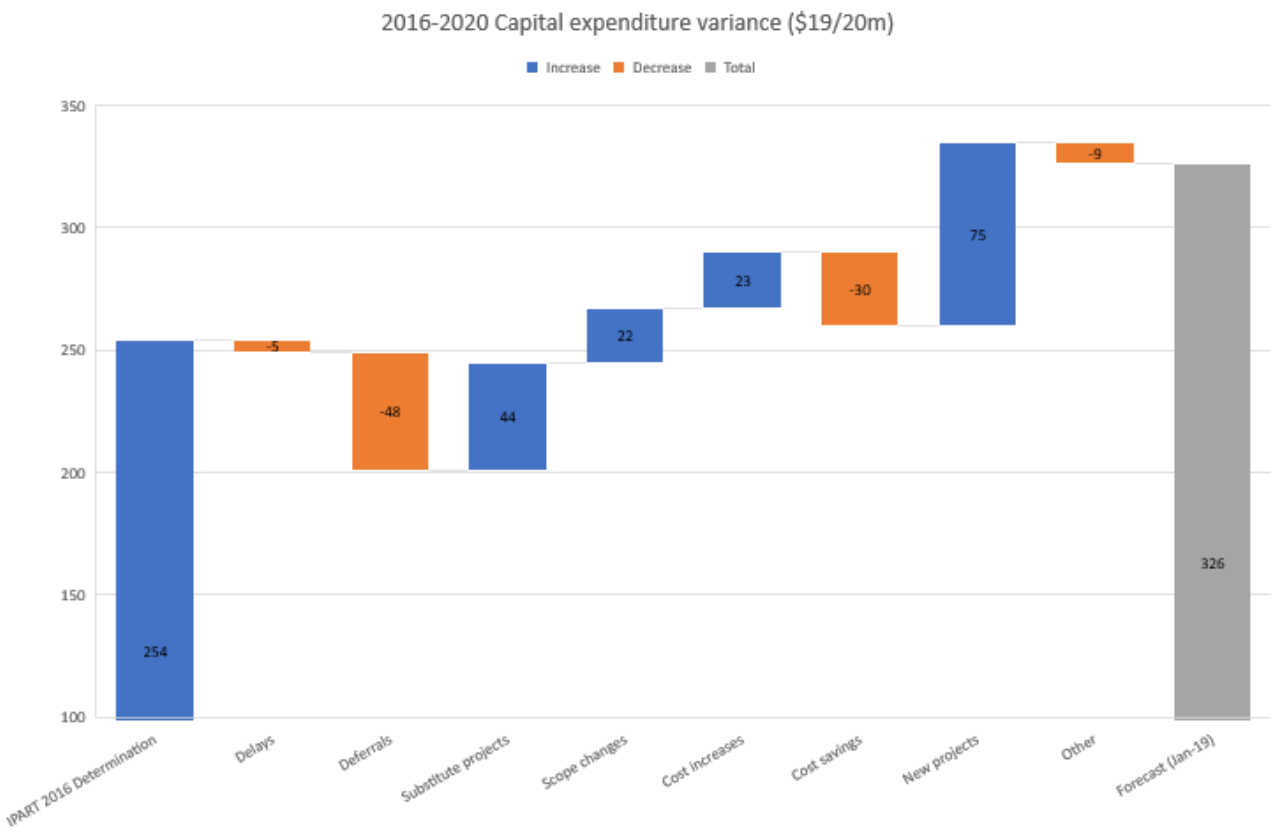


Figure 0-3 Capital expenditure variance current Determination Period

Within the current Determination period we recommend two significant adjustments to arrive at our recommended level of efficient capital expenditure for the current period. These adjustments are:

- A $25.9m reduction to reverse the change in capitalisation policy and a number of project level changes to take account of updated 2020 estimates;
- A $34.3m reduction [redacted].

We provide our view on the efficient level of capital expenditure in the current period in Figure 0-4.

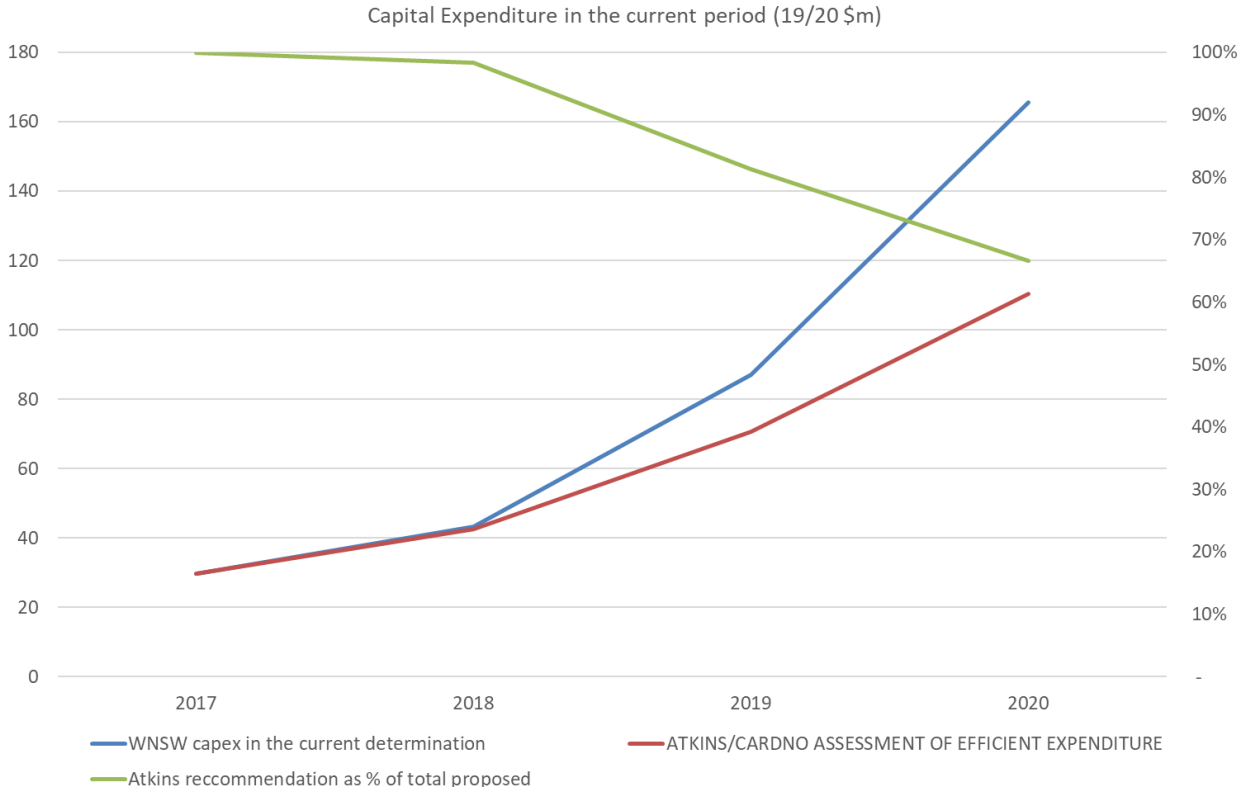


Figure 0-4 Efficient capital expenditure 2016-2020

Cost estimating has been undertaken on a project by project basis with estimates built from bottom up. However, because of this approach there is a need to challenge expenditure at a portfolio level to optimise the program. We did not see evidence of any formal, business-wide approach to internal efficiency challenge of the capital expenditure program. WaterNSW does not demonstrate strong links between their performance expectations and how it is able to manage its physical infrastructure to meet these expectations. Important business processes such as renewals forecasting and procurement have been improved in recent years but are yet to become business as usual.

Overall our findings are that:

- Total capital expenditure is masked by drought response schemes and a change in the capitalisation policy;
- There is systemic capex underspending across many projects which in our view could benefit from a formal top down efficiency challenge process;
- Performance and measures of success are not always well defined within the business overall and are not linked to expenditure.

2020 Determination Period

In the current Determination period capital expenditure is $74.8m per annum. WaterNSW has proposed to more than double this to just over $170m per annum for the 2020 Determination period with significant expenditure proposed for drought response schemes (government programs/growth drivers).

WaterNSW's Greater Sydney capital expenditure program for the forward period is generally based on bottom up discreet and often unique projects. We have not been provided evidence of a formal approach to internally challenging the capital program expenditure at a whole of program level.

We have made a number of specific recommendations adjustments to the proposed capital program of which the most significant are:

- Warragamba e-flows – we recommend deferring significant expenditure on this project until towards the end of the next period to commence in 2022 in order to resolve the uncertainty around the potential raising of the Warragamba dam wall and to focus corporate attention on drought related projects. We recommend an adjustment within the future period of $89.3m.

- Greater Sydney Resilience provision – this project does not appear to be prudent based on the resilience that already exists within the system. We recommend a $17m expenditure adjustment.

- 2025 – should IPART wish to make a five-year Determination we recommend uplifting pre-efficiency expenditure by $28.6m which is based on the average capital expenditure proposed expenditure for 2020-2024 excluding any expenditure for drought schemes.

We have further made some minor adjustments for areas of imprudence identified in corporate capital projects, in particular for ICT. We then recommend adjustments to reflect catch-up and continuing efficiency, Catch-up reflects the efficiency need to be achieved over time to catch up with a frontier company.

We have recommended catch-up efficiencies across four specific areas:

i. Improvements to capital program development, optimisation and prioritisation
ii. Improvements to value engineering
iii. improvements in cost estimating and the management of contingencies,
iv. the impact of new procurement processes and the likely savings from more effective program management.

The continuing improvement element of efficiency relates to the increased productivity derived from process innovation and new systems and technology that all well performing businesses should achieve. We have applied the results of recent analysis for Ofwat, the water regulator in England and Wales, which has been applied to frontier water companies. We have applied Frontier Shift efficiency of 0.8% per annum which is the lower quartile of the range proposed; this is consistent with our approach to operating expenditure set out in Section 5.7.3.

Our view of efficient operating expenditure is summarised in Table 0-3 below.

Table 0-3 Efficient level of capital expenditure

WATERNSW PROPOSAL - CAPEX - WATER SERVICE							
($M 2019/20) year ending June	2021	2022	2023	2024	2025	2021-24 Total	2021-25 Total
Existing mandatory standards	79.8	69.3	63.6	64.1	44.2	276.8	321.0
New mandatory standards	11.7	10.3	15.6	6.6	0.8	44.2	45.0
Discretionary standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by other	20.9	98.2	108.5	10.5	0.0	238.1	238.1
Government programs	34.8	39.1	29.2	20.3	6.6	123.3	130.0
Business efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	147.2	216.9	216.9	101.5	51.6	682.4	734.0
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2019/20) year ending June	2021	2022	2023	2024	2025	2021-24 Total	2021-25 Total
Existing mandatory standards	75.5	59.3	52.1	52.9	62.1	239.8	301.9
New mandatory standards	13.8	11.9	14.1	5.8	0.7	45.5	46.2
Discretionary standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by other	19.7	91.6	97.5	9.2	0.0	218.0	218.0
Government programs	2.5	0.0	9.8	32.0	23.5	44.3	67.8
Business efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Efficient Expenditure	111.5	162.8	173.5	99.9	86.3	547.6	633.9

Special Review Items

We were asked to review specific items of WaterNSW's submission. Our findings have been included in the relevant areas of the report. The specific causes of historic under expenditure of operating and capital expenditure are explained in Sections 5 and 6 respectively. The review of forward-looking capital projects is discussed in Section 6.

Atkins/Cardno would like to take the opportunity to thank WaterNSW for the professional manner in which it prepared for and presented information at interviews and responded to our questions and requests for further details through the expenditure review.

1. Introduction

1.1. Terms of Reference

In July 2019 the Independent Pricing Tribunal of New South Wales (IPART) appointed the Atkins/Cardno consortium to carry out a detailed review of WaterNSW's Greater Sydney operating expenditure, capital expenditure and demand forecasts. The purpose of this review is to inform the Tribunal's Determination on prices for the upcoming price control period.

This report has been prepared in accordance with the Terms of Reference set out in the contract between Atkins/Cardno and IPART which commenced on 1 July 2019. These are reproduced in Appendix A.

The findings of this report form an important component of the overall price review process as set out in the IPART Issues Paper. The conclusions relating to prudence of expenditure in the 2016 Determination period inform what IPART includes in WaterNSW's Greater Sydney's opening Regulated Asset Base value. The conclusions relating to efficient operating and capital expenditure in the 2020 Determination period assist the Tribunal's assessment of what are justified requirements to be included in the 'building block' model for determining future prices.

The Terms of Reference state that the price control period is for a period of up to five years, 2021 to 2025.

1.2. Terminology in this report

WaterNSW has four separately determined price controls:

- WaterNSW's Greater Sydney bulk water services;
- WaterNSW regional and rural water services;
- WaterNSW supplies to Essential Energy near Broken Hill; and
- Water Administration Ministerial Corporation shared services

Within this report we refer to WaterNSW's Greater Sydney bulk water services Determination as WaterNSW unless otherwise stated.

1.3. WaterNSW Greater Sydney submission to IPART

IPART required WaterNSW to provide a submission outlining and substantiating its proposed prices for the next Determination period and report on actual and forecast expenditure for the 2016 Determination period from 2016 to 2020. The following versions of this information have been used in the preparation of this report:

(i) Submission to IPART dated July 2019;

(ii) Special Information Return (SIR) dated July 2019;

(iii) Annual Information Return (AIR) dated July 2019;

(iv) An updated version of the AIR and SIR including actual expenditure for 2019, dated October 2019.

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

1.4. Review Process

We, the Atkins/Cardno team, commenced our review on 2 July 2019. We submitted an Inception Report to IPART on 31 July 209. Following initial review of available date, we submitted an Information Request to

WaterNSW on 24 July 2019. Documents were provided by WaterNSW from 1 October 2015. Our review team commenced the phase 1 review interviews from 12th to 20th August 2019. The second phase of interviews focussing on project reviews, were carried out from 2nd to 10th September 2019.

Over the interview period we requested additional supporting documentation relating to a range of issues. WaterNSW provided us with this information to the best of its ability. We then requested further information and queries over the subsequent weeks to which WaterNSW was able to respond.

Atkins/Cardno would like to take the opportunity to thank WaterNSW for making its staff available for the interview days and for the professional manner in which the organisation responded to our challenges and requests for further detail.

An initial draft report was submitted to IPART on 17 October 2019. An updated version of the report taking into account any changes to the SIR submission, was submitted to IPART and WaterNSW on 15 November 2019. WaterNSW and IPART were invited to comment on the draft, which we have accounted for in this final report.

A final report is planned for submission in December 2019.

1.5. Methodology

Our review and assessment of capital and operating efficiency is based on the hypothesis of a frontier company competing in an open market to deliver services to customers, the continuing efficiencies that a frontier company makes through innovation and technological development, and the catch up efficiency required of WaterNSW to achieve the performance of a frontier company over time. We use this approach to compare the business processes and systems with current best practice and to identify the extent of catch-up that may be required over time to reach an efficient level of operation. The approach is similar to that taken for the 2015 and 2011 efficiency reviews of Sydney Water, the 2016 review of SDP and the 2018 review of Central Coast Water.

We review the decision-making processes for both operating and capital expenditure to test whether there is sufficient challenge and rigour to deliver total least cost solutions. We comment in Section 2 on WaterNSW's management systems and processes and identify areas with the potential to drive further efficiencies over the Determination period.

Within the Expenditure Review we have considered the asset management practices, the capital investment appraisal, the estimating methodology and procurement process insofar as they are used to identify investment needs and timing, appraise solutions, prioritise projects within defined budgets and procure and manage timely delivery.

1.5.1. Strategic review

Task 1 of the Expenditure Review was to review the long-term investment planning and asset management practices and processes. We examined the longer-term investment strategy and the key assumptions driving this expenditure. We checked that the price submission and SIR were consistent with this long-term investment program. We were able to compare asset management frameworks with best practice. Our analysis was focussed on the ability of the asset management systems and processes to deliver efficient expenditure. Our review is consistent with the IPART paper 'Regulatory Tests of past and forecast Capital Expenditure', December 2010.

1.5.1. Demand forecast

IPART requires us to assess the utility's forecast sales and customer connections used to support its proposed expenditure and prices. We have undertaken a review of: the reasonableness of the utility's demand and customer connection forecasts over the 2020 Determination period.

About 99% of WaterNSW's total water sales are determined by Sydney Water and WaterNSW relies on the water sales estimate supplied by Sydney Water to set its prices.

1.5.2. Operating expenditure

IPART requires us to assess:

- the efficiency of operating expenditure for the period from 1st July 2016 to 30th June 2020, to the extent necessary to assess the efficiency of the proposed operating expenditure; and
- the efficiency of proposed operating expenditure for the period from 1st July 2020 to 30th June 2025.

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

Our approach to forward-looking operational efficiency is based on a combination of process-based qualitative and quantitative assessments. We consider how WaterNSW performed against the 2016 Determination and the reasons for outperformance, whether due to exogenous factors or actions taken by the Company.

Looking forward we test how the efficiency gains in the current Determination period will impact on opex in the future and the potential for further gains through improved processes. Our approach therefore includes an assessment of the agency's operating expenditure proposals and scope for further efficiencies by function and process. We focus on the material areas of expenditure such as energy, operations and maintenance activities. We also test the extent to which planned maintenance is able to extend the life of assets and defer capital expenditure.

We focus on risk management and the approach taken by WaterNSW in balancing risk between the agency and customers. There is an increasing customer engagement in developing business plans across many utilities including the frontier. We take account any productivity benchmark analysis which may be applicable. Again, this is a guide to what extent the agency may be at or behind the frontier.

We recognise that a proportion of operating costs may not be directly controllable because they are driven by external factors. But this impact could be two-sided; for example, there could be potential savings in energy prices where the benefits may not be shared equitably with customers. We would normally exclude non-controllable costs but take a view on the risk taken by WaterNSW through their inclusion. We also identify areas where we consider operating costs are unduly low in relation to industry averages; we may suggest some increase in operating costs to reduce the risk of failure in service level provision.

We look to offset these efficiency targets with any efficiency programs demonstrated by WaterNSW. The evidence of such efficiency programs is indicative of an Agency which is looking to catch up with the frontier.

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

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

We present our review of operating expenditure and our present proposals for an efficient level of future expenditure in Section 5.

1.5.3. Capital expenditure

IPART requires us to assess:

- the efficiency of capital expenditure for the period from 1st July 2016 to 30th June 2020; and
- the efficiency of proposed capital expenditure for the period from 1st July 2020 to 30th June 2025 – in order to ensure that planned capital expenditure is directed to the most appropriate projects at an efficient cost.

Our assessment of the efficiency of schemes in the current Determination period is based on a review of a representative sample of projects. We reviewed the need for each project, its timing and the difference between actual costs and outputs against planned. We considered the basis of costs and the procurement route for implementation of sample projects. For the year 2020, we took a view of the most likely outturn expenditure based on the current status of schemes in the program.

Our approach to the assessment of allowable future expenditure is based on a review of the asset management and capital expenditure processes, project appraisal and decision processes and a review of a representative sample of schemes in the program. Our methodology involves the following steps which we apply to all expenditure at a real 2019/20 price base:

- Any inconsistencies in inclusions and allocation of capital expenditure by driver recorded in the SIR;
- Adjustments to the scope and assumed workload of asset replacement projects given;
- Adjustments to the timing of some projects due to uncertainties in the implementation programs;
- Adjustments for specific scheme cost estimates; and
- The scope to gain efficiencies through the implementation of the appraisal and cost estimating process, the approach to procurement and the program management process discussed in Section 4.

We make an assessment of the extent of efficiencies that have been made since the previous review and the scope for further efficiencies to catch up with the frontier company.

In our review of investment and asset management planning, we test the assumptions underlying asset replacement expenditure in relation to service level outputs, in particular continuity of water supply measures. This is to confirm whether the most efficient and timely solution is identified to maintain or enhance current service levels.

We then confirm that the cost estimates in the submission reflect the likely cost of efficient solutions, and the extent to which risk contingencies may be applied. Good practice is to include some risk contingency where justified but at programme level rather than individual projects.

We test the procurement strategy to confirm whether the approach is the most effective and to what extent this reflects best practice compared with alternatives. Our experience shows that agencies have made good efficiencies through new and innovative procurement models.

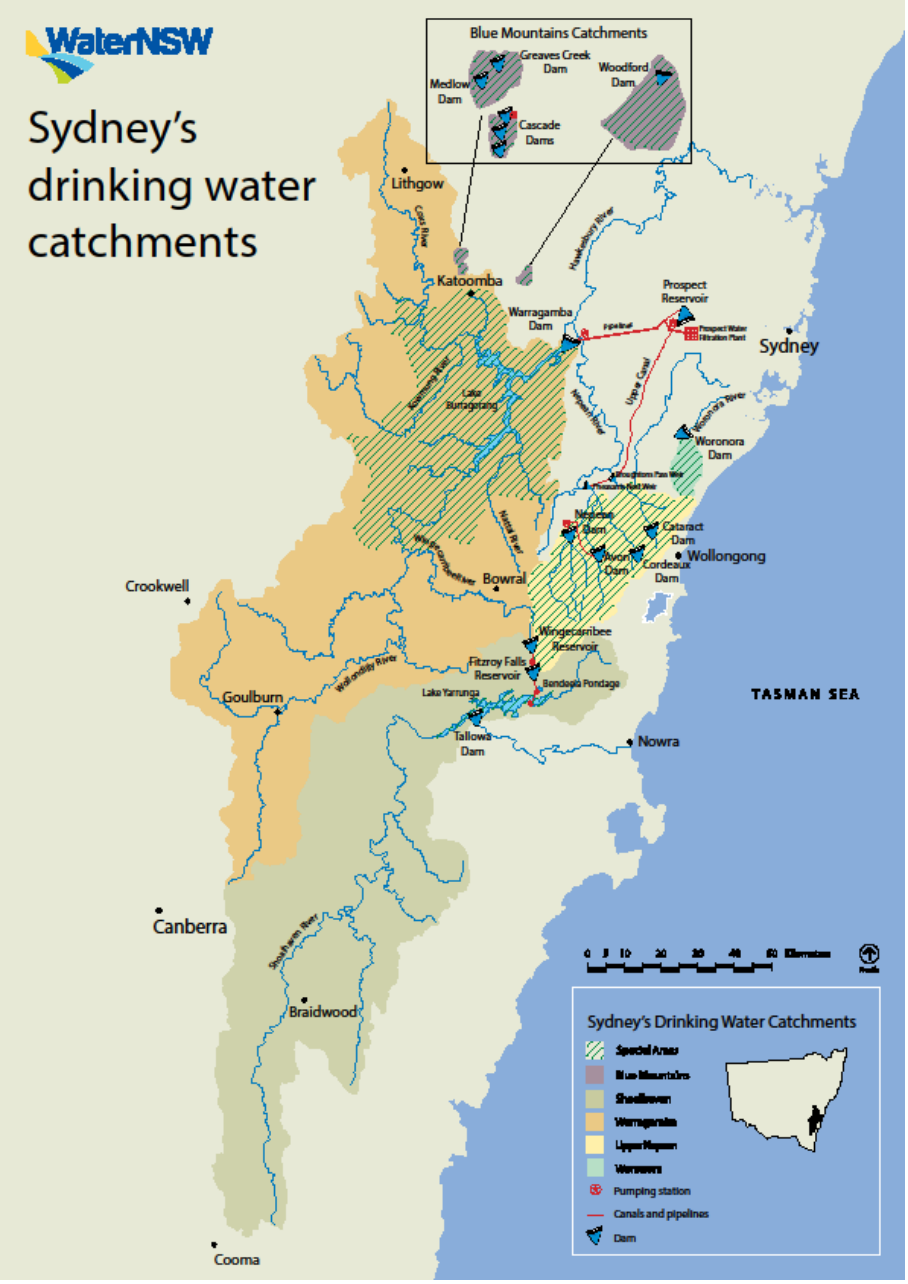
We also test to what extent risk is shared between WaterNSW and customers. It is often easy to justify additional work against a qualitative objective such as a licence condition or legislation, but a test is whether this work can be prioritised on a risk basis within current activities and a constrained budget. A frontier company would test to see whether work can be prioritised to limit any cost increases.

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

2. The regulated business

2.1. Operating environment

WaterNSW is responsible for the management and supply of raw water in NSW. It is responsible for supplying high quality drinking water more than 5 million people in Sydney and the Illawarra, Blue Mountains, Shoalhaven, Goulburn and Southern Highlands regions. and delivering raw water to towns and irrigators and other customers across NSW. WaterNSW operates major water storage infrastructure, provides water infrastructure solutions to customers and stakeholders and is responsible for the protection of declared drinking water catchments in its area of operations as shown in Figure 2-1 below.



Source: WaterNSW Pricing proposal for regulated prices for Greater Sydney 2020 to 2024

Figure 2-1 WaterNSW's Greater Sydney area of operation

In supplying and delivering water in the Greater Sydney area, WaterNSW's role includes:

- Being the primary supplier of bulk water to Sydney Water;
- Protecting 16,000 square kilometres of drinking water catchments;
- Managing and operating 21 dams and 11 weirs;
- Managing prescribed dams in accordance with NSW Dams Safety Committee requirements and Australian National Committee on Large Dams (ANCOLD) guidelines;
- Preparing emergency management plans for prescribed dams;
- Managing pipelines and other infrastructure used to supply raw water to customers;
- Supplying water for environmental flows; as well as

Providing services in accordance with the operating licence, water sharing plans, water supply agreements, Memorandum of Understandings with NSW Health and NSW EPA and relevant legislation including the WaterNSW Act 2014, WaterNSW Regulation 2013, Dam Safety Act 1978 and the Independent Pricing and Regulatory Tribunal Act 1992.

In the GS area, WaterNSW supplies bulk water to four water utilities and 61 retail customers. The four bulk water utilities are:

- Sydney Water Corporation (99% of all water supplies);
- Wingecarribee Council;
- Shoalhaven Council;
- Goulburn-Mulwaree Council.

The water system as shown in Figure 2-2 supplies WaterNSW collects water from river catchments to the south and west of Sydney, stores it in 10 major dams, and transports it via a network of rivers, pipes and canals to water filtration plants. Most of the water from Sydney's catchments is supplied to; Sydney Water's nine filtration plants for treatment and distribution to customers. More than 80% of Sydney's water is treated at Prospect water filtration plant, which supplies 3.7 million people in Sydney

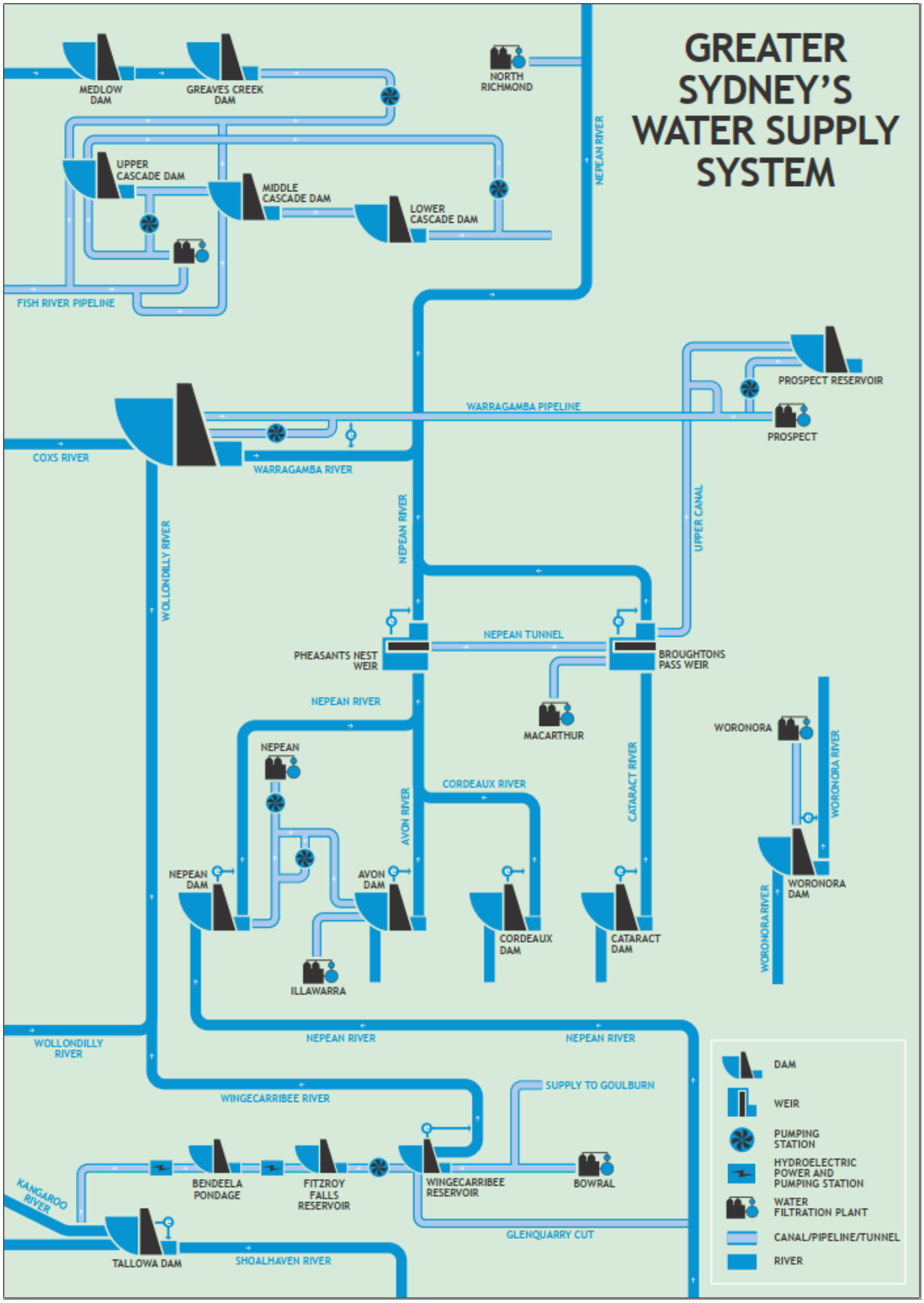


Figure 2-2 Schematic of Greater Sydney's water supply system

2.2. Legislation

WaterNSW was formed on 1 January 2015 under the WaterNSW Act 2014 (NSW) (WaterNSW Act). WaterNSW assumed the functions of State Water Corporation and Sydney Catchment Authority (SCA). WaterNSW replaced State Water Corporation in Schedule 5 of the State Owned Corporations Act 1989 (NSW) (SOC Act), making WaterNSW a statutory state owned corporation under that Act. WaterNSW has been granted an Operating Licence under section 11 of the Water NSW Act to carry out the functions specified in the licence which include most of the possible functions listed in section 7 of the WaterNSW Act. The current Operating Licence came into effect on 1 July 2017 replacing two separate Operating Licence which reflected the scope of the previous State Water Corporation and SCA businesses.

WaterNSW further increased its scope on 1 July 2016 when the WaterNSW Amendment (Staff Transfers) Act 2016 took effect to facilitate the transfer of employees of the then Department of Primary Industries - Water to WaterNSW. This enabled WaterNSW to carry out functions of the Minister and the Water Administration Ministerial Corporation (WAMC) conferred on WaterNSW under its operating licence in relation to water monitoring and licensing.

2.3. Regulatory requirements

The principal objectives of WaterNSW set out in section 6 of the WaterNSW Act are:

a) *to capture, store and release water in an efficient, effective, safe and financially responsible manner, and*

b) *to supply water in compliance with appropriate standards of quality, and*

c) *to ensure that declared catchment areas and water management works in such areas are managed and protected so as to promote water quality, the protection of public health and public safety, and the protection of the environment, and*

d) *to provide for the planning, design, modelling and construction of water storages and other water management works, and*

e) *to maintain and operate the works of WaterNSW efficiently and economically and in accordance with sound commercial principles.*

The other objectives of WaterNSW, set out in section 6(2) of the WaterNSW Act are of equal importance but are subordinate to the principal objectives of WaterNSW. They are:

a) *to be a successful business and, to that end:*

   i) *to operate at least as efficiently as any comparable business, and*

   ii) *to maximise the net worth of the State's investment in WaterNSW,*

b) *to exhibit a sense of social responsibility by having regard to the interests of the community in which it operates,*

c) *to exhibit a sense of responsibility towards regional development and decentralisation in the way in which it operates,*

d) *where its activities affect the environment, to conduct its operations in compliance with the principles of ecologically sustainable development contained in section 6 (2) of the Protection of the Environment Administration Act 1991.*

2.4. The regulated business

The regulated business of WaterNSW related to Greater Sydney is primarily the supply of bulk water to Sydney Water and some local authorities. There is a water supply agreement with Sydney Water to supply bulk water and defines maximum parameter values for colour and turbidity. The agreement includes a water quality incentive payment of up to $1m/a depending on the quality of water provided to Sydney Water.

The regulated business includes the costs of supplying raw water from the Shoalhaven system although these costs are not included in the Determinations. This is because the costs are likely to be periodic but significant.

2.5. Other regulated businesses

WaterNSW operates a rural water supply business subject to separate regulation. There are also separate regulatory processes applied to the WAMC and Broken Hill pipeline. Corporate and support costs are apportioned across all businesses. This is discussed in Section 5.

2.6. Water sector relationships

2.6.1. Sydney Water

Sydney Water purchases bulk water from WaterNSW and is its major customer. IPART is also responsible for determining the maximum charges for bulk water services to customers within the Sydney Water Corporation regulatory business.

2.6.2. Sydney Desalination Plant

The Sydney Desalination Plant (SDP) is required to operate when the combined reservoir storage level falls below 60% of total storage. The agreement with Sydney Water and supported by IPART is for the plant to operate for a minimum 14 months or if the storage increases above 70% whichever is the longer period.

The impact of the plant operation is to reduce the water sales from WaterNSW over the period of operation.

2.6.3. Metropolitan Water Plan

The Metropolitan Water Plan (MWP) 2017[2] is the third iteration of NSW Government's plan to ensure a reliable and secure supply of water in the Greater Sydney region for the next 50 year. The 2017 MWP builds on the 2006 and 2010 MWPs. The review of the 2010 MWP comprised technical studies, independent reviews, hydrological modelling and economic analyses, community and stakeholder engagement activities and social surveys. The MWP considers options analysis for drought readiness, decision sequencing during drought and provides triggers and processes for infrastructure "readiness to construct".

The MWP is a key document which helps guiding expenditure and investment decisions for all water utilities within the Greater Sydney region and in particular WaterNSW. The MWP provides a framework and strategy for implementation with key actions and timelines laid out.

[2] https://www.planning.nsw.gov.au/-/media/Files/DPE/Other/About-us/Metropolitan-Water/2017-Metropolitan-Water-Plan.pdf

2.7. Organisation, structure and functions

WaterNSW has nine operating departments covering its operational and support functions across all its Greater Sydney, Rural valleys and WEMD businesses. These are summarised in Table 2.1 below.

Table 2-1 WaterNSW Functional structure

Driver	Division	Includes
Operations	Water operations	Operations, modelling, monitoring
	Water and catchment protection	Source protection, land management, water quality science, catchment protection
	Assets	Engineering and dam safety, capability, delivery, asset maintenance and services, construction, security
	Water solutions	Asset strategy, major projects
	Customer and community	Customer continuity and experience, assessments and approvals
Corporate and Support	Finance	Finance, commercial services, economic regulation
	Safety, people and performance	
	Business systems	Infrastructure delivery, systems and applications, innovation and architecture, service delivery, information
	Legal and Governance	Customer and risk, legal, community involvement

Source: WNSW organisation chart and Atkins analysis

WaterNSW classifies Customer and Community as a corporate service. We consider that customer management is an operational function, consistent with other water utilities. The Greater Sydney business has one very large and some small customers; this compares with the Rural Valleys where customer engagement and billing requires much greater input. We discuss the impact of this change on the allocation of corporate costs in Section 5.

2.8. Business systems and processes

The digital landscape has transformed significantly with the merger of three organisations with their own unique systems and processes, so a huge amount of change was necessary in order to identify the requirements for the new organisation and to make this a reality. This has involved rationalisation and harmonisation of some existing systems, retirement of others and implementation of some new ones: the centrepiece has been the implementation of CIMS[3], a Microsoft Dynamics Enterprise Resource Planning system, in April 2019.

There are currently 47 business systems and applications identified by WaterNSW as key (and a further 39 also being maintained and employed). Eleven systems have also been retired or replaced. Table 2-2 captures the key changes in the make-up of the ICT landscape as a result of CIMS. Table 2-3 summarises the other key WaterNSW systems. This illustrates the volume of tools and applications managed by the IT department and which underpin the day to day functioning of WaterNSW.

[3] CIMS simply stands for “Consolidation of Information Management Systems”.

Functional Area	Current State		Future State	Implemented?
	Rural (former SW)	Greater Sydney (former SCA)	WaterNSW	
Finance	TechnologyOne Financials		MS Dynamics AX7 (Standard system)	Yes
Asset Management	• T1 Fixed assets register • SmartAsset	• Maximo • T1 Fixed assets register • Asset Datamart	MS Dynamics AX7 (Standard system)	Yes
	Note: No link between finance system and asset management systems – maintained manually by staff.			
Project Management	*No fit for purpose system*	*No fit for purpose system*	MS Dynamics AX7 (Standard system + MS Project Online)	Yes
Procurement and Contract Management	• Purchase orders in T1 • Purchase cards	• Maximo for legacy SCA contracts • Purchase orders in T1 • Purchase cards	MS Dynamics AX7 (Standard system)	Procurement – Yes Contract Management – Yes
	Note: No centralised contracts register – an Excel version maintained.			
Travel and expense management	• Paper expense forms • Travel arranged by BSOs and AP • Concur		MS Dynamics AX7 (Standard system)	No, de-scoped.
Billing and Customer Relationship Management	• Billing: ProClaim	• MS Excel • No CRM	MS Dynamics AX7 (Standard system)	Billing – Yes CRM – No, de-scoped and to be implemented in next price path
HR, Payroll and Timesheets	• Payroll: Technology One • Human Resources Management: Paper forms and spreadsheets. • Time Recording: Kronos • Recruitment: Scout	• Payroll: Chris 21 Payroll • Human Resources Management: Chris 21 HR • Time Recording: TRS • Recruitment: Scout	MS Dynamics AX7 (Standard system)	Human Resources - Yes Payroll and timesheets – No, de-scoped, utilising Chris21.
Risk Management and Compliance	Tickit		MS Dynamics AX7 (Standard system)	Yes
Cross-application workflow	None / HP-TRIM used for approval workflows.		MS Dynamics AX7 (Standard system)	Yes
Business intelligence	• Data kept within systems • No centralised data warehouse		MS Dynamics AX7 (Standard system)	Yes

Table 2-2 WaterNSW Key changes in ICT landscape as a result of CIMS implementation

System	Description	Comment
12D Model	12d Model is a surveying processing software use to process field data captured from survey instrument and to analyses survey result.	
ARK - HPE Records Manager	ARK (HPE Records Manager 8) is the WaterNSW Archiving and Record Keeping System.	Updated to latest version in 2019
AutoCAD	Autocad is a software package used within WaterNSW to prepare maps and plans for the organisation.	
CAIRO	CAIRO is a decision support system that assists river operators in their day-to-day running of NSW regulated river systems and to improve the efficiency and effectiveness of this task.	
CARMS	Computer Aided River Management for the Murrumbidgee River maximizes knowledge of the current and predicted river behaviour as a basis for improved and more efficient river operations.	
Chris21	Comprehensive Human Resource Integrated Solution used for Human Resources, Payroll, Learning and Development, Performance Management, Payment Advisor Superannuation, Workforce Profiling.	Now used for all WNSW payroll processing. Replacing Technology One and TRS
CONCUR	Travel and expense management	Implemented in 2016-20 price path
DamGuard	Real time monitoring of dam safety.	Implemented in 2016-20 price path. Replaces Legacy Dam Safety systems
Development Asset Register (DAR)	All development applications referred to WaterNSW for concurrence under the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 are recorded and managed through the DAR.	
DRS	Key functions are to record daily operation of dams, provide capability to retrieve the latest data collected by key sites through telemetry, provide estimate to the required environmental flow release and summary reports.	
EWater Source	eWater Source is the modelling platform that support hydrologic modelling of rivers, incorporating representation of dam and water users.	
EWN Operations	The EWN system is an externally hosted service that provides the ability for WaterNSW to issue notifications to external customers and members of the public, as well as for external parties to register and self-manage their subscription to these alerts.	
EWN Retail	EWN Customer service instance is used for sending out customer notices by Retail – Supplementary Events from Water Delivery and occasionally used by Comms team. It is hosted by EWN and is an annual subscription service.	
Gallagher Security	Gallagher is primarily a security and identity management program. It controls our field hardware, ID cards and numerous security functions.	
Hunter Salinity	"Hunter Salinity Trading Scheme: collects data Assists with flow forecasting Calculates salt volumes that can be released "	Part of Hydstra
Hydrometic data calculator	Metro real time data capture to be published in WNSW web sites	
Hydrotel	Telemetry system used for collecting field data.	
Hydstra Rural	Rural Hydstra System is the data processing and data storage application for WaterNSW water time series, site and related instrumentation metadata.	
IES	IES SCADA system including the plant SCADA systems provide monitor and control function for water operation. It gathers operational data from the field and feeds hydrometric data into other systems like OSI PI	
Intranet	Internal Websites, via Squix Matrix	Plan to replace with Sharepoint in 2020

System	Description	Comment
iSMART	ISMART SCADA system provide monitor and control function for river operation. It gathers operational data from the field and feeds into other systems like Hydstra and CARM.	
iWAS (Internet Water Accounting System)	Provides access to a subset of Water Accounting functions via the Internet	Internal Bespoke application updated as needed.
Kronos (Rural)	KRONOS is the time recording system which incorporates staff attendance times against project codes and costings for the staff paid against the TechOne Payroll system	Implemented in 2016-20 price path. Now used for all WNSW timesheet capture. Linkages reengineered to link with CIMS rather than Technology One
LAS	Legacy desktop client application used to manage Old Water Act licences. Will be retired in the future as licenses are transferred to WLS	Implemented in 2016-20 price path. Moved to WNSW responsibility in DPI function transfer
ManageEngine Support Centre	Support Centre manages all customer enquires that are sent in via email and fax generated by both staff and customers.	
MyWaterNSW (ServiceNow)	MyWaterNSW is WaterNSW ticking system, used for creating, managing and reporting on all Incidents, Problems, Change requests and request fulfilments.	Implemented in 2016-20 price path.
NSW Water Register	Internet application used to publish licence and approval data and water trading statistics.	Implemented in 2016-20 price path. Moved to WNSW responsibility in DPI function transfer
Office365	Exchange supports the transfer and storage of email for all email addresses of the form @waternsw.com.au, @statewater.com.au or @sca.nsw.gov.au.	Implemented in 2016-20 price path. Replaces legacy MS Office version
PageUp	Recruitment and onboarding training system	Implemented in 2016-20 price path. Replaces Scout
RACS (Risk Assurance and Compliance System)	Risk and audit tool. Safety issues, actions on people etc. All risks are articulated in RACS. Safety observations made on a site, near misses, non-compliance etc. should all be captured in RACS.	Implemented in 2016-20 price path. Replaces Tickit,
Real Time Data Web Site	Web site that reports real time water data to customers, public	
SCARMS	ARMS was developed in response to recommendations from the inquiry into the 1998 water quality incident, to provide the organisation with access to near time information to the behaviour of the reservoirs and modelling capability to forecast future reservoir conditions to reduce the risk in providing poor water quality water to Sydney.	
Terramodel	Terramodel is a surveying processing software use to process field data captured from survey instrument and to analyses survey results and generate AutoCAD input file for drafting purposes. This is mainly used for dam monitoring survey.	
TMS System	TMS system is a data acquisition system for metering data. The metering data gathered feeds into water accounting system and CARM via OSI PI	TMS is in reality is a system comprising SCADA, OSI Pi and CARMS
Water Accounting System (WAS)	WAS is a business critical system holding all data related to: Customer billing, Legislative rules, Water orders, Budget projections and accruals, Statutory and Regulatory reporting	Internal Bespoke application updated as needed.
Water Applications Online (WAO)	Public can select an application type and complete application details, lodge, pay and authenticate - online. Generates a received application record in WLS.	Moved to WNSW responsibility in DPI function transfer

System	Description	Comment
Water Billing Module	Water Billing Module is a desktop application for facilitating water billing process in WaterNSW.	Moved to WNSW responsibility in DPI function transfer
Water Licensing System (WLS)	Web based portal that provides WNSW staff with a consolidated workspace of applications that directly relate to Water Regulation Group activities.	Moved to WNSW responsibility in DPI function transfer
Water Quality Database	The Water quality database delivers key business requirements in being able to monitor and evaluate the water quality throughout the water supply system.	This has been redeveloped in 2018-19, will be used by Customers/DPI in the future
Website	WaterNSW public facing web site, Squiz Matrix	
Webtool/ KONCENTRATOR	Manual data entry tool for Koncentrator. Hydrometric, water orders and potentially other timeseries data.	
Westpac Corporate Online	Credit Card processing system	Implemented in 2016-20 price path.

Table 2-3 WaterNSW Other Key ICT systems

2.9. Cost allocation

During the 2016 Determination period, WaterNSW has changed its accounting system from the previous legacy systems within its predecessor businesses to the current Microsoft Dynamics Enterprise Resource Planning (ERP) system, in April 2019. This has presented difficulties in deriving reliable cost data at disaggregated levels of the business. The new ERP system should capture cost data in a consistent manner with costs allocated to activities and businesses in a more robust way. Most staff submit timesheets so there will be greater visibility of costs and improve the ability to allocate costs directly and not as general overheads.

3. Strategic Review

3.1. Scope of review

We are required to undertake a strategic review of the utility's long-term investment planning and its asset management systems and practices. In undertaking this task, we are asked to provide advice on:

- *Whether the longer-term capital investment strategy is the most efficient, and whether processes supporting this including options analysis, procurement processes, customer engagement practices, whole of life cycle planning and assessment of capital and operating expenditure trade-offs are best-practice and therefore likely to result in efficient investment decisions.*
- *The key assumptions that are driving expenditure (e.g., asset replacements, demand forecasts and growth assessments (**please see links with the demand review below**), environmental regulatory requirements, licensing standards, customer service standards and preferences), including comments on whether these assumptions are reasonable and how they have been considered and tested by the utility.*
- *The robustness of systems for linking asset management decisions with current and future levels of service and performance requirements, including customer preferences, service standards and environmental outcomes.*
- *The way in which the utility manages the risks associated with asset failure or underperformance.*
- *Any particular concerns or issues relating to the utility's strategic processes for determining and prioritising future infrastructure expenditure and asset management decisions.*

3.2. Performance

WaterNSW's operating licence defines two performance standards that it is required to meet for its Greater Sydney systems and services:

- Supply Water Quality Performance Standard (Clause 4.2.2) – requires that WaterNSW must manage the quality of water supplied to its Customers in accordance with its Water Quality Management System
- Supply Service Interruption Performance Standard (Clause 4.2.3) – requires that WaterNSW must manage service interruptions in accordance with the Asset Management System required under clause 5.1.1.

WaterNSW is required to establish arrangements with Sydney Water under the WaterNSW Act, which include:

- the standard of quality of the water supplied;
- the continuity of water supply;
- the maintenance of adequate reserves of water by WaterNSW.

These arrangements are established through the Sydney Catchment Authority and Sydney Water Corporation Raw Water Supply Agreement (RWSA) and Raw Water Supply Protocols Operational Protocol. The protocols cover raw water quality management as well as flow measurement, information management, operational changes, system configuration, strategic planning and maintenance planning.

The RWSA requires that WaterNSW must supply raw water that meets the requirements specified in the RWSA and that it must also use best endeavours to supply Sydney Water with the best quality water that is reasonably available. There is then an obligation that WaterNSW and Sydney Water work together to manage operating

costs efficiently. An example of the water quality standards included in the RWSA is provided in Table 3-1. This example is for Prospect WFP.

Table 3-1 Example raw water quality standard from RWSA for Prospect WFP

Parameter	Units	Minimum	Maximum
Turbidity	NTU	-	40
True Colour	CU	-	60
Iron	mg/L	-	3.50
Manganese	mg/L	-	1.40
Aluminium	mg/L	-	2.60
Hardness	mg/L as CaCO3	25.0	70.0
Alkalinity	mg/L as CaCO3	15	60
Algae	ASU	-	1000

While the RWSA sets minimum and maximum standards, the Raw Water Supply Protocols establish Sydney Water's preferred water quality standards. The preferred water quality standards reflect treatment plant capability and operating costs.

The 2018 Operating Licence report found in 2017/18:

- Water quality supplied for treatment met the Australian Drinking Water Guidelines for 100% of health-related characteristics.
- Water quality supplied for treatment met 99.99% of the Raw Water Supply Agreements which was above the target of 95%.
- Water quality supplied for treatment was within preferred operational ranges for 89.9% of samples, which was above the target of 85%.

For water supply, the RWSA requires that WaterNSW supplies water to Sydney Water in line with forecasts made by Sydney Water for its water filtration plants. Where requirements exceed the forecasts, WaterNSW must use its best endeavours to meet this demand. In the agreements for water supply to local governments within the Greater Sydney area the supply requirements are qualitative and only require joint working, liaison and incident response.

Performance requirements for WaterNSW are therefore most relevant to the quality and quantity of raw water supplied to Sydney Water. Outside of this, the performance requirements are generally qualitative and relate to processes rather than the service provided by WaterNSW. Water quality is primarily a function of the catchments from which water is collected. Beyond this, WaterNSW has operational measures that is can undertake to improve raw water quality such as changing sources and blending different sources, but these are constrained as to what can be achieved. There are no measures to confirm whether WaterNSW has met its qualitative obligations; some form of risk measure could be developed as a basis for performance assessment.

For the quantity and continuity of water supplied, the bigger picture relates to long term rainfall which is outside of WaterNSW's control. Long term supply and drought response is currently managed under the Metropolitan Water Plan. The Forecasts are more operational and WaterNSW is able to manage its sources to some extent to meet these demands. However, there are constraints as to which supply nodes (water filtration plants) can be supplied form which sources.

Therefore, we consider that there is not a strong link between the performance expectations on WaterNSW and how it is able to manage its physical infrastructure to meet these expectations. While a large contributor to this is that there are constraints outside of WaterNSW's control, we consider that WaterNSW is yet to embed links between what it can control in terms of performance and how it manages its assets across their lifecycle. Improvements in this area should help WaterNSW to better scope, optimise and prioritise expenditure.

3.3. Long term investment plan

As noted in Section 3.4.3, WaterNSW has developed a Capital Investment Strategy for 2019 to 2023 for the purpose of supporting delivery of the asset management objectives set out in the Strategic Asset Management Plan "by guiding capital investment planning and decisions". The Capital Investment Strategy includes a 20-year Capital Investment Plan. This is WaterNSW's long term investment plan to meet the needs of customers and meet its regulatory obligations. The Capital Investment Strategy also includes a 10-year Capital Investment Plan which is reviewed annually and used as the basis for WaterNSW's State of Corporate Investment, budgeting and regulatory submission.

The Capital Investment Strategy includes Figure 3-1 which depicts the institutional arrangements and participants that influence WaterNSW's long term planning. In particular, this shows the relationship between WaterNSW and State Government policy. While this figure includes both WaterNSW's Greater Sydney and rural water businesses, it shows the range of considerations that WaterNSW needs to account for in long term planning. An important area where these institutional arrangements have influenced WaterNSW's regulatory submission is in its response to the drought.

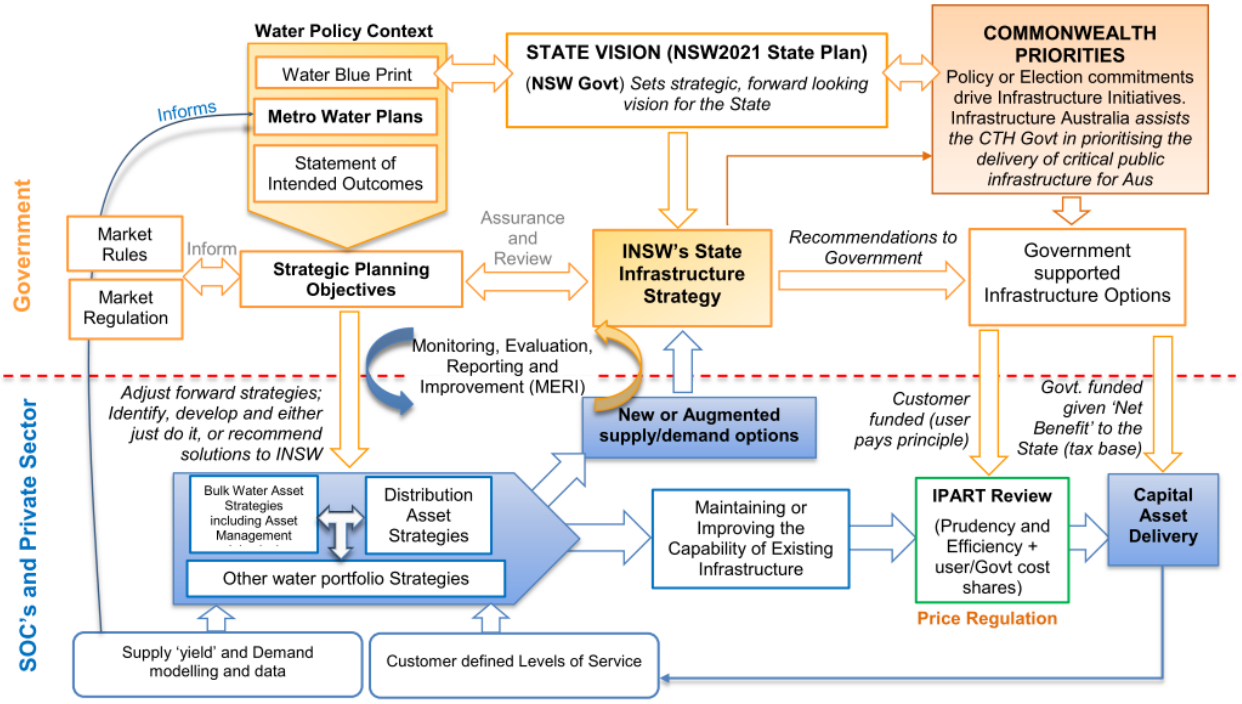


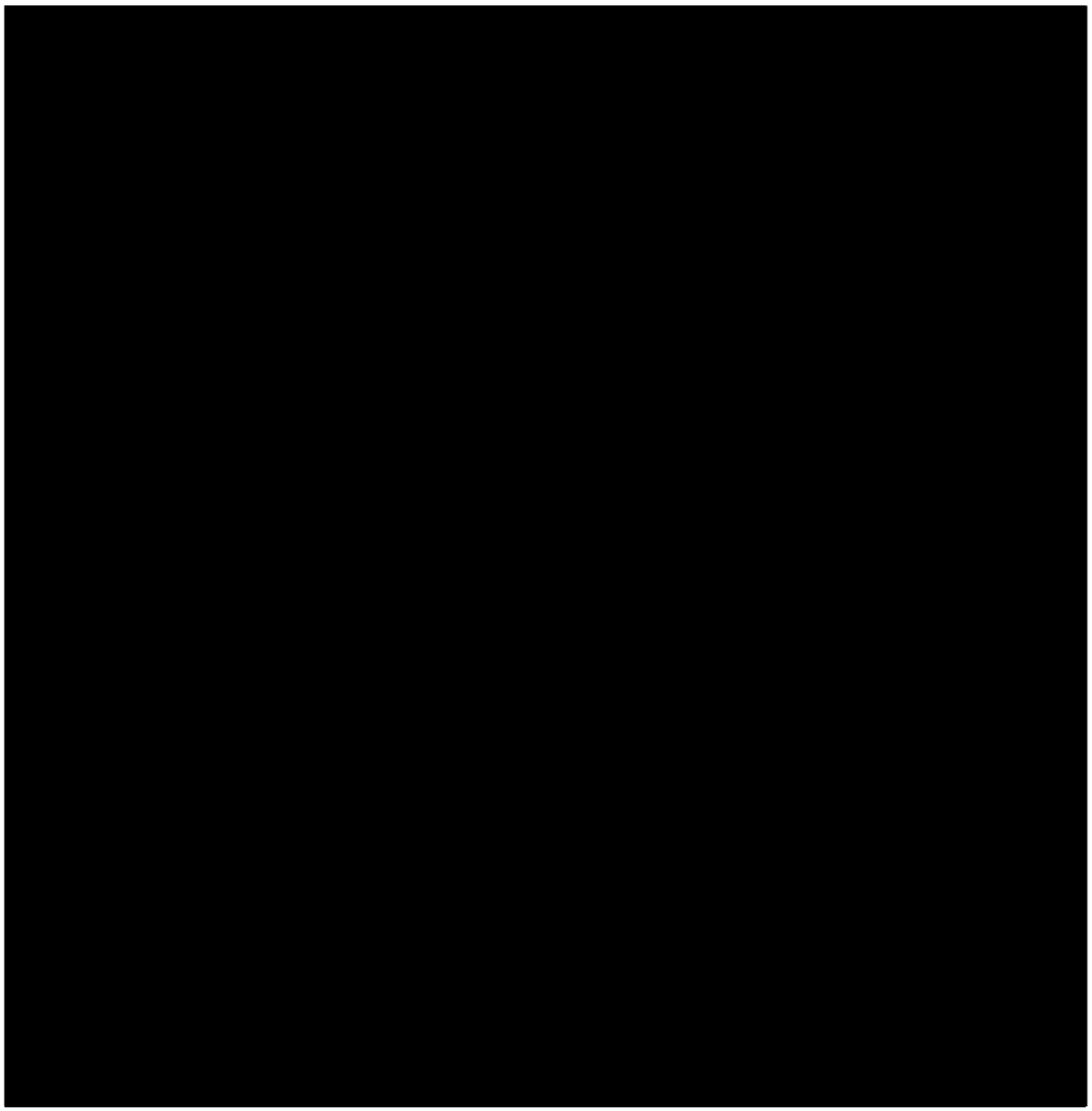
Figure 3-1 Institutional arrangements for long-term planning

WaterNSW classifies capital investment into the following four categories:

- Maintaining Capability;
- Augmenting Capability;
- New Capability/Solutions;
- Regulatory Compliance.

[redacted].

[redacted]



[redacted].

Source: WaterNSW Capital Ivestment Plan presentation

The 10-year Capital Investment Plan has the following features:

- The first four (and five) years of the 10-year program are much larger than the last half of the program. The last half of the program averages just under $50 million per annum. The first half of the program ranges from $100 million to over $200 million per year. While this is in part due to expenditure for water security and reliability, almost all categories drop away in the second half of the program.
- Water Security and Reliability dominates the first four years of the program but drops away in 2024 and there is very little expenditure for this program in the last five years

We challenged WaterNSW regarding the inconsistent expenditure profile between the first and second half of the 10-year program WaterNSW responded that the program was front loaded due to a backlog of asset renewal needs. Note that this profile excludes the Burrawang to Avon Tunnel which is required to increase long term system yield. WaterNSW also advised that projects and programs are only included in the Capital Investment Plan when endorsed.

While we acknowledge these factors, we also consider that the inconsistency in the program is contributed to by:

- The second half of the program being less developed than the first half and may increase when further developed. Individual items within a long term program will always be at different levels of development and approval. Excluding items that aren't endorsed undermines the value of a long term forecast.

- WaterNSW has not considered fully whether there the benefits in levelling expenditure between the first and second half of the program (e.g. increased utilisation of resources) outweigh the risks associated with not acting sooner.

We consider that there is an opportunity for WaterNSW to refine and more fully develop this long-term forecast over time. This is important to inform long term planning and can be used to monitor and inform the development and approval process. The 10-year plan is the aggregation of bottom up programs and projects. Therefore, improvement of the program is likely to require greater scoping of the 5 to10-year program (while balancing uncertainty) by extending forecasts for the shorter-term projects and programs. There is likely also benefit in top-down checks by driver and for other factors such as deliverability and procurement efficiency.

3.4. Asset management practices and processes

3.4.1. Asset management overview

WaterNSW has in place a management system for asset management that was certified against the standard ISO 55001:2014 Asset management – Management systems – Requirement on 10 January 2017. WaterNSW's Operating Licence requires it to have an asset management system in place consistent with this standard. WaterNSW is currently undergoing recertification against the requirements of the standard.

The 2018 Operating Licence audit concluded that WaterNSW was non-compliant against the licence clause requiring it to have an asset management system at all times for the purpose of carrying out its functions. This was due to the management systems being scoped with reference to WaterNSW's physical assets rather than its functions and due to a lack of documented outcomes for various expectations of stakeholders. A non-compliance (non-material) was assigned for the clause relating to implementing the asset management system due to the absence of some asset class planning documents and other more minor matters.

WaterNSW has responded to these findings by undertaking a third-party review of its asset management system which has identified 25 improvement initiatives for WaterNSW to consider. An immediate outcome is that WaterNSW has revised its Strategic Asset Management Plan (SAMP).

WaterNSW's SAMP acts a system manual in that it is structured consistent with the requirements of the ISO55001:2014 standard and thereby provides a reference for how the elements of the standard are addressed.

Figure 3-3 provides and overview of WaterNSW's asset management system including how stakeholders influence and provide information into the system.

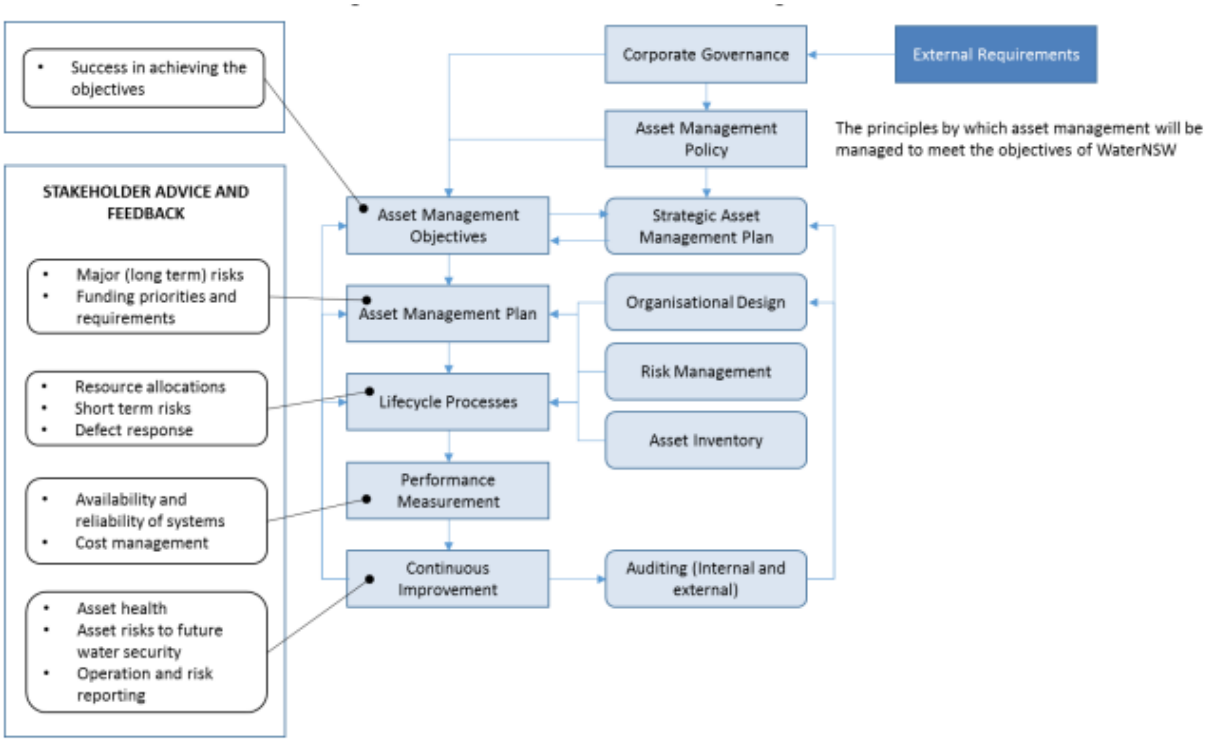


Figure 3-3 Overview of WaterNSW asset management system

3.4.2. Asset base

WaterNSW's asset base is across four regions within New South Wales: North, South, Central and Greater Sydney. This review relates to the Greater Sydney asset only. The major assets within the Greater Sydney region are:

- Warragamba Dam;
- Warragamba Pipelines and Prospect Reservoir;
- Upper Nepean System; and
- Shoalhaven System.

A schematic of the Greater Sydney water supply system is shown in Figure 3-4. Note that this schematic includes water filtration plants and treated water pipelines which are the responsibility of Sydney Water.

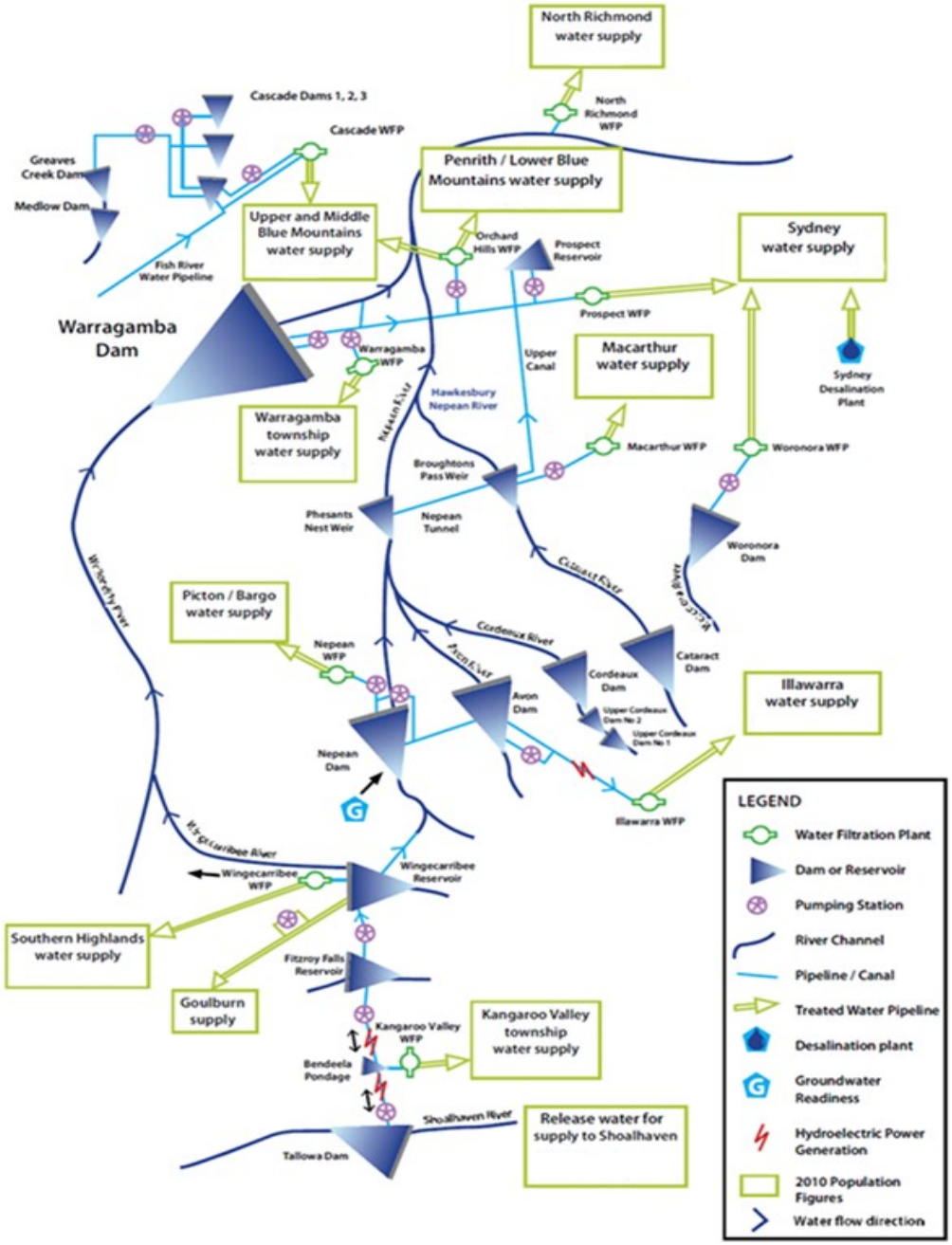


Figure 3-4 Greater Sydney water supply system

Source: WaterNSW

Figure 3-5 shows the depreciated value of WaterNSW's assets by asset class. Dams are the largest asset class (by depreciated value) at $1.32 billion followed by pipelines at $1.0 billion. The total depreciated value of the asset base is $3.3 billion, and the replacement value is $6.5 billion.

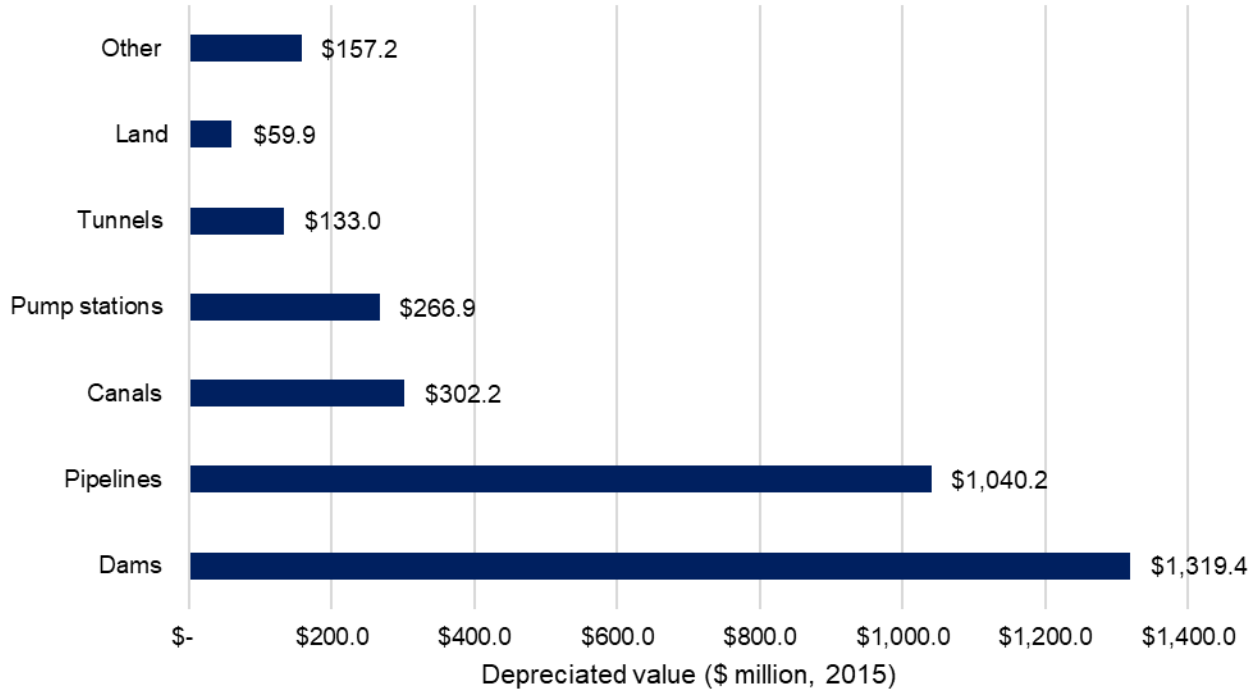


Figure 3-5 Depreciated replacement cost of WaterNSW assets

Source: WNSW SIR

3.4.3. Asset management objectives and planning

Under an ISO55001:2014 approach to asset management, WaterNSW is required to:

(i) Understand the requirements and expectations of stakeholders (ISO55001:2014, Clause 4.2). Stakeholders typically include customers, customer representative groups, environmental regulators, safety regulators etc. Expectations should include legislation, regulations, service standards, customer desires and willingness to pay, contracts, etc.;

(ii) Define asset management objectives (Clause 6.2.1) which support the corporate objectives and reflect the stakeholder requirements;

(iii) Sydney Water then needs to undertake planning (Clause 6.2.2) to achieve the asset management objectives;

(iv) Determine and document the method and criteria for decision making and prioritising activities and resources to achieve its asset management plan(s) and asset management objectives (Clause 6.2.2).

WaterNSW has defined eleven asset management objectives which support its corporate objectives as shown in Table 3-3.

Table 3-3 WaterNSW asset management objectives

	Asset Management Objectives	Corporate Objective (what it means)
1	Health & safety implications are considered in asset management activities.	***Be Safe4Life***.
2	Maintain and improve the Asset Management System to support evolving business requirements	***Improve Organisational Performance***
3	People are engaged and developed with the appropriate competencies, experience and behaviours to meet present and future asset management requirements	***Develop Our People and the Effectiveness of Our Team***
4	Provide raw water supply infrastructure solution options to address identified risks & opportunities for current and future demands	***Provide Strategic Solutions***
5	Assets are reliable and maintained to acceptable standards	***Deliver Reliable Performance in a Changing environment***
6	Work management processes are consistently delivered and monitored.	
7	Water Service to customer is delivered in accordance with their requirements	
8	System is operated and managed in accordance with Design Criteria	
9	Manage and Protect Declared Catchment Areas	
10	Asset Management Activities are communicated to stakeholder.	***Be a Customer Centric Organisation***
11	Management Information Systems and appropriate technologies are maintained and improved to support business requirements.	***Support performance through innovation and adoption of new technology***

Each asset management objective has measures that support achieving them. Table 3-4 sets out these measures for four of the objectives that focus on WaterNSW's physical asset and service delivery. These measures are about the process rather than result, i.e. the process of undertaking asset performance evaluation or the process of preparing an investment plan, not whether asset condition (and risk) should be within acceptable level of whether the investment plan is prudent, efficient and affordable. We consider that there is an opportunity for WaterNSW to better define indicators that reflect whether objectives are being met or not.

Table 3-4 Sample of asset management objectives

Asset Management Objectives	Measurement Reference - what is to be measured	Evidence of Measures
Provide raw water supply infrastructure solution options to address identified risks & opportunities for current and future demands	a. 20-year Infrastructure Strategy Options. b. Capital Investment Plan	a. Publication of 20 Year Strategy to Customers (evidence of key documents available on the external website - 20-year plan). b. Overall Measure of Delivery (OMD) metric
Assets are reliable and maintained to acceptable standards	a. Audits (Asset Condition and Capability, Dam Safety) completed against Audit schedule. b. External Auditing against Operating Licence. c. Asset Performance evaluated in accordance with Asset Performance Evaluation manual. d. Asset performance for water quality management	a. Dam Safety Surveillance Audit reports. Asset Condition and Capability Audit reports. b. Annual IPART Audit report. c. Asset Health reports. d. Water quality incidents due to asset failure
Work management processes are consistently delivered and monitored.	a. Routine and Corrective Maintenance completion rate across WNSW (with break down into individual valley/clusters).	CMMS / WO reporting.
Water Service to customer is delivered in accordance with their requirements	a. Supply interruptions are managed in accordance with individual supply agreements. b. Service interruptions are managed within the parameters specified in the WNSW operating licence Clause 4.3.4	a. Water Worry Report b. Monthly Capture, Store Release Water performance against Standard report.

The Design Criteria referred to at Objective 8 are crucial for operation of the Greater Sydney system. The Design Criteria refers to levels of service for security, robustness and reliability of water available for supply to customers from. The design criteria in place are:

- Security - storages should not approach emptiness (defined as 5% of water in the storage) more often than 0.001% of the time, or one chance in 100,000 in any one month;
- Robustness – imposed water restrictions should not occur more often than once in every ten years on average i.e. restrictions should not be too frequent;
- Reliability – imposed water restrictions should not last longer than 3% of the time on average, or 3 months in 100 months.

WaterNSW's planning to meet its asset management objectives is undertaken through two main planning processes or artefacts as set out in Table 3-5.

Table 3-5 WaterNSW planning processes/artefacts

Asset Class Strategies	▪ High level, strategic direction for each asset class ▪ Strategic direction as to how assets within a class should be managed throughout their life cycle to optimise risk, performance and cost combinations ▪ Input into the development of the asset management plan
Asset Management Plan	▪ A single AMP for all WaterNSW's operations (Greater Sydney and rural) ▪ Register of tasks required to achieve asset management objectives detailing: timescales, budgets, projects ▪ Departure from previous AMPs which included more information. The focus now is on the actions.

The asset management plan is in effect, a work plan that details the operation and maintenance activities and capital projects required to deliver service from the assets. As WaterNSW notes, this is a literal interpretation of the ISO5001:2014 standard. In the planning framework described by WaterNSW, the Asset Class Strategies have the role of determining risk, performance and cost trade-offs for each asset class. This then makes the Asset Class Strategies important for generating prudent and efficient expenditure proposals. However, Asset Class Strategies are incomplete across WaterNSW's asset classes.

The 2018 Operating Licence Audit found that only two of 14 Asset Class Strategies had reached 'draft' status and consistency with the Asset Management System. For this review, WaterNSW has advised that Asset Class Strategies are complete for the following asset classes:

- Fishways;
- Greater Sydney hydrometric assets;
- End of line control valves;
- HV power transformers;
- Dams (through the dam safety management system); and
- Lands.

Based on WaterNSW's described asset management system, the incompleteness of the asset class strategies across all asset classes is a concern in that it raises questions as to how trade-offs between risk, performance and cost are determined and in turn, how prudent and efficient expenditure proposals are developed. We accept that WaterNSW is in the process of bringing together legacy approaches to asset management and it is reasonable to harmonise planning over time. We consider that WaterNSW's focus in recent years has been more on asset maintenance than strategic planning to inform performance-cost trade-offs or to optimise expenditure over the asset lifecycle. We think that a more strategic approach in future should realise efficiencies for the scope and frequency of maintenance and the justification and scoping of capital expenditure. We consider that improvements in this area will support ongoing efficiencies as discussed in Section 6.

3.4.4. Risk management and decision making

WaterNSW's Strategic Asset Management Plan states that it is "committed to…effective risk management for prioritisation of its activities". WaterNSW's has in place a corporate risk management framework that is consistent with AS/NZS ISO31000:2009 Risk management – Principles and guidelines. The framework document described the processes for assessing risks and responding to them. The risk framework includes guidance for assessing the likelihood of risk events and their consequence against the following categories:

- Safety (People)
- Capability / Service Delivery (Assets/ICT/drinking water quality/water quantity/customers)

- Environment
- Compliance
- Financial (Fiscal responsibility/ viability/resource procurement)
- Reputation (Staff/customers/public confidence).

Risks are rated based on their combined consequence and likelihood as extreme, high, medium or low. WaterNSW's risk management framework states that its risk appetite is such that risks with a residual rating of high or extreme are not tolerable and need to be mitigated. The framework also states that risk mitigation measures are subjected to cost benefit analysis. We note that this stated risk appetite is inconsistent with the risk treatment approach set out in the risk management framework (see Table 3-6) which states that for hazards with a residual risk rating of high that "further treatment should be considered".

Table 3-6 WaterNSW risk treatment approach

Residual Risk Rating	Treatment Guidance	Planning Guidance
Extreme (20-25)	Further treatment must be considered	Escalate to the CEO and Executive immediately - treat immediately.
High (11-19)	Further treatment should be considered	Escalate to the relevant Executive Manager – treat as soon as reasonably practicable within a month).
Medium (5-10)	May be tolerable - treat if cost-benefit exists	Treat risks as long as the costs do not outweigh the benefits. Risk after treatment is As Low as Reasonably Practicable.
Low (1-4)	Likely to be acceptable	Opportunity for improvement as long as cost does not outweigh benefits. If there is a rare or unlikely likelihood but a severe impact the risk should be actively managed

Source: WaterNSW Risk Management Framework (10)

The application of this risk management framework to decision making is described in WaterNSW's Asset Planning Manual. This document describes that risks across the asset portfolio are identified through periodic activities including:

- Dam Safety Audits;
- Asset Condition and Capability Audits;
- Field Based Condition Assessments;
- Requests from field personnel or system operators;
- Detailed Asset Reliability Analyses;
- Asset Performance Issues/ Failure Data.

The likelihood of risk events is determined based on asset condition, formal likelihood assessments and evaluation of asset failures and performance history. The Asset Criticality Assessment Procedure is used to determine the consequence of a risk event. This approach is in line with many large water utilities in Australia. The Asset Criticality Assessment Procedure employs consequence definitions that are the same as those in the corporate risk management framework although additional criteria are described for dams which are managed in accordance with ANCOLD guidelines.

WaterNSW uses a software tool (PowerPlan) for recording asset risks and planning interventions to cost effectively and address the risks. PowerPlan takes asset attribute information from the asset register and asset criticality from Dynaway. PowerPlan incorporates a standard asset failure curve which estimates the probability of the given asset failing in the given time step (one year). Using this information, the risk associated with

possible failure of the asset in each year of the planning horizon can be estimated. An annualised risk cost is then determined and compared to the estimated cost of intervention. The need to renew assets is then forecast based on either the absolute risk score (i.e. if the risk score is unacceptably high the asset will be replaced) or the comparison of the risk cost and the intervention cost. WaterNSW advised that the intervention cost is typically based on the modern equivalent replacement cost of the asset reduced by a factor to account for WaterNSW's experience that interventions often cost less than replacement, e.g. if refurbishment only is required.

While we consider that WaterNSW's approach to risk-based renewals planning for its assets is logical, but still at a realtively early stage of development. We note that methodologies such as this take time to mature in areas including:

- Determining the actual cost of intervention for the given asset/failure;
- Calibrating forecast deterioration and failure against actual failures;
- Accounting for redundancy and operational work arounds;
- Calibrating predicted consequence of failure against consequence of failure realised.

For expenditure in the future period, WaterNSW has relied on consultants to validate its renewal planning approach through investigation and options analysis. While this likely has been appropriate for WaterNSW leading into this regulatory submission, a more mature approach will be to move to business as usual needs identification and evaluation across the portfolio on a rolling, risk-based approach. This more measured approach should allow WaterNSW to achieve efficiencies in scope and value engineering as well as optimisation and prioritisation. We discuss this further in Section 6.

3.4.5. Program development and prioritisation

WaterNSW's 'Approval to Spend' Framework details how the business evaluates and governs expenditure. The stated aim of the Framework is to ensure "prudent and efficient decisions that ensure effective delivery of customer and business objectives and are value-for-money". The Approval to Spend Framework is one of four commercial frameworks defined by WaterNSW across the lifecycle of expenditure as shown in Figure 3-6. We discuss procurement and delivery in Section 3.4.7.

Figure 3-6 WaterNSW commercial frameworks for expenditure

The Approval to Spend Framework applies to proposed expenditure over $20,000. The framework defines governance documentation and consultation that is required to be undertaken for approval to be gained. The level of documentation and engagement required varies based on the assessed level of risk. This is in line with good practice.

The Approval to Spend Framework is focused on the processes for progressing and approving individual expenditure items. It does not address how an overall investment program is developed or prioritised other than to note that these are the responsibilities of the Investment Review Committee.

WaterNSW has developed a Capital Investment Strategy for 2019-2023 for the purpose of supporting delivery of the asset management objectives set out in the Strategic Asset Management Plan "by guiding capital

investment planning and decisions". The Capital Investment Strategy defines how WaterNSW's capital program is developed including alignment with objectives and drivers.

The Capital Investment Strategy states that WaterNSW "prioritises capital works according to a number of criteria aligning with a general approach to the effective and efficient management of risks and benefits for customers and community". The primary drivers for prioritisation of capital expenditure are detailed as:

- reduction in health and safety related risks;
- reduction of risk of asset related failure;
- optimising lifecycle costs;
- reduction of risks associated with non-compliance with regulatory requirements; and
- maintaining the required levels of service to customers.

Although not explicit or completely mapped, these stated drivers are consistent with WaterNSW's approach to risk management.

The Capital Investment Strategy also defines "guiding principles" for the identification, prioritisation and scheduling of capital works. These are

- all investment is justified against a "do nothing" scenario;
- investment analyses consider whether an asset is still needed;
- "latest possible intervention" policy sensitive to asset criticality, regulatory compliance requirements, and life cycle costing considerations;
- customer interests are always considered.

We have found that these guiding principles are not always followed extensively throughout all project planning processes. Where appropriate, we have made project or program level adjustments for future capital expenditure where we think that the scope of works can be better scoped, optimised and prioritised. We have also identified that this is an area where improved practice will likely lead to future efficiencies in capital expenditure.

3.4.6. Cost estimating

WaterNSW has a cost estimating framework to guide preparation of cost estimates. It also has unit rates database and has on staff a cost estimator responsible for updating the unit rates database using contract values.

The regulatory submission has been based on a mix of internal estimates and external estimates. Business case's for capital project expenditure within WaterNSW all appear to include an expenditure item identified as a "management reserve". This tends to sit over and above contingency and capitalised business unit overhead amounts which are also included above the direct capital costs.

We are informed that the majority of capital projects are costed at a P50 including some risk components (latent conditions, weather delays etc.) the latter forming the risk based contingent amount. The management reserve effectively takes the estimate to the P90 level. In this instance variations to the original project contract costs are required to go through a more robust approval process before they are permitted to continue. Such items include changes to contracted works due to unknown issues arising on site beyond simple site conditions, or changes to the work scope in order to deliver the originally intended project outcome. In some cases, it also includes some provisional sum items.

WaterNSW outlined that it has subjected cost estimates in the submission to review and challenge. For example, it identified that a cost estimate for the Avon Deep Water Access project included a pipeline unit rate

higher than WaterNSW's understanding of market rates. This rate was challenged and reduced before being included in the submission. Similarly, unit rates for items of work in the Greater Sydney Renewal Provision have been challenged and reduced before inclusion in the submission.

We consider that while improvements have been made, WaterNSW's approach to cost estimation is at an early stage of maturity. In our reviews of specific projects and programs (Section 6) we have also identified that Business cases for capital project expenditure appear to include an expenditure item identified as a "management reserve". This tends to sit over and above contingency and capitalised business unit overhead amounts which are also included above the direct capital costs. We consider that this is an overly conservative approach.

3.4.7. Procurement and delivery

WaterNSW has in progress a 'Spendwise' Program to deliver a step improvement in procurement. The program includes:

- Refreshed procurement framework
- A new e-procurement portal and incorporation into electronic workflows
- Scout RFP – a platform for evaluating tender responses electronically and collaboratively across stakeholders. The platform brings together all approaches to market into a consolidate view.

Many of these initiatives have been implemented in the last year or are soon to be implemented.

WaterNSW has a procurement framework which determines an appropriate procurement pathway based on the inherent risk of the project and expected contract value. This is shown in Figure 3-7. The risk assessment is completed by the project sponsor online through a workflow. Where assessed as high risk or for any contract with expenditure over $250,000, the procurement process is to be led by the procurement team. That is, the business is only able to lead procurement for low-medium risk projects under $250,000 in value. Above contract value of $50,000, three written quotes are mandatory.

It is evident that WaterNSW has invested in improving its procurement approach and supporting tools and systems. The current framework appears stricter (i.e. less procurement control with the business) than for comparable agencies. However, this is likely appropriate for WaterNSW's maturing business processes. The improved procurement function should provide greater insight into the overall program and identification of opportunities for efficiencies. We identify in our reviews of future capital expenditure (Section 6) and in the preceding section that cost estimates are typically based on historic costs and external estimates. Therefore, we consider that the cost estimates for future capital expenditure will not fully reflect the improved cost estimating approach and that there is likely scope for more efficient costs to be realised.

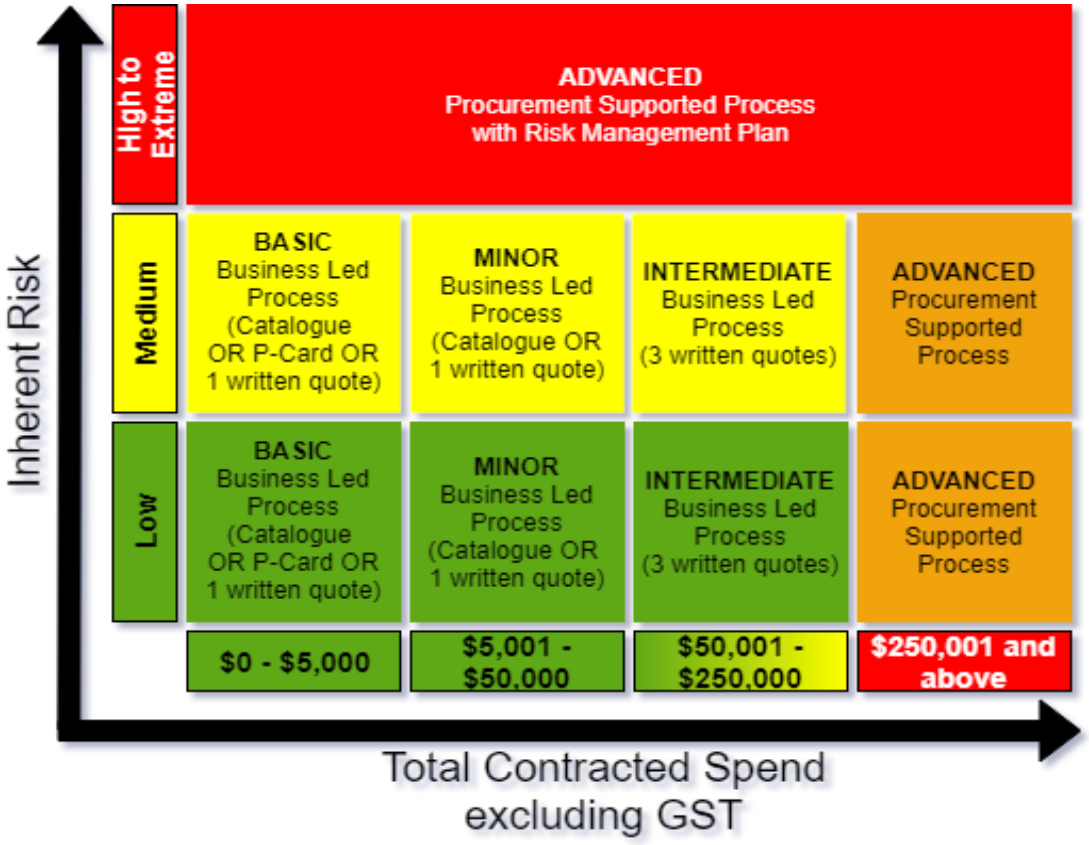


Figure 3-7 Procurement framework

In the last 12 months, WaterNSW has remodelled its internal capital delivery function. Previously, it had in place project managers who were responsible for most aspects of capital delivery. It has now separated out the project engineer function from the construction manager function allowing greater specialization. WaterNSW considers that this improves timeliness of delivery and quality of delivery.

WaterNSW has also refined its measures for program delivery and now looks to the Overall Delivery Measure (ODM) as a key indicator of successful delivery of its program. This is a weighted metric of delivered project benefits (based on project milestones) compared to costs.

3.4.8. Conclusions

On the whole, WaterNSW has logically based asset management processes in place to support the development of prudent and efficient expenditure proposals. However, there are some notable gaps in its processes, for example the Asset Class Strategies, and some of its key processes, such as procurement and PowerPlan, are still in the early days of implementation and have not had the benefit of refinement and improvement. We consider that WaterNSW has focused its attention on improving its processes in time for this expenditure review but in that regard, there is still some time before the improved processes become part of business as usual.

4. Demand Forecast Review

We comment below on the outturn and projected demands in WaterNSW's submission. These are the basis of WaterNSW's sales volumes and therefore play a key role in revenue calculation.

4.1. 2016 Determination period

With average volumes of 563,434 Ml p.a., Sydney Water makes up 99% of WaterNSW's projected sales volumes for 2016 to 2020, with Wingecarribee Shire Council making up nearly 1% at 5,490Ml p.a. Other customers provide average sales volumes of 302 Ml p.a. in the same period.

IPART's 2016 Determination set maximum prices that WaterNSW could charge six customer groups:

- Large customers (i.e. Sydney Water);
- Wingecarribee Shire Council;
- Shoalhaven City Council;
- Goulburn Mulwaree Council;
- Small customers of bulk raw water;
- Small customers of unfiltered water

In 2020, WaterNSW expects total sales volumes to be 3.9% higher than assumed in the 2016 Determination, with the majority of the increase being in Sydney Water sales volumes, but also Wingecarribee Shire Council, whose sales volumes WaterNSW expects to by 27% higher than in the Determination. These are only slightly offset by lower than expected growth in Goulburn Mulwaree Council, raw and unfiltered water use.

Table 4-1 Summary of sales volumes in the 2016 Determination period (Ml)

Ml	Sales growth (2015-20) assumed in Determination	Sales growth in WaterNSW's submission (2015-20)	Variance from 2015-20 sales growth expected in Determination	Variance as % of 2016 Determination
Sydney Water	33,913	54,082	20,169	3.7%
Goulburn Mulwaree Council	42	14	-28	(26.2%)
Shoalhaven City Council	10	26	16	17.8%
Wingecarribee Shire Council	338	1,635	1,297	27.0%
Raw and unfiltered	92	24	-68	(31.0%)
Total water sales	34,395	55,781	21,386	3.9%

Source: WaterNSW SIR, IPART's Determination and Atkins Cardno analysis

Sydney Water

WaterNSW is the main supplier of water to Sydney Water. We have reviewed Sydney Water's demands in detail in the Sydney Water report, including the drivers for variance from the Determination, so do not comment on it in detail here.

As can be seen in Table 4-2 sales volumes have been significantly higher than assumed in the Determination. This is the result of a number of factors including:

- Higher levels of new dwelling construction;
- Hot and/or dry weather, especially in 2018;
- "Densification" of non-residential consumption, with more high-rise development, for example.

The impact of weather is particularly marked in 2018 when sales volumes were 11.4% higher than the Determination assumption.

Table 4-2 Annual Sydney Water sales volumes in the 2016 Determination period

WATERNSW SALES VOLUMES TO SYDNEY WATER- CURRENT DETERMINATION PERIOD (ML per annum)							
Year ending June	**2016**	**2017**	**2018**	**2019**	**2020**	**Average growth 2015-19 (actuals) % p.a.**	**Average growth 2015-20 % p.a.**
WaterNSW 2015 Projections	522,292	527,763	533,174	537,654	543,798	1.0%	1.0%
Determination	522,292	532,125	539,433	543,943	550,135	1.3%	1.3%
Actual	530,000	558,231	601,069	557,566	570,304	1.9%	2.0%
Annual change	13,778	28,231	42,838	-43,503	12,738	10,336	10,816
Annual change %	2.7%	5.3%	7.7%	(7.2%)	2.3%		
Actual > Determination	7,708	26,106	61,636	13,623	20,169	27,268	25,848
Variance as % of Determination	1.5%	4.9%	11.4%	2.5%	3.7%	5.1%	4.8%

Source: WaterNSW SIR and October AIR update, IPART's Determination and Atkins Cardno analysis

For a number of years, it is difficult to fully reconcile WaterNSW's sales volumes to Sydney Water with the volumes reported by Sydney Water. The variance appears large in 2019 but we note that this is a comparison of Sydney Water projections with WaterNSW actuals. In aggregate the variance is not large with only 785 Ml (0.04%) aggregate variance between 2015 and 2018.

We note that WaterNSW and Sydney Water's projected values for these two lines are entirely consistent from 2020 to 2025. It is possible that the variances in some of the historical outturn values is due to adjustments applied by one or the other party after reporting the figures. We asked WaterNSW to explain the apparent discrepancies. They consider it likely that the discrepancy in 2019 is due to the fact that Sydney Water's figures are projected values. WaterNSW has not provided an explanation for the other years except to note that they consider the variances minor.

Table 4-3 Reconciliation with Sydney Water reported volumes (Ml p.a.)

Year ending June	2015	2016	2017	2018	2019	2020
Sales volume reported by WaterNSW	516,222	530,000	558,231	601,069	557,566	570,304
"Total untreated water received" plus ""treated water used for recycled water top-up" reported by Sydney Water	515,182	531,749	557,807	599,999	567,644	570,304*
Variance in year	1,040	-1,749	424	1,070	-10,078	0
Variance	0.2%	(0.3%)	0.1%	0.2%	(1.8%)	0.04%

Source: WaterNSW and Sydney Water's SIRs and Atkins Cardno analysis. Note that the WaterNSW 2019 figure is based on the October 2019 AIR resubmission. Sydney Water did not update volumes to reflect 2019 actuals in its October AIR submission so the 2019 remains a projected value.

*Note: Sydney Water's assume 70.5GL p.a. in 2020 from desalination, discussed below.

For Sydney Water's projected sales volumes, WaterNSW relies on demand forecasts provided by Sydney Water. The pricing proposal is based on the update provided by Sydney Water in April 2019. We have confirmed that the total volumes projected for 2019 and 2020 match those in the spreadsheet provided by Sydney Water.

However, we note that Sydney Water's submission assumes 70.5GL p.a. of its water in 2020 will come from SDP rather than from WaterNSW. This is inconsistent with WaterNSW's projected sales volumes for this year which assumes that WaterNSW will supply all of the demand. We have therefore recommended an adjustment to take account of this inconsistency.

As noted in our report on Sydney Water, the demand projections for 2020 are based on average weather and do not take account of demand restrictions or SDP charges. There is an unusually high level of uncertainty in WaterNSW's projected sales volumes for 2020 due to the combined impacts of demand restrictions, weather, SDP charges and growth volatility. We have not recommended an adjustment to Sydney Water's 2020 demand forecast because it is not clear what the combined impact of these factors will be.

However, we have applied an adjustment to take account of Sydney Water's assumed purchases of desalination water in 2020. This is summarised below.

Table 4-4 Adjustment of Sydney Water sales volumes for SDP (Ml p.a.)

Year ending June	2015	2016	2017	2018	2019	2020
Sydney Water sales volume reported by WaterNSW	516,222	530,000	558,231	601,069	557,566	570,304
Sydney Water's assumed purchase of desalination water						70,500
Adjusted assumed Sydney Water sales volumes excluding SDP	516,222	530,000	558,231	601,069	557,566	499,804

Source: WaterNSW and Sydney Water's SIRs and Atkins Cardno analysis

Other customers

We have compared outturn sales volumes to the Determination assumptions in Figure 4-1 and Table 4-5 below.

Sales volumes to Wingecarribee have continued to grow at a reasonably steady rate which is what has taken them above the (flat) Determination assumptions. Sales of raw and unfiltered water and sales to Goulburn Mulwaree Council have remained roughly in line with historical levels and have therefore come in under the (higher) Determination assumptions. Sales to Shoalhaven have grown a little taking them over the (flat) Determination assumptions.

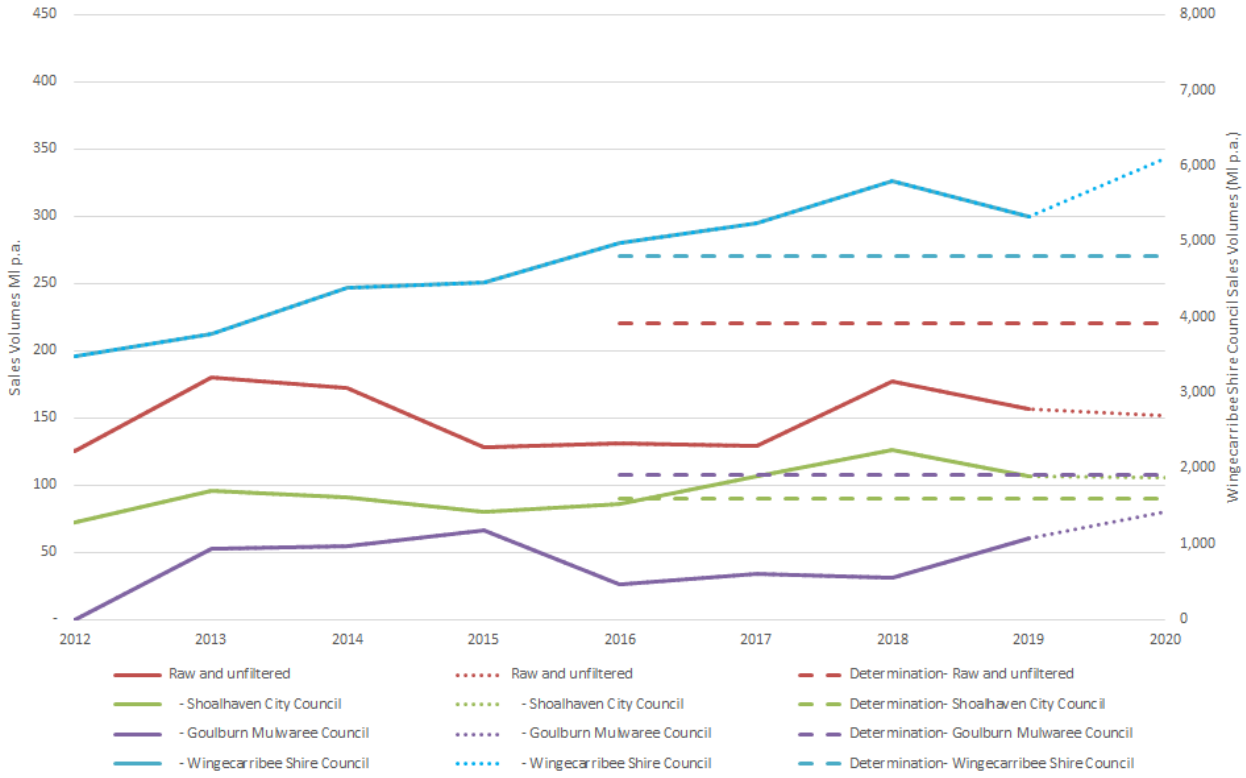


Figure 4-1 Sales volumes from other customers in current Determination period

Source: WaterNSW SIR and IPART Determination. Note that the 2019 figure is based on the October 2019 AIR resubmission.

Table 4-5 Annual 'other customer' sales volumes in the 2016 Determination period

WATERNSW SALES VOLUMES- CURRENT DETERMINATION PERIOD (ML per annum)							
Year ending June	2016	2017	2018	2019	2020	Average growth 2015-19 (actuals) % p.a.	Average growth 2015-20 % p.a.
Goulburn Mulwaree Council							
WaterNSW 2015 Projections	108	108	108	108	108	13.1%	10.4%
Determination	108	108	108	108	108	13.1%	10.4%
Actual	26	34	31	61	80	(2.0%)	3.8%
Annual change	-40	8	- 2	30	19	- 1	3
Annual change %	(60.6%)	28.8%	(6.6%)	94.5%	30.9%		
Actual > Determination	-82	-75	-77	-47	-28	-70	-62
Variance as % of Determination	(75.9%)	(69.0%)	(71.0%)	(43.6%)	(26.2%)	(64.9%)	(57.2%)
Shoalhaven City Council							
WaterNSW 2015 Projections	90	90	90	90	90	3.0%	2.4%
Determination	90	90	90	90	90	3.0%	2.4%
Actual	86	107	126	107	106	7.5%	5.8%
Annual change	6	21	19	-19	- 1	7	5
Annual change %	7.4%	24.4%	17.8%	(15.0%)	(1.0%)		
Actual > Determination	- 4	17	36	17	16	16	16
Variance as % of Determination	(4.5%)	18.8%	39.9%	18.9%	17.8%	18.3%	18.2%
Wingecarribee Shire Council							
WaterNSW 2015 Projections	4,800	4,800	4,800	4,800	4,800	1.8%	1.5%
Determination	4,800	4,800	4,800	4,800	4,800	1.8%	1.5%
Actual	4,978	5,243	5,802	5,328	6,097	4.5%	6.4%
Annual change	516	265	559	-474	769	217	327
Annual change %	11.6%	5.3%	10.7%	(8.2%)	14.4%		
Actual > Determination	178	443	1,002	528	1,297	538	690
Variance as % of Determination	3.7%	9.2%	20.9%	11.0%	27.0%	11.2%	14.4%
Raw and unfiltered							

WATERNSW SALES VOLUMES- CURRENT DETERMINATION PERIOD (ML per annum)							
Year ending June	2016	2017	2018	2019	2020	Average growth 2015-19 (actuals) % p.a.	Average growth 2015-20 % p.a.
WaterNSW 2015 Projections	220	220	220	220	220	14.5%	11.4%
Determination	220	220	220	220	220	14.5%	11.4%
Actual	131	129	177	157	152	5.2%	3.5%
Annual change	3	- 2	48	-20	- 5	7	5
Annual change %	2.3%	(1.4%)	37.0%	(11.4%)	(3.1%)		
Actual > Determination	-89	-91	-43	-63	-68	-72	-71
Variance as % of Determination	(40.5%)	(41.3%)	(19.5%)	(28.7%)	(31.0%)	(33.8%)	(32.2%)
Total water sales							
WaterNSW 2015 Projections	527,510	532,981	538,392	542,872	549,016	1.0%	1.1%
Determination	527,510	537,343	544,651	549,161	555,353	1.3%	1.3%
Actual	535,221	563,744	607,205	563,219	576,739	2.0%	2.1%
Annual change	14,263	28,523	43,462	-43,986	13,520	10,565	11,156
Annual change %	2.7%	5.3%	7.7%	(7.2%)	2.4%		
Actual > Determination	7,711	26,401	62,554	14,058	21,386	27,681	26,422
Variance as % of Determination	1.5%	4.9%	11.5%	2.6%	3.9%	5.1%	4.9%

Source: WaterNSW SIR, IPART's Determination and Atkins Cardno analysis. *Note that the 2019 figures are based on the October 2019 AIR resubmission.*

4.2. 2020 Determination period

We examine below WaterNSW's projected sales volumes for the 2020 Determination period for Sydney Water and for other customers.

Sydney Water

WaterNSW has based its projected Sydney Water sales volumes on a demand forecast spreadsheet provided by Sydney Water. We have reviewed Sydney Water's demand forecasts separately in our report on Sydney Water.

Sydney Water has confirmed that the demand forecast they provided relates to "the forecast total system demand as per the outlet meters on the filtration plants"[4]. Except for Prospect WFP, WaterNSW's revenue meters are on the raw water supply (i.e. inlet) rather than outlet meters, as summarised below.

[4] Sydney Water's response to Atkins Cardno RFI 154

WFP	Billing Flow Meter(s)
Cascade	Raw Water
Orchard Hills	Raw Water
Warragamba	Raw Water
Nepean	Raw Water
Prospect	Treated Water x 2
Macarthur	Raw Water
Woronora	Raw Water
Illawarra	Raw Water + Industrial Water
North Richmond	Raw Water

Figure 4-2 Location of revenue meters by water filtration plant

Source: extract from Raw Water Supply Protocol provided by WaterNSW by email 19 September 2019

In general, raw water volumes into WFPs are greater than the volumes put into supply due to process losses such as backwashing, disposal of sludge, which contains water, and evaporation/seepage. The amount depends on treatment process, weather and the effectiveness of any recovery processes.

This suggests that sales volumes should be greater than the demand at the outlet meters for all WFPs except Prospect.

Studies elsewhere have found process losses of approximately 0.6% and 0.8% of process capacity[5]. Applying a mid-point figure of 0.7% to the 879Ml/d capacity of WFPs other than Prospect suggests 2.2Gl p.a. of additional sales volumes at the inlet than the outlet. We have therefore recommended a 2.2Gl p.a. adjustment to projected sales volumes.

Sales volumes may also be affected by water restrictions, the operation of SDP and any unusual weather conditions.

Level 1 water restrictions were put in place in Sydney, the Blue Mountains and the Illawarra from 1 June 2019. Level 2 water restrictions then became effective from 10 December 2019. These significantly limit water use for garden watering, hosing of hard surfaces and vehicles and prohibit the use of unattended hoses.

[5] See Sutton and East Surrey Water (https://www.waterplc.com/userfiles/file/Revised%20Appendix%20B%20-%20Raw%20and%20treatment%20works%20losses.pdf) and South East Water (https://corporate.southeastwater.co.uk/media/2727/rwrmp19-appendix-4d-process-losses-review.pdf)

The 2017 Metropolitan Water Plan (MWP) set out three levels of demand restrictions. Sydney Water has stated that under the Level 2 restrictions, it is targeting achieving a saving of 13.7% or 78.5 GL p.a. compared to average day demand. The savings that Sydney Water expect to achieve from the current restrictions suggest that they consider that the "Level 1" restrictions in place in 2019 are equivalent to MWP Level 2, and the "Level 2" restrictions in place in 2019 are equivalent to MWP Level 3.

Table 4-6 MWP restriction levels

MWP restriction level	Trigger storage level	MWP description	Demand saving assumed in MWP
1	50%	Enforcement of existing Water Wise Rules, with potential for further minor mandated measures limiting outdoor water use	3.7%
2	40%	Mandated measures will constrain water use, for example the number of days per week you can water gardens. May involve per person water use targets supported by extensive education and communication campaigns.	7.8%
3	30%	Emergency restrictions involve very limited or no outdoor water use. This could include no washing of outdoor surfaces or cars, only using greywater for garden watering, and lower per person water use targets to save water in and around the home	13.7%

Source MWP and Drought Management Options Study

It is not possible to forecast with confidence how long these restrictions will be in place or if deeper restrictions will be announced in the 2020 Determination period. However, we note that water restrictions were in place for nearly six years during the last major drought (2003-2009), suggesting that it is quite possible restrictions will be in place for all or most of the 2020 Determination period.

In the 2003-09 period, Level 1 restrictions were in force for approximately eight months, replacing the previous voluntary measures. Level 2 restrictions were then in place for a year, followed by more than four years of Level 3 restrictions. These Level 3 restrictions were maintained for approximately two years after storage levels recovered to above 50%.

Source: WaterNSW[6]

Figure 4-3 Greater Sydney Storage Levels

Analysis carried out by Sydney Water's Demand Analyst[7] estimated that Level 1, 2 and 3 restrictions in 2003-09 led to 12%, 16% and 17% reductions in demand.

The impacts of the 2003-09 restrictions on Sydney Water's total demand are summarised below. After the restrictions were lifted, water demand did not bounce back quickly to pre-drought levels. Instead, demand climbed slowly back up after the restrictions were lifted, driven primarily by customer growth.

The response may be different following the lifting of the current restrictions, as the customer base has evolved in the last ten years, initiatives such as the Water Efficiency Labelling and Standards scheme have changed water use[8], and it is hard to predict customer behaviour change. However, the experience of the 2003-09 restrictions does suggest that demand restrictions can have long-lasting effects, especially after being in place for many years, as customers adjust to more efficient use of water (drought-resilient gardens for example).

[6] Greater Sydney water storage and supply report, 5 December 2019.
https://www.waternsw.com.au/__data/assets/pdf_file/0017/151622/Thursday-5-December-2019.pdf
[7] From: Estimating the Savings from Water Restrictions in Sydney, F.Spaninks, Journal of the Australian Water Association, August 2010
[8] See for example, Institute for Sustainable Future (2018) Evaluation of the Environmental and Economic Impacts of the WELS Scheme, Prepared for: Australian Government Department of Agriculture and Water Resources

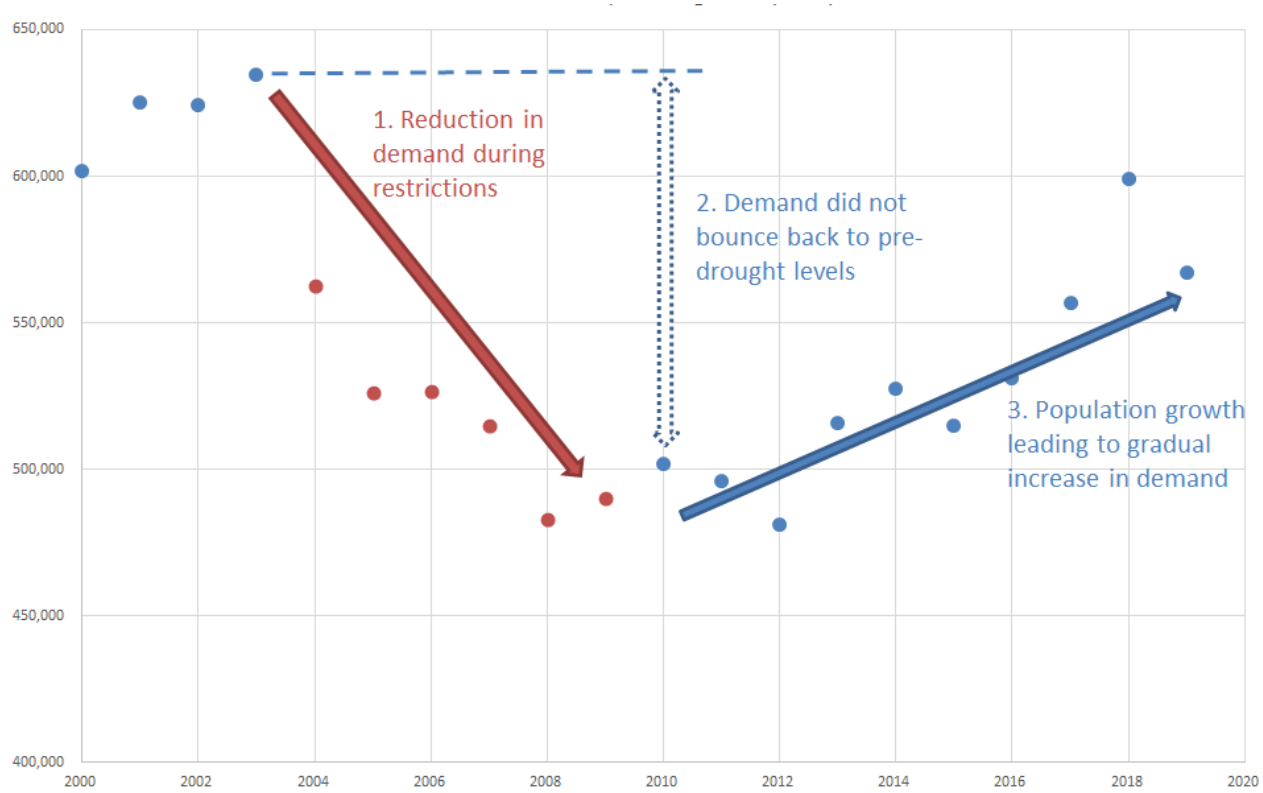


Figure 4-4 Impacts of 2003-09 restrictions on Sydney Water total demand

Source: Sydney Water SIR and Atkins/Cardno analysis

As seen in Table 4-6 above, the MWP envisages three levels of water restrictions. Level 1 & 2 restrictions were enacted at approximately 53% and 45% storage levels, i.e. 3-5% in advance of the MWP triggers. If this pattern continues, the next level of restrictions could be enacted at 33-35% storage. Storage levels have reduced by approximately 16% in the twelve months to early December 2019. If this rate of decline in storage continues, the next level of restrictions could commence in mid to late 2020.

Our view is therefore, that, if the drought continues, deeper restrictions could be in place early in the next Determination period. Experience from 2003-09 suggests that they may then be maintained at this level for a reasonable period of time. Only if the drought stabilises soon is it likely that the Level 2 restrictions will be maintained.

For the purposes of a representative 'drought' demand we have assumed that average savings of 15% will be achieved. We have proposed this level of saving as a **very approximately** probability-weighted estimate taking account of the probabilities that Level 2 restrictions continue, or deeper restrictions are put in place. The derivation is summarised below:

Table 4-7 Derivation of assumed drought demand saving

Restriction level	Probability assumed	Saving assumed
Level 2	20% Lower probability than Level 3 as, if the drought continues, it seems likely that deeper restrictions will be put in place relatively soon. Experience from 2003-09 that approximately 20% (1 year) of the Level 2/3 restrictions duration (5 years) was spent in Level 2	13.7% As per Sydney Water target
Level 3	80% Remainder from above	15.4% Mid-point of 13.7% and 17% savings (deepest savings achieved in 2003-09). The mid-point has been chosen rather than 17% as it seems likely to be harder to achieve the same savings as in 2003-09 because of the change in customer base and the chance that some of the savings from 2003-09 remain in place. NB: it is not yet known what the restrictions will consist of so this is a very high level estimate
Overall saving		15.0% (20% x 13.7% + 80% * 15.35%)

Source Atkins Cardno Analysis

There are a number of caveats around this figure:

- Drought is inherently unpredictable and is not a single state of affairs (e.g. there is a significant difference in customer perception and therefore demand responses between a ‘drought’ at 50% storage and 10% storage)
- The outturn savings depend on the effectiveness of water conservation measures and communications.
- The adjustment is built on uncertain new development projections and a non-residential model in which we have limited confidence.
- Sydney Water’s customer base has changed significantly since 2003-09, and continues to do so, so care is required when extrapolating the impacts into the future.

Although there is a wide range of uncertainty around the assumption of a 15% saving, we consider it is reasonable when set against the savings achieved in 2003-09 (12, 16 and 17% for levels 1, 2 and 3) considering that we expect the savings to be a little harder to achieve this time. We recognise that sales volumes may be affected by unusual weather conditions, incidents and the operation of SDP (addressed below).

For consistency with the Sydney Water review we have also made an adjustment to the leakage level ('real losses') to take account of the assumption that Sydney Water will manage leakage to match the ELL. In the water balance used to provide the demand forecast to WaterNSW, Sydney Water has assumed average 'real losses' of 43,100 (Ml p.a.) equivalent to 118Mld. This compares to typical ELLs of approximately 102Mld in drought and 105Mld in non-drought conditions[9].

The operation of SDP would also be likely to significantly affect sales volumes. The plant has a maximum daily output of 266 Mld but is required to produce an average of 250 Mld over a 365-day period i.e. 91.3GL p.a. We have included the potential impact of SDP below.

We have not incorporated a specific price elasticity adjustment for the operation of the SDP as it is only one of many components making up Sydney Water's usage charge, which will be decided by the Sydney Water Determination process taking account of many other factors.

Table 4-8 Impacts of different restriction levels on Sydney Water sales volumes (Ml p.a.)

Year ending June	2021	2022	2023	2024	2025
Sales volume reported by WaterNSW	575,928	582,798	589,588	598,136	602,491
Adjustment for process losses	2,246	2,246	2,246	2,246	2,246
Sales volumes adjusted for process losses	578,174	585,044	591,834	600,381	604,737
Sydney Water assumed real losses (leakage)	42,705	42,948	43,192	43,554	43,678
DROUGHT					
Real losses in drought	37,230	37,230	37,230	37,230	37,230
Adjustment to Sydney Water reducing leakage to drought ELL	-5,475	-5,718	-5,962	-6,324	-6,448
Adjustment for water restrictions	-85,147	-86,221	-87,236	-88,515	-89,165
Sales volumes adjusted for process losses, drought leakage reduction & water restrictions	487,552	493,105	498,636	505,543	509,124
Potential output from SDP	-91,250	-91,250	-91,250	-91,250	-91,250
Sales volumes adjusted for SDP output, leakage, water restrictions and process losses (no price elasticity effects)	396,302	401,855	407,386	414,293	417,874
NON-DROUGHT					
Real losses outside of drought conditions	38,325	38,325	38,325	38,325	38,325

[9] Based on Sydney Water RFI response 385.1. See all Sydney Water review report

Year ending June	2021	2022	2023	2024	2025
Adjustment to Sydney Water reducing leakage to outside of drought conditions	-4,380	-4,623	-4,867	-5,229	-5,353
Sales volumes adjusted for process losses & non-drought leakage reduction	573,794	580,420	586,967	595,152	599,384
Potential output from SDP	-91,250	-91,250	-91,250	-91,250	-91,250
Sales volumes adjusted for SDP output, non-drought leakage reduction and process losses (no price elasticity effects)	482,544	489,170	495,717	503,902	508,134

Source: WaterNSW SIR and Atkins Cardno analysis

These impacts are presented graphically for drought conditions below.

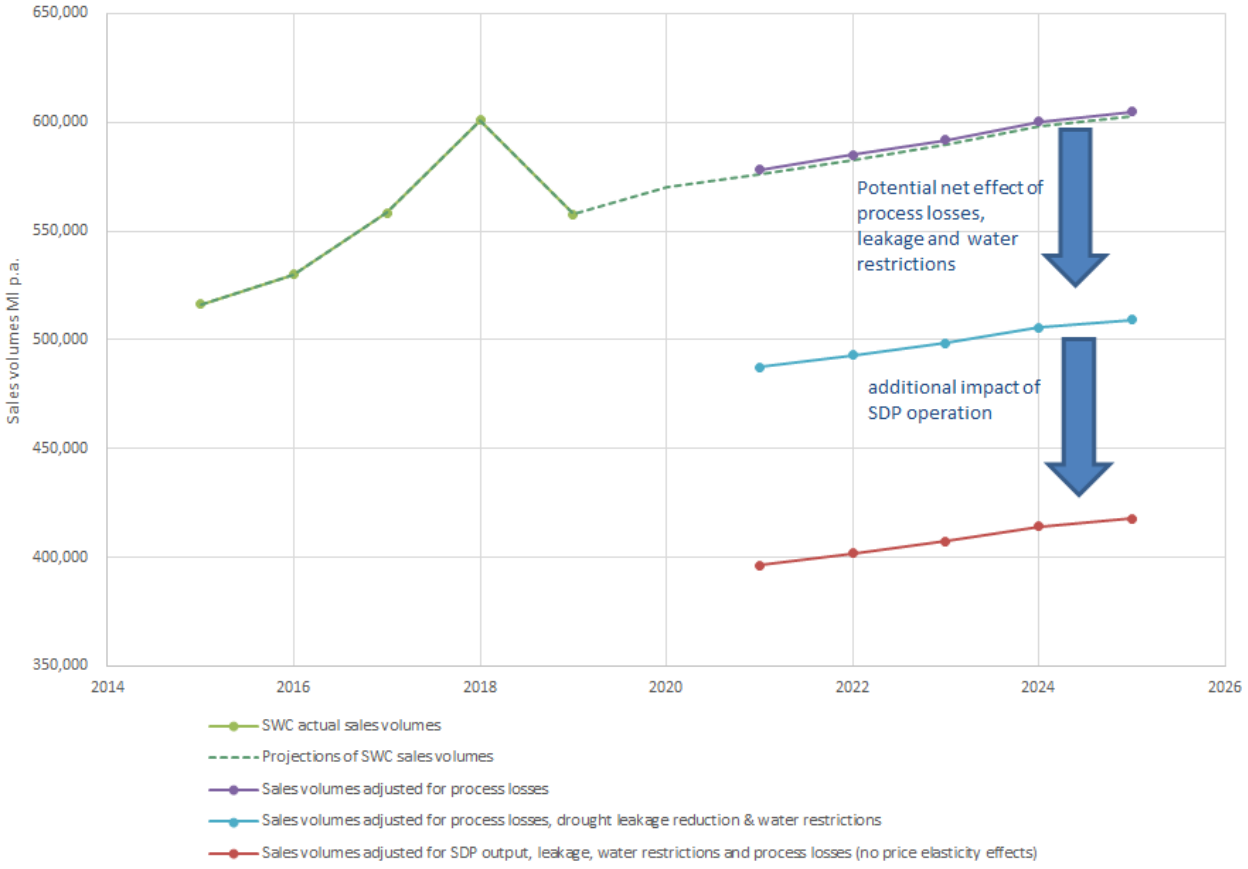


Figure 4-5 Sydney Water sales volumes in next Determination period under drought conditions

Source: WaterNSW SIR and Atkins/Cardno analysis

Other customers

WaterNSW has used a number of different approaches to projecting sales volumes for other customers. These are summarised and presented graphically below.

Table 4-9 Approaches taken to projecting sales from other customers

Customer	Approach taken	Comment
Goulburn Mulwaree Council	Based on information from the Council. Assumed drought conditions in 2020 but normal conditions thereafter, when it is assumed to revert to recent average.	Does not appear unreasonable
Shoalhaven City Council	Council asked for recent average to be increased by 2Ml each year.	Does not appear unreasonable
Wingecarribee Shire Council	WNSW applied a growth rate of 2% p.a. which the council reviewed and agreed to.	This is lower than recent growth rates but does not appear unreasonable.
Raw water	Based on average of 2018 and (projected) 2019	The volume used for 2019 was a projection rather than outturn so the average of 2017 and 2018 would perhaps have been a better basis. However, the difference is minor in absolute terms, so we have not recommended an adjustment.
Unfiltered water	Based on 2014-19 average	Appears reasonable

Source: Atkins Cardno analysis of WaterNSW SIR and discussions during interview

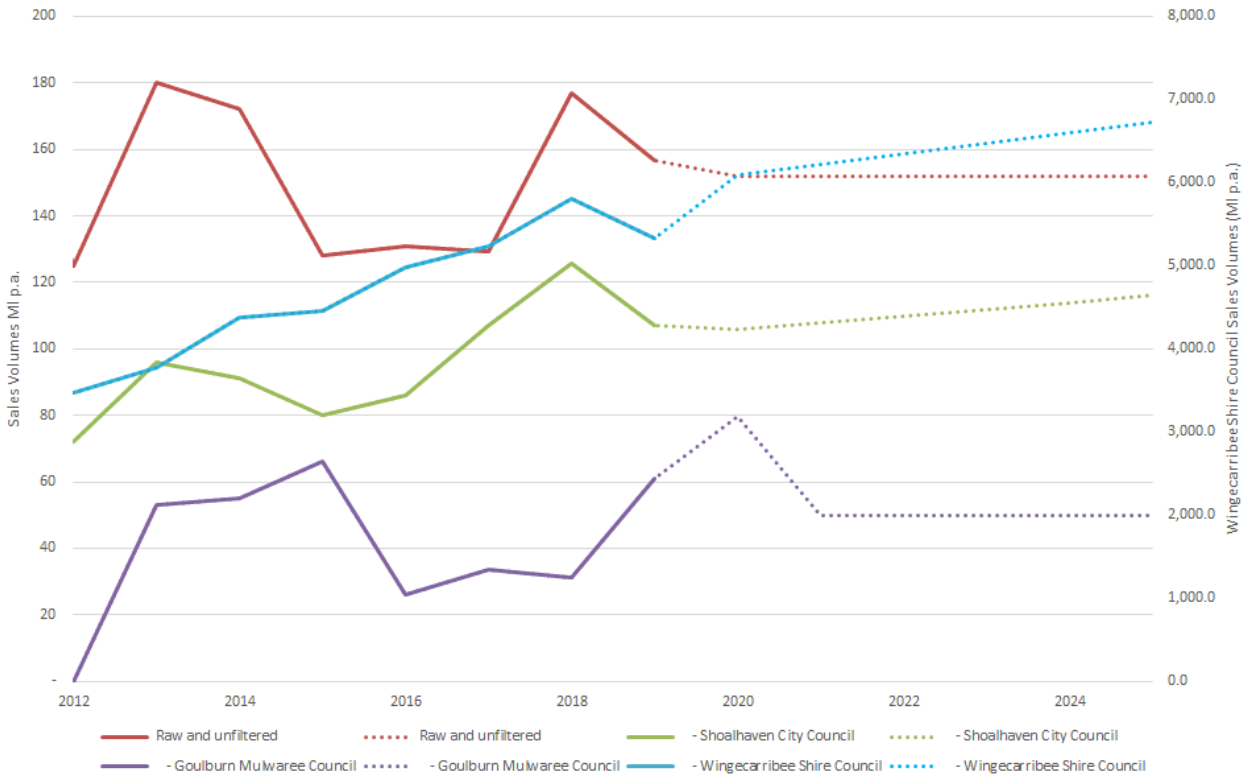


Figure 4-6 Other customer sales volumes in next Determination period

Source: WaterNSW SIR and Atkins/Cardno analysis

Having reviewed the basis of the projections the only recommendation we have made is to take account of the potential impacts of drought-related restrictions assuming a 15% reduction as for Sydney Water. The results are summarised in the table below.

Table 4-10 Adjustment of 'Other Customer' projected sales volumes for drought-related water restrictions (Ml p.a.)

Year ending June	2021	2022	2023	2024	2025
Goulburn Mulwaree Council	43	43	43	43	43
Shoalhaven City Council	92	94	95	97	99
Wingecarribee Shire Council	5,286	5,392	5,500	5,610	5,722
Raw and unfiltered	129	129	129	129	129
Total 'other customer'	5,550	5,657	5,766	5,878	5,992

Source: WaterNSW SIR and Atkins Cardno analysis

5. Operating Expenditure

We are required to review actual operating expenditure incurred over the 2016 Determination period. In undertaking we must:

- *Report and comment on the variations in operating expenditure from what was allowed in the 2016 Determination, including the extent to which these variations are justified or not.*
- *Identify and comment on the nature and size of operational savings realised (e.g., whether they are permanent or temporary in nature).*

We are also required to review the efficiency of forecast operating expenditure for the 2020 Determination period. In undertaking this task, we must:

- *Provide recommendations as to the efficiency of the utility's forecast level of operating expenditure and provide annual estimates of the level of operating expenditure that is required to efficiently supply the regulated monopoly services.*
- *Identify the potential for and recommend efficiency savings to be achieved within the operating expenditure budget and provide evidence and reasoning to support the recommended savings.*
- *Advise on the appropriateness of and recommend how shared operating costs (including overheads) are allocated to monopoly services, and the rationale for this allocation.*
- *Identify any consequential impacts on capital expenditure (i.e. increased or reduced costs) based on the assessment of operating expenditure.*
- *Where appropriate, have regard to productivity benchmarking analysis when identifying potential efficiency savings.*

5.1. Summary

5.1.1. 2016 Determination period

Operating expenditure reported in the 2016 Determination period includes actuals for 2017, 2018 and 2019; forecast expenditure is included for year 2020. WaterNSW reports an overall under-expenditure of $45.8m.

There was a change to accounting assumptions. The capitalisation rules changed from 2019 resulting in a $25.9m reduction in operating expenditure. While there may be a good accounting reason to make this change, we question whether it is equitable to add these costs to the RAB when allowance has been made in operating expenditure. We have therefore reversed an equivalent amount from the RAB in 2019 and 2020 to reflect this double counting.

Corporate and support costs are allocated to the Greater Sydney, Rural Valleys and WAMC businesses. The methodology has changed from that assumed in the Determination with allocation now based on totex; that is the combination of operating capital expenditure. For some large projects, the allocation is based on one-off assessments. The impact is to reduce the allocation to Greater Sydney by $6.8m. This leaves a residual variance of -$13.1m. Actual operating expenditure was therefore an average 3.7% below the Determination after adjustments for capitalisation and corporate allocations.

The 2016 Determination assumed a $27.5m reduction on the 2012 base; this was delivered from 2017. In 2018, expenditure was 19% below the Determination which WaterNSW attributes to a lower corporate allocation in the year and the impact of the restructuring of the business with lower headcount and a greater number of vacancies. There was then a significant increase in expenditure in 2019 and forecast for 2020 which exceeded the Determination for those years. Expenditure in 2019 was a 21% increase on the average of years 2017 and 2018. To affect such an increase over one year questions the efficiency of the business and the extent to which the long term efficiencies of the merger have been maintained.

WaterNSW was established in 2015 from the previous Sydney Catchment Authority (SCA) and State Water Corporation. The completion of restructuring of the combined businesses which related more to the management structure than activities has taken some time. For example, the new ERP system implemented in 2019.

Many of the activities of water operations, catchment management, maintenance and related activities for Greater Sydney are business-as-usual and continuing from the previous SCA; there are no significant changes to these activities in the current and future periods. Reductions in activity and expenditure were reported in these operating areas in 2018 although these have had no material impact on performance. Because of the qualitative nature of the performance measures, it is difficult to determine whether expenditure is efficient, or a low-risk is taken and some over-provision (or gold plating) is applied.

WaterNSW has changed its financial system during the period, from legacy systems.in the previous SCA and State Water Corporation businesses. The current system was fully implemented in 2019. These changes and the impact of applying different charts of account has made it difficult for WaterNSW to provide a robust estimate of some historic costs.

The lower actual expenditure is due mainly to reduced activity levels in maintenance, catchment management and water operations. A backlog in maintenance activity was identified by WaterNSW; it plans to resolve this in 2020 although some backlog is likely to be carried over into the 2020 Determination period. Monitoring activities have reduced because of drought conditions with lower inflows.

WaterNSW has continued its business operations under the Operating Licence requirements although in some areas at lower levels of activity. We consider that it has achieved these requirements although there is little information to confirm that expenditure is efficient. The business does not appear to be focused on delivering efficiency and has not proposed any savings in the 2016 period through the Efficiency Incentive Mechanism.

The findings from the review of the 2016 Determination period on the 2020 period are that

- lower operating expenditure is expected from a higher level of capitalisation;
- the main activities have continued as ‘business-as-usual’ and there is flexibility in accommodating additional requirements through re-prioritising of activities;
- the qualitative nature of most of the performance measures makes it difficult to determine whether expenditure is efficient, or a low risk is taken with some over-provision;
- some form of risk-based measure should be considered to prioritise activities, promoting those activities with clear risk reduction and deferring others;
- WaterNSW costs are substantially independent of the volume of bulk water supplied.

5.1.2. 2020 Determination period

There are no material changes to the Operating Licence requirements to provide bulk water supplies to Sydney Water and local councils and operations follow established business-as-usual activities. There are a small number of exceptions in that Sydney Water has requested additional water monitoring activities and operational support has been given to drought management functions requested by Government. While dam safety legislation is changing, WaterNSW is well placed to manage this and the impact is mainly for capital expenditure. There is a new licence requirement to undertake more water quality science.

WaterNSW is proposing an increase in operating expenditure of $22.0m (6.1%) above the 2016 period; this is after $3.9m (1%) efficiency is applied across the whole program. The main increases are in Catchment Management and Water Delivery. Corporate and support costs remain higher than comparator utilities. Where a business is facing additional cost pressures, we would expect it to manage these, where possible, within existing budgets but adjusting priorities. We have derived an efficient level of expenditure based on

adjustments to specific activities and programs to meet qualitative objectives. We have then applied catch-up and continuing efficiencies, taking into account the efficiencies proposed by WaterNSW. We have sought to benchmark WaterNSW's performance against bulk water supply comparators with limited success as the nature and operating environment of managed catchments is non-homogeneous. We comment on specific adjustments.

- **Corporate and support expenditure:** Corporate expenditure for Greater Sydney is an average 32.3% of the total operating expenditure. This is relatively high when compared with other utilities. We noted that customer service costs are included within corporate. This is unusual when comparing with other utilities where they are regarded as operational expenditure. It is appropriate to allocate these costs directly to the relevant businesses. Our estimate of this reallocation is to reduce the Greater Sydney expenditure by $ 5.6m. We consider there is scope for further restructuring to reduce costs in corporate and support activities and across the business;
- **Business Systems:** Benchmarking of the Business systems and information (ICT) operational expenditure shows that there is scope for efficiencies above those proposed by WaterNSW to catch up with the frontier company;
- **Catchment management:** justification for increases in source protection is not made. While the outsourcing of fire-fighting activities to the RFS is an increase in expenditure, there is no offset for the savings of in-house costs; the contingency applied is high. We have supported an increase in water quality science expenditure above the 2016 period but not to the extent proposed by WaterNSW;
- **Water operations:** we have supported a modest increase in monitoring expenditure above the 2016 period but not to the extent proposed by WaterNSW;
- **Additional monitoring for Sydney Water:** Sydney Water has requested additional monitoring through the Bulk Supply Agreement. While the additional water quality monitoring proposed was reasonable, it would appear from the monitoring program that some locations are monitored by both Sydney Water and WaterNSW. It would be more efficient to have one utility sample and test at these locations and use the resources to undertake the additional sampling and testing requested by Sydney Water. On this basis there is no requirement for additional expenditure;
- **Drought Plan:** WaterNSW has included expenditure to support the drought plan work carried out at the request of Government.
- **Site security:** There is scope to reduce increasing operating expenditure here through new technology. We have assumed this saving will be included within the continuing efficiency adjustment.

We then made adjustments to reflect catch-up and continuing efficiency, Catch-up reflects the efficiency need to be achieved over time to catch up with a frontier company. We have assumed catch-up efficiencies of 0.9% per annum cumulative over the period, offset in part by the efficiency proposed by WaterNSW. This is about half the efficiency applied to Sydney Water in 2016. The continuing improvement element of efficiency, termed 'Frontier Shift', relates to the increased productivity derived from process innovation and new systems and technology that all well-performing businesses should achieve. We have applied the results from the Australian Productivity Commission Multi-Factor Productivity (MFP) analysis, proposed efficiencies from other water utilities in New South Wales and recent analysis for Ofwat, the water regulator in England and Wales, which has been applied to frontier water companies. We have applied a Frontier Shift of 0.8% per annum cumulative over the Determination period.

Our view of efficient operating expenditure is summarised in Table 5-1 below.

Table 5-1 Efficient level of operating expenditure

WATERNSW EFFICIENT LEVEL OF OPERATING EXPENDITURE					
($m 2019/20) year ending June	**2021**	**2022**	**2023**	**2024**	**Total 2021 to 2024**
WATER NSW PRE-EFFICIENCY PROPOSED EXPENDITURE					
Total pre-efficiency expenditure	97.48	97.37	98.77	94.69	388.32
ATKINS SCOPE ADJUSTMENTS					
Total adjustment	-2.80	-2.80	-3.70	-3.60	-12.90
Expenditure post adjustments	94.68	94.57	95.07	91.09	375.42
ATKINS EFFICIENCY ADJUSTMENTS					
Efficiency applied	-1.61	-3.22	-4.85	-6.19	-15.87
ATKINS RECOMMENDED EFFICIENT EXPENDITURE					
Total	93.07	91.36	90.22	84.90	359.55

Source: Atkins analysis

5.2. Methodology

In this section, we present the results of our review of the efficiency of WaterNSW's operating expenditure. We identify the major cost drivers and explain the variances in the current price path expenditure against the 2016 Determination. We comment on the prudence and efficiency of operating expenditure in the 2016 Determination period which is used to inform our view of future efficiency. We comment in Section 3 on the strategic management of the business and the structures and systems used to plan and manage expenditure.

We then make an assessment of an efficient level of expenditure for the period 2021 to 2025 taking into account our discussions with WaterNSW, documents presented and subsequent answers to questions we raised. For year 20205, we have based our assessment of efficiency from the expenditures proposed in the SIR and the detailed expenditure proposals in the WaterNSW submission, which only cover the period to 2024. We note the efficiencies proposed by WaterNSW. We discuss the cost drivers and efficient cost level recommendations for operational and support activities.

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

(i) Actual expenditure for financial years ending 2017 to 2019;

(ii) The current budget for year ending 2020; and

(iii) The projected costs for the financial years ending 2021 to 2025.

Our methodology is explained in Section 1.5.

5.3. Overview

WaterNSW was formed in 2015 from the previous Sydney Catchment Authority covering Greater Sydney and the State Water Corporation serving the mainly rural areas of New South Wales. The 2016 Determination[10] for Greater Sydney was the first for the new water utility.

Figure 5-1 shows a comparison of actual expenditure against the 2016 Determination. We also show, for comparison, the actual expenditure against Determination for the 2012 period and the WaterNSW proposed

[10] Review of Prices for WaterNSW Greater Sydney, Water, IPART June 2016.

expenditure for the 2020 Determination period. This comparison enables a long-term view to be taken on Determination allowances and actual expenditure.

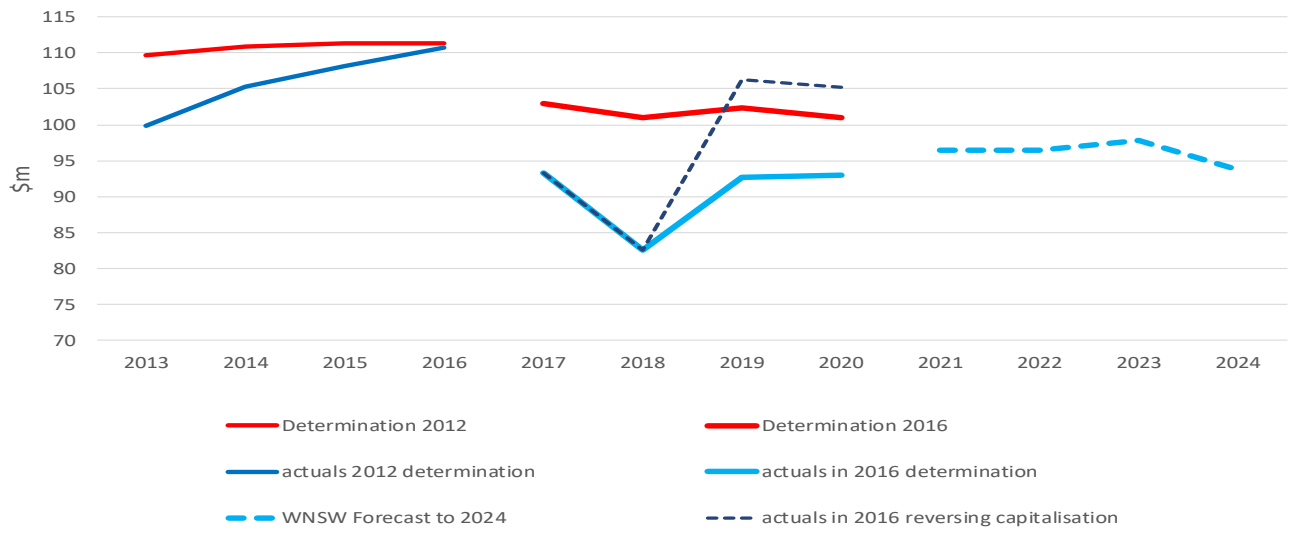


Figure 5-1 Expenditure comparisons 2012, 2016 and 2020 Determination periods

Source SIR, IPART Determination report and Atkins Cardno 2016 report and analysis

The 2016 Determination for the new organisation set a level of expenditure which included an efficiency saving of $27.5m from its corporate restructuring over the period; this was partly offset by a net increase of $4.0m for Portfolio Risk Assessment (PRA) of the dams. The cost of pumping from Shoalhaven was covered in a separate pass-through mechanism. No further efficiencies were applied, although WaterNSW advised that this mechanism did not include the full costs. A marginal increase in corporate overheads was allowed to reflect a revised methodology. There was then a significant increase in expenditure in 2019 and forecast for 2020 which exceeded the Determination for those years. Expenditure in 2019 was a 21% increase on the average of years 2017 and 2018. To affect such an increase over one year questions the efficiency of the business and the extent to which the long term efficiencies of the merger have been maintained.

Actual expenditure from 2016 to 2017 showed a $17.5m step reduction followed by a further reduction in 2018 but recovering to about the 2017 level in the last two years of the forecast.

There was a change in the capitalisation policy from 2019 which had a material impact on this variance analysis. At the start of the 2016 Determination period, WaterNSW assumed that the capitalised overhead applicable to Greater Sydney was $1.8m and $1.6m for 2017 and 2018 respectively. This increased to $15.4m and $13.9m in 2019 and forecast for 2020; a net increase of $25.9m. While there may be a good accounting reason to make this change, we question whether it is equitable to add these costs to the RAB when allowance has been made in operating expenditure. We have therefore reversed an equivalent amount from the RAB in 2019 and 2020 to reflect this double counting.

Comparing actual expenditure against the Determination using the rules when the Determination was made would increase opex by $13.m in 2019 and a forecast $12.2m in 2020. These adjustments are in the broken line on the graph in Figure 5.1.

WaterNSW has underspent the 2016 Determination, after taking into account changes in capitalisation and corporate cost allocations, by a net by $13.1m 0r 3.7% using the same capitalisation rules assumed at the start of the Determination. We discuss the reasons for this under-expenditure in Section 5.4.

Expenditure in the 2020 period shows a relatively even trend and similar to forecast expenditure in 2019 and 2020.

We had some challenges in reviewing the Corporate opex expenditure, in particular for ICT related opex expenditure which was in sharp contrast to the evidence presented on capital expenditure. This was not directly addressed in the 2015 review for us to refer back to either. We understand that WaterNSW experienced some technical issues in compiling the data given that they are working with two systems and three sets of data (the original Tech One data, migrated data and CIMs data) to compile these reports. As a result, during the interviews, WaterNSW provided very little visibility on and was unable to have any robust discussions on this expenditure. A breakdown for ICT was subsequently provided with explanations of the key items and movement between the current and next price paths. Our findings have therefore been limited to a desktop review[11].

In the 2020 Determination period, there are no material changes to the Operating Licence requirements to provide bulk water supplies to Sydney Water and local councils and operations follow established business-as-usual activities. There are a small number of exceptions in that Sydney Water has requested additional water monitoring activities and operational support has been given to drought management functions requested by Government. While dam safety legislation is changing, WaterNSW is well placed to manage this and the impact is mainly for capital expenditure. There is a new licence requirement to undertake more water quality science research.

WaterNSW is proposing an increase in operating expenditure of $22.0m (6.1%) above the 2016 period; this is after $3.9m (1%) efficiency is applied across the whole program.

5.4. Operating Expenditure in the 2016 Determination period

5.4.1. Variance analysis

WaterNSW's submission compares actual expenditure against the 2016 Determination and explains the reasons for cost variances. We have analysed the operating expenditure by operating activity and identify and comment on material variances. We identify any cost savings and increases as a result of external factors and WaterNSW's management actions. We comment on the efficiency and prudence of expenditure in the 2016 Determination period and identify any areas of expenditure which are not consistent with the definition.

WaterNSW has changed its accounting system through the period. From the merger of SCA and State Water Corporation, it used the Technology One system. It moved to the current CIMS system in 2019. All staff are now on timesheets which improves the ability to apply activity based costing. The change in systems with differing chart of accounts has made it difficult for WaterNSW to provide robust analysis of some disaggregated historic costs through the 2016 period. WaterNSW commented that

> *The reporting difficulties are focused on changes in the classification of business expenses as either direct or indirect costs and the roll out of a new suite of projects codes and chart of accounts which were intended to improve on our IPART reporting capability but which had limited uptake during the transition period. WaterNSW understands these issues are not unexpected when transitioning to new IT systems…*

[11] ICT expenditure does not easily lend itself to focusing only on capital investment. The split is approximately 60% capex to 40% opex across the two price paths, with opex actually increasing to 45% in 2021-2024. This is part of a wider trend we are seeing elsewhere where developments such as the Cloud and Software as a Service alongside higher licence and support costs result in overall increase in ICT expenditure. The levels of expenditure are therefore very similar and hence why we also reference IT opex spend in the Capital Expenditure section when we are reviewing projects. Opex may relate to costs related to the implementation of capital projects or to recurrent opex associated with licences and support for existing and new projects as well as staff support costs. We recommend that for future reviews, ICT expenditure should be presented in the IPART Submissions on a totex basis and also reflected in the methodology for the review process.

and that:

> *…the transition into CIMS that was finalised at the end of 2018-19 will enable WaterNSW to produce more timely and reliable financial information for future IPART Price Reviews. Notwithstanding, WaterNSW argues that it has well established financial management systems that are both sound and reliable and that the overall controls on its financial systems and processes are fit for purpose.*

We have taken actual and forecast expenditure for the current price path from 2017 to 2020 and compared these values with the Final Determination 2016 inflated to the 2020 price base using indices provided by IPART. We have calculated the variance at service level or product level as shown in Table 5-2.

Table 5-2 Variance Analysis: actual v Determination

WATER NSW OPERATING EXPENDITURE: 2016 PERIOD VARIANCE					
$2015/160 Year ending June	2017	2018	2019	2020	Total
2016 DETERMINATION					
At 2015/16 price base	94.50	92.70	93.90	92.70	373.80
At 2019/20 price base	102.99	101.03	102.34	101.03	407.39
ACTUAL EXPENDITURE					
At real nominal	87.25	78.82	92.67	93.03	351.78
At 2019/20 price base	93.32	82.57	92.67	93.03	361.59
Additional capitalisation	0.00	0.00	13.68	12.23	25.91
Actual reversing capitalisation	93.32	82.57	106.35	105.26	387.50
Variance (actual >Determination)					
Total	-9.67	-18.46	-9.66	-8.01	-45.80
Reversing capitalisation	-9.67	-18.46	4.02	4.22	-19.89

Source: SIR, 2016 Determination, RPI and Atkins analysis

WaterNSW reports by expense descriptor and by operating activity in the AIS 'Opex GS' and by change in activity expenditure in the SIR tab 'opex'. There is no further disaggregation of operating activity reporting. We have therefore used the expenditure reported from WaterNSW accounting system for deriving expenditure by activity. WaterNSW has explained the reasons for material variances.

The report on efficiencies prior to the 2016 Determination did not disaggregate expenditure by operating activity[12]. The 2016 Determination also did not disaggregate expenditure[13]. This means there is limited information to enable a quantitative assessment of variance of actual expenditure against the Determination or to understand the reasons for the under-spend. We have therefore relied on presentations from and discussions with the relevant WaterNSW managers.

Expenditure by operational activity is shown in Table 5-3. We comment on each operational area in the following sections.

[12] WaterNSW Greater Sydney; a Review of Operating and Capital Expenditure, Aither December 2015
[13] Final Report Review of prices for WaterNSW Greater Sydney, IPART June 2016

Table 5-3 Actual expenditure by operational activity

WATERNSW ACTUAL EXPENDITURE BY OPERATING ACTIVITY					
$m 2020 Year ending June	**2017**	**2018**	**2019**	**2020**	**Total**
2016 DETERMINATION					
Determination	102.99	101.03	102.34	101.03	407.39
Actual	93.32	82.57	92.67	93.03	361.59
Variance Actual > Determination	-9.67	-18.46	-9.66	-8.01	-45.80
Actual reversing capitalisation	93.3	82.6	106.4	105.3	387.5
Variance reversing capitalisation	-9.67	-18.46	4.02	4.22	-19.89
ACTUAL EXPENDITURE					
Catchment management	29.29	24.62	22.37	28.72	105.0
Dam safety	6.95	6.52	4.87	8.42	26.76
Water delivery and other operations	24.26	20.96	29.47	25.91	100.59
Maintenance	26.64	22.40	23.13	24.29	96.46
Environmental Planning and Protection	0.12	0.17	1.99	0.42	2.70
Asset Management	1.99	1.57	1.44	1.16	6.16
Other	4.07	6.34	9.41	4.11	23.92
TOTAL EXPENDITURE					
Total operating expenditure	93.32	82.57	92.67	93.03	361.59

Source: SIR, WNSW opex GL and Atkins analysis

5.4.2. Efficiencies reported in core operating expenditure

There was little evidence to show that WaterNSW was actively driving efficiencies in the 2016 Determination period. It is not proposing any savings in the Efficiency Incentive Mechanism. We have sought to benchmark WaterNSW's performance against bulk water supply comparators with limited success as the nature and operating environment of managed catchments is non-homogeneous.

5.4.3. Corporate expenditure and allocated cost

WaterNSW has changed the method it allocates corporate overheads across its businesses, both regulated and unregulated. Overhead costs, that is costs that cannot be mapped directly to specific activities, are allocated to each business in proportion to the totex of each business; totex is the summary of direct operating expenditure and capital expenditure. The allocation of overheads for each year is shown in Table 5-4.

Table 5-4 Overhead allocation

WATERNSW OPERATING EXPENDITURE: OVERHEAD ALLOCATION						
$m 2020 Year ending June	**Rural Valleys Determination 2018**	**2017**	**2018**	**2019**	**2020**	**2017 to 2020 Average**
WATER OPERATIONS (All %)						
Allocation basis	55-45	55-45	TOTEX	TOTEX	TOTEX	TOTEX
Greater Sydney	55	55	52	58	58	63
Rural Valleys	45	45	37	32	32	24
WAMC	n/a	n/a	11	10	10	13
TOTAL ALLOCATED COSTS ($m)						
Total	43	63.00	53.00	60.00	60.00	49
Allocated to Greater Sydney		34.65	27.56	34.80	34.80	30.87
2016 Determination assumption		34.65	34.65	34.65	34.65	
Variance actual > Determination		0.00	-7.09	0.15	0.15	

Source: WNSW submission table 6.3

Overall, WaterNSW has allocated a percentage of overhead to its Greater Sydney business which is marginally lower than in the 2016 Determination. This is a further explanatory factor for the variance in operating expenditure.

Business systems and information

This line of expenditure is equivalent to the Information, Communications and Technology heading under Capital Expenditure but there was not much visibility either in the Submission or SIR. WaterNSW subsequently provided us with a breakdown for the current and future price paths for the total ICT operational expenditure, which is captured in Table 5-5 below for 2017-20.

Table 5-5 Total ICT operational costs for WaterNSW

WATERNSW ACTUAL EXPENDITURE ICT (pre-allocation, pre-capitalisation)					
$m 2020 Year ending June	**2017**	**2018**	**2019**	**2020**	**Total**
2016 DETERMINATION					
Administration - Overheads	2.60	3.97	2.11	1.73	10.41
Analytics Programme	0.01	0.00	0.00	0.46	0.47
Corporate Systems Program	0.50	0.20	3.11	0.00	3.81
ICT Business Process Automation programme	0.03	0.02	0.19	0.09	0.33
ICT Data Centre	0.05	0.22	0.09	0.00	0.36
ICT EUC & Collaboration	0.00	0.32	0.37	0.18	0.87
ICT Renewals and Replacement	0.78	0.88	0.62	1.68	3.95
Information Technology Support	7.12	8.51	10.28	12.11	38.02
Operational Systems programme	0.00	0.01	0.00	0.00	0.01
Organizational Development	0.03	0.01	0.03	0.00	0.06
Training OH&S	0.01	0.00	0.00	0.00	0.02
Training Technical	0.10	0.14	0.10	0.19	0.53
Ungrouped	0.35	3.23	0.04	0.00	3.61
Water Marketing Systems programme	0.00	0.01	0.03	0.00	0.04
SUB TOTAL ICT COSTS					
Sub-total	11.56	17.52	16.97	16.44	62.50
GREATER SYDNEY SPECIFIC COSTS					
Greater Sydney specific ICT costs	0.00	0.06	0.65	0.63	1.34

Source: WaterNSW RFI response 189

The major items relate to:

- Information Technology Support ($38m) - Expenditure in 2017 to 2019 includes atypical one-off expenditure on telecommunications to bring communication systems together after the merger and to comply with minimum standards. It also includes security expenditure on ISO certification and as a response to the findings of the security audit. A major component also includes salaries for support staff (~$3m), telecommunications costs, external Level 3 support as well as administration costs (e.g. rent, postage, travel, and printing)
- Overheads Administration ($10.4m) - This relates to internal administrative salaries. For example, Team Leaders and Business Support Officers. There is also a small allowance for minor operational administrative costs such as room hire.
- ICT Renewals and Replacement ($4m) - These costs cover a large range of annual software maintenance and support agreements, e.g. ServiceNOW, Hydstra, ClearSCADA, Sensi, STREAMSETS, HOLOCENTRIC and many other smaller cost applications. It is unclear why there is such as steep jump in 2020; we assume it could be an accounting error in previous years where expenditure was captured elsewhere or that a significant number of contracts were up for renewal in the same year.
- Corporate Systems Program ($3.8m) - This is for licencing costs for Field Mobility staff, RACS mobility, Talent Attract/Onboarding, HR Case Management, and Support services for Talent and Field service mobility.
- Ungrouped ($3.6m) - The expenditure in 2017/18 relates to the additional ICT costs incurred as a result of the merging of 220 DPI staff and offices to WaterNSW. Most of the costs were for telecommunications, including equipment and hosting charges.

It was unclear why there is no opex associated with the Data Centre or Corporate Systems program in 2019/20 (and also 2020/21 to for the latter), i.e. whether this was an accounting error. WaterNSW explained: *"….that the capital replacement program for the Data Centre will be undertaken in 2019-20 and therefore opex will only*

be incurred post the implementation of the service contract related to the ongoing management of the new environment. As a result, the Data Centre operational costs during this transitional period will be nil in 2019-20. The Corporate Systems opex is similar in that the project went live in April 2019 and ongoing opex associated with support & licencing requirements will be incurred post the implementation".

The ICT operational expenditure represents between 7% to 8% of total operating expenditure allocated to Greater Sydney. We have carried out some benchmarking analysis of this expenditure, which is discussed under 5.6.3 Corporate expenditure and allocation.

5.4.4. Catchment management

WaterNSW has a requirement under the WNSW Act to undertake certain catchment management activities from 1st January 2015. The organisation's responsibilities relate to acting as a landowner, protecting special areas, being a landowner and managing the Shoalhaven scheme. Specific activities, with the related operating expenditure are shown in Table 5-6.

Table 5-6 Catchment management by activity and expenditure

CATCHMENT MANAGEMENT 2016 PERIOD BY ACTIVITY AND EXPENDITURE					
$m 2020 Year ending June	**2017**	**2018**	**2019**	**2020**	**Total**
CATCHMENT MANAGEMENT					
Source Water Protection	4.08	2.87	3.26	6.79	17.0
Land Management	17.98	16.05	14.65	15.62	64.3
Water Quality Science	1.46	0.97	1.01	1.88	5.3
Enforcement and Surveillance	0.27	0.45	0.34	0.86	1.9
Development Impact Assessment	4.26	3.04	2.53	2.54	12.4
Engaged Communities	1.25	1.26	0.57	1.02	4.1
TOTAL CATCHMENT MANAGEMENT					
Total	29.29	24.63	22.37	28.72	105.00

Source: WNSW opex GL, Atkins analysis

Source water protection

Work is carried out under the WaterNSW Act to manage and protect the declared catchment to promote good water quality. The objective of this program is to reduce the risk of point or diffuse pollution in the catchment area. There are three strands relates to grazing and erosion, urban stormwater and dairy effluent. These programs have been running over several years and prior to the formation of WaterNSW in 2015.

Some 38% of the catchment is used for extensive grazing. The activity is to improve fencing of streams, repair erosion and improve grazing practice. Some 94% of urban pollution, mainly nitrogen and phosphorus come from four urban centres in the catchment. The program is to work with local councils to reduce the risk of uncontrolled continuous and intermittent (stormwater) discharges into the catchment. There are 21 dairies with a total 4000 cows in the designated catchment area. The pollution load is equivalent to a 160,000 population. WaterNSW is working with farmers to reduce the risk of pollution Solutions are management of effluent collection and treatment, fencing off waterways and control polluted run-off from lanes.

While the outcome of this work represents good practice, we did not see any information to evaluate the benefits of these programs. Expenditure in 2019/20 is to include a catchment audit estimated to be $1.57m. Discounting this activity, expenditure in 2020 appears high. Average expenditure over the period is $3.9m/a

Expenditure excludes the Catchment Decision Support System (CDSS) although $2.6m is included in the 2020 Determination period.

Land management

This activity forms the largest element of catchment management. This includes biosecurity, fire risk management, recreation management. catchment enforcement and reserve management on land owned by WaterNSW. Fire risk management comprises mitigation, suppression and fire trail maintenance. Biosecurity activities are aimed to minimise weed and pest infiltration and reduce wild pig and deer in the catchment, with the objective of minimising the impact on water quality. This is an ongoing program over several years. This activity has the highest level of operating expenditure showing a relatively even profile over the period.

Water quality science

There is an ongoing water quality program to meet the obligations under the WNSW Act. In addition. there is a new licence requirement to undertake water quality science programs. Expenditure has been low through the period due to low staffing levels.

Enforcement and Surveillance

There is a small team who control entry into restricted areas and monitor any illegal entry for nefarious activities. This is carried out by a small team and expenditure is relatively low but increases as corporate costs are apportioned.

Development impact assessment

There are three strands of activity: catchment protection planning, catchment assessments and mining. The catchment protection planning function provides land use planning advice to DPE and councils and provides advice on planning consent applications. Catchment assessments focuses on water quality protection in the Sydney catchment area and influences local councils, state and federal agencies w a focus on protecting water quality and quality. Mining in the catchment is a high risk to the catchment. There are two operating mines in the WNSW Special Area; mining proposals are examined, and their impact assessed. Supervision is carried out to ensure that the impact of mining is minimised consistent with approvals. Expenditure shows a reducing trend through the period.

5.4.5. Dam Safety

Dam safety expenditure comprises direct expenditure and site security expenditure Specific activities and related expenditure is shown in Table 5-7.

Table 5-7 Dam safety activity and expenditure

DAM SAFETY 2016 PERIOD BY ACTIVITY AND EXPENDITURE					
$m 2020 Year ending June	2017	2018	2019	2020	Total
DAM SAFETY					
Portfolio Risk Assessment (PRA)	0.45	1.87	2.19	0.00	4.51
Follow up PRA	0.00	0.00	0.00	1.50	1.50
Core Surveillance activities	2.59	2.25	1.17	2.05	8.07
Compliance Other	3.90	1.17	0.29	1.46	6.83
Sub-total Dam Safety	6.95	5.30	3.65	5.02	20.91
SITE SECURITY					
Site Security	0.00	1.22	1.22	3.40	5.84
SITE SECURITY					
Total Dam Safety and Security	6.95	6.52	4.87	8.42	26.76

Source: WNSW dam safety costs

WaterNSW has a significant asset base with 21 storage dams in the Greater Sydney business. All dams are subject to regulation by the Dams Safety Committee. New regulatory requirements are being implemented and

are likely to take effect later in 2019. This will bring a change in approach to dam safety, moving to a risk-based approach. A separate section was established to manage the whole dam safety program including surveillance, PRA and follow-up work on assets at risk and other compliance work. There is a team of 33 people engaged in dam safety, surveillance, engineering and geospatial technology. Expenditure excluding the PRA assessments has been an average $4.1m/a over the period. The PRA expenditure has been capitalised.

Portfolio Risk Assessment

Thee PRA work was identified in the 2016 Determination when an allowance of $4.4m (2020 price base) was made. This work was completed in 2019 for a similar expenditure as the allowance. The results of the PRA analysis were to increase the 'Extreme' and 'High' risk categories from 40% to 70%. The output from the PRA provides the basis for future investment in investigations, studies, and some risk reduction work to ensure that the inherent risks remain within acceptable limits.

The NSW Dam Safety Committee (DSC) and the new regulations about to be implemented requires that a risk assessment is carried out every 10 to 15 years. WaterNSW has therefore defined this work as periodic dam safety review with a finite life of ten years.

The PRA was assumed to be an operational activity but was not consistent with other similar risk reviews and inspections. WaterNSW has therefore capitalised all expenditure for this work in 2019 for all costs up to this date and will be applied in the future.

Site security

This activity is to provide security at 24 sites in the Greater Sydney area. Work is outsourced to contractors. The previous contract had come to an end and WaterNSW sought tenders from the market to continue this work. In 2017 site security costs were allocated to an overhead. Changes in accounting systems and chart of accounts has led to more accurate costs from 2018. The step increase in 2019 was as a result of additional costs at the Bendeela site following a fatality.

5.4.6. Water delivery and other operations

Water delivery includes bulk supply operations, system modelling, water flow and quality monitoring and associated licence feed. Expenditure is shown in Table 5-8.

Table 5-8 Water delivery by activity and expenditure

WATER OPERATIONS 2016 PERIOD BY ACTIVITY AND EXPENDITURE					
$m 2020 Year ending June	**2017**	**2018**	**2019**	**2020**	**Total**
WATER OPERATIONS					
Operations	6.24	4.45	4.78	3.64	19.12
Modelling	2.98	4.34	5.51	3.82	16.65
Monitoring	11.56	8.71	11.91	11.35	43.53
Licences/ Fees	3.47	3.44	3.59	3.89	14.39
Total base operations	24.25	20.95	25.80	22.70	93.69
ADDIITONAL MONITORING					
Additional Monitoring	0.00	0.00	0.00	0.00	0.00
METROWATER and DROUGHT PLANS					
Additional for Drought Plans	0.00	0.00	0.73	3.22	3.94
Shoalhaven					
Shoalhaven overheads	0.00	0.00	2.95	0.00	2.95
TOTAL WATER OPERATIONS					
Total	24.25	20.95	29.47	25.91	100.58

Source: WNSW financial system and submission

Fish river

Water operations include operation of the Fish River scheme where costs for 2018 to 2019 are based on the 2017 IPART Determination for the rural valleys and are lower than 2017.

Modelling

Activities include special data management and implementation, water data systems and modelling, water supply system yield review and long-term system planning. The catchment management support system and climate change activities are also included

Monitoring

Activities include routine and non-routine water quality sampling and testing, and flow monitoring. Field services are outsourced.

Drought Plans

Additional expenditure is reported for activities on the drought plans carried out at the request of Government.

Shoalhaven

Expenditure reported for Shoalhaven represents the corporate and support costs allocated to Shoalhaven but not included in the separate Determination Water Operations. WaterNSW explained that this was shown for transparency. If not applied to Shoalhaven the corporate costs would be allocated over a smaller activity cost base.

We comment further on current and future period expenditure in Section 5.5.5.

5.4.7. Maintenance

This activity is for the proactive and reactive maintenance of operational assets across the business. Expenditure through the 2016 Determination period shows a reducing trend from $26.6m in 2017 to $19.6m in 2019 followed by a forecast increase in 2020 to $ 24.3m. WaterNSW explained that:

> *through 2017 the high cost of outsource maintenance was ramping down as the new organisation structure implementation commenced. Maintenance spend declined over 2018 and 2019 due to insourced maintenance being delivered at lower cost and some staff vacancies were progressively filled in 2018 and 2019.*

WaterNSW undertook a condition assessment of all its water asset portfolio through 2017 and 2018 to establish their condition. This program identified a significant quantity of deteriorated assets and an increasing list of corrective maintenance tasks and renewal projects to recover asset condition. While WaterNSW refers these as 'new corrective works not previously identified' we consider this to be a 'backlog'. These works should have been identified if effective asset management had been carried out.

WaterNSW further stated that:

> *It has since become clear that the preventative maintenance plan carried over from the former Sydney Catchment Authority (SCA) had been previously reduced at the commencement of the outsourcing to allow this approach to be adopted within budget constraint. This had involved the removal of a significant quantity of lower criticality preventative maintenance tasks.*

During 2018 the preventative maintenance plan was reviewed and updated across the businesses to standardise planned maintenance. This process resulted in many maintenance tasks previously removed from the former SCA program being reinstated. Implementation of the updated maintenance program was delayed 12 months because of the late implementation of CIMS (the ERP software suite); this was operational in April 2019.

WaterNSW added that:

> *At the commencement of year 2020 the new preventative maintenance plan is underway; a strengthened maintenance team is in place with recruitment continuing and a separate 'backlog' team being implemented.*

Maintenance expenditure is forecast to increase significantly over 2020 in comparison with previous years. WaterNSW forecast that it aims to complete most of the 'backlog' activity within the 2016 Determination period.

The number of corrective and preventative work orders is summarised in Table 5-9 below.

Table 5-9 Corrective and preventative work orders

WATERNSW OPERATING EXPENDITURE MAINTENANCE WORK ORDERS				
Year ending June	2017	2018	2019	2020
WORK ORDERS				
Corrective (Unplanned)	530	798	507	no data
Percentage corrective	8%	12%	7%	
Preventive (Planned)	6414	6065	6813	no data
Percentage corrective	92%	88%	93%	
Total work orders	6944	6863	7320	no data
Total maintenance expenditure	26.64	22.47	23.13	24.29

Source: WNSW response to 69

We noted an increase in maintenance work orders in 2019 which WaterNSW explains is to address the 'backlog' in maintenance in earlier years. Maintenance expenditure is reported by reactive and preventive activities in Table 5-10. This includes actual expenditure in 2019 which was an increase in the forecast for that year.

Table 5-10 Maintenance expenditure

MAINTENANCE 2016 PERIOD BY ACTIVITY AND EXPENDITURE					
$m 2020 Year ending June	**2017**	**2018**	**2019**	**2020**	**Total**
MAINTENANCE					
Planned	21.15	18.04	16.24	18.87	74.30
Reactive	5.49	4.36	6.89	5.42	22.16
TOTAL EXPENDITURE					
Total	26.64	22.40	23.13	24.29	96.46

Source: WNSW financial system and submission

5.4.8. Environmental Planning and protection

Expenditure comprises minor activities at Tallowa Dam in 2017 to 2019 and a start to the land management work to address contaminated land and hazardous building materials forecast in 2019 and 2020 at $2.7m. A project is planned for the 2020 Determination period to include capital work and operating expenditure. A list of potential sites is being prepared.

5.4.9. Other activities

WaterNSW has included a range of activities and costs in 'Other' expenditure. Expenditure is summarised in Table 5-11.

Table 5-11 Other expenditure by activity

OTHER EXPENDITURE 2016 PERIOD BY ACTIVITY AND EXPENDITURE					
$m 2020 Year ending June	**2017**	**2018**	**2019**	**2020**	**Total**
OTHER EXPENDITURE					
Insurance	0.00	2.75	3.09	1.77	7.61
Land tax	0.14	1.99	3.11	2.06	7.30
Procurement	0.47	0.47	2.14	0.00	3.07
Minor expenditure	3.47	1.13	1.07	0.27	5.94
TOTAL OTHER EXPENDITURE					
Total	4.07	6.34	9.40	4.11	23.92

Source: WNSW financial system and submission

There appears to be an anomaly for year 2017 when costs may have been coded to other areas of the business. Both insurance and land tax should be included in corporate expenditure. There is a one-off expenditure for procurement which is now included in capital works. Some of the expenditure in 'minor' relates to the quality science program and has been misallocated. Our view is that all expenditures should be allocated to specific areas of work or corporate and an 'other' category should not be used. The high 'minor' expenditure in 2017 and 2018 is as a result of miscoding or mis-allocation from earlier financial accounting systems.

5.5. Efficient Expenditure in the 2016 Determination period

Efficient Expenditure

Our view of efficient expenditure in the 2016 Determination period is related to whether the performance to customers has been delivered and compliance has been achieved with the Licence requirements. We are not aware of any shortcomings in compliance or performance to customers

This is the first four-year Determination period following the formation of WaterNSW. Restructuring of the business continued into the first two years of the period with building of new teams and staff. However, the main operating functions of the Greater Sydney business were generally unchanged and there has been continuity from the previous Sydney Catchment Authority for many of the staff.

Where WaterNSW has changed its capitalisation rules during the period there is a risk that expenditure may be double counted for regulatory analysis. While there may be good reason to change the capitalisation policy, we need to compare expenditure using the rules applied when the Determination was made. To avoid double counting this amount both in operating and the RAB for the 2016 period, we have applied a prudent approach and reversing capital expenditure by the same $25.9m, allocating $13.6m to 2019 and $12.3m in 2020. We discuss this in section 6.10.

Comparing expenditure using the rules in place when the Determination was made shows that operating expenditure was $19.8m below the Determination.

WaterNSW has changed the method of apportioning corporate and support costs to its businesses. It uses TOTEX from 2018 compared with the allocation assumed at the Determination. The impact is a $6.8m reduction in operating expenditure allocated to the Greater Sydney business. The net variance is then reduced to $13.1m.

WaterNSW has not made any claim for Efficiency Carryover Mechanism.

Operating expenditure is reported by activity with the largest expenditures for water operations, maintenance and catchment management. The 2016 Determination and supporting reports did not disaggregate expenditures by these activities so variances with actual expenditure are not possible. In addition, the financial management system, with some differences in the chart of accounts, has changed through the period which questions the ability for any variance analysis.

We have noted some areas of the business where WaterNSW could be more efficient:

- Maintenance: there was a backlog in preventative maintenance work in the first part of the 2016 Determination period which the business has recognised and is seeking to resolve. While WaterNSW attributes this to the outsourcing of maintenance by the previous SCA, the backlog is indicative of ineffective asset management. The impact of the backlog is to defer some maintenance into the 2020 Determination period;
- Site security: a new security contract with changed scope was in place in 2019 at additional cost. We questioned whether a more cost-effective solution could be used applying existing and new technology
- Catchment management: the various activities are carried out under established legislation aimed at protecting the catchment and reducing the risk of point or diffuse pollution and other impacts on water quality in the catchment. They have good intentions and clear local objectives. At catchment level, the requirements are generally expressed in qualitative terms. It is therefore difficult to determine what activities may be efficient or over-provided. We suggest that all these activities should be subject to risk assessment methodology to determine what benefits are delivered in terms of risk reduction, whether significant or have no material impact, using some form of sliding scale, and compare against the business risk thresholds;

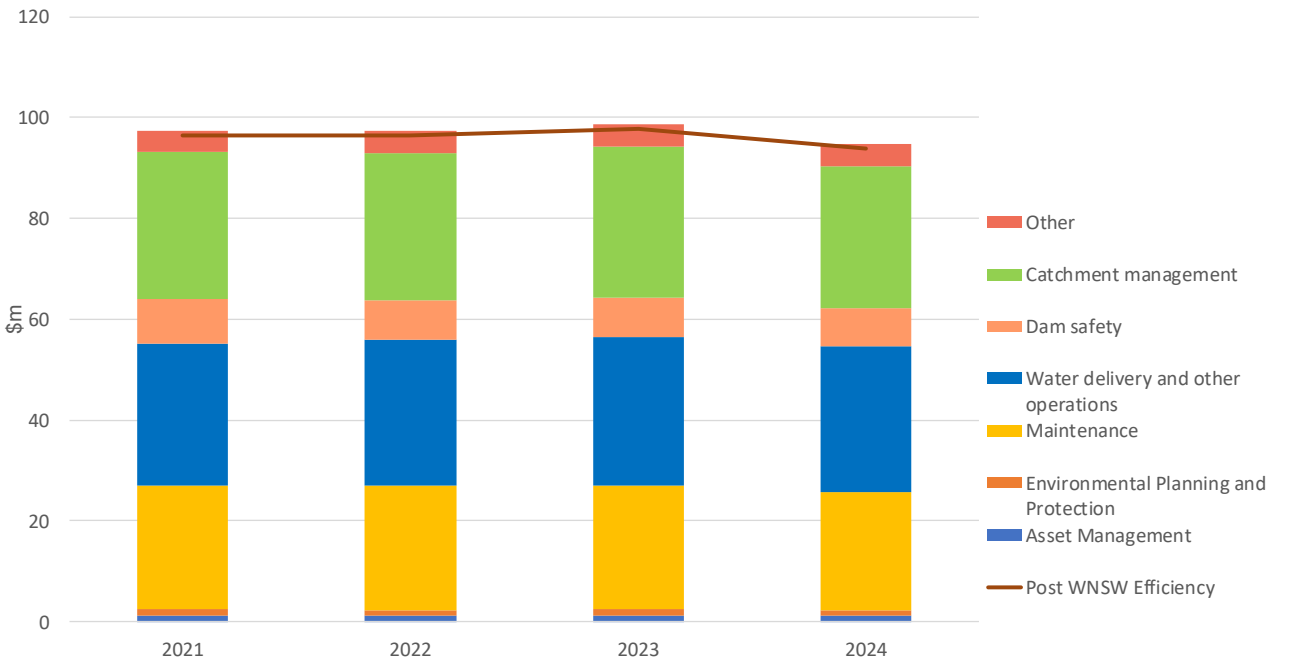
- Water operations: these costs are directly related to the supply function. Because of the nature of the supply arrangements, these costs are not sensitive to changes in the volume of raw water delivered. In average years, operations are straightforward. In a period of drought and reducing reservoir levels operational monitoring is important to manage flows and assess water quality. In an open market we would expect a utility to recover fixed and volumetric costs;
- Drought expenditure: there is some drought expenditure in 2019 and 2020 for planning activities to support the Metro Water Plan. Additional expenditure is reported for activities on the drought plans carried out at the request of Government.
- Fixed and variable costs: nearly all of WaterNSW operating expenditure is generally independent of the volume of water delivered. Volumetric sales currently represent 20% of the total invoice to Sydney Water. There is little incentive for the business to increase supply to generate additional sales or to reduce costs as sales of water reduce.

We did not see evidence in the current price period that efficiencies are being encouraged across the business, are monitored and delivered. While it is difficult for us to confirm that all expenditure in the 2016 Determination period is efficient, the business structure provides a good basis for delivery of efficiencies in the 2020 period.

5.6. Operating Expenditure in the 2020 Determination period

5.6.1. Summary

WaterNSW has proposed operating expenditure for the period 2021 to 2025 by operating area as shown in Figure 5-2 and Table 5-12 below. These expenditures include allowances for corporate overheads allocated as set out in Section 5.5.3.



Source: WNSW Submission

Figure 5-2 Operating Expenditure in the 2020 Determination period by activity

The expenditure profile shows an even profile for the period 2021 to 2023 then reductions in 2024 and 2025. Total expenditure over the period is a net $22.0m above actual expenditure in the 2016 Determination period; this is equivalent to an increase of 6.1%. This includes a 1% efficiency proposed by WaterNSW and applied across all years; the net expenditure is show as a brown line in Figure 5-2 above. Table 5-12 below shows the expenditure forecasts for each operational area.

Table 5-12 Proposed expenditure for the 2020 period

WATERNSW EFFICIENT LEVEL OF OPERATING EXPENDITURE					
($m 2019/20) year ending June	**2021**	**2022**	**2023**	**2024**	**Total 2021 to 2024**
WATER NSW PROPOSED EXPENDITURE					
Catchment management	29.2	29.2	30.2	28.2	116.8
Dam safety	8.8	7.9	7.9	7.5	32.1
Water delivery and other operations	28.0	28.9	29.3	29.1	115.3
Maintenance	24.7	24.6	24.6	23.5	97.3
Environmental Planning and Protection	1.1	1.0	1.1	0.9	4.1
Asset Management	1.3	1.3	1.3	1.3	5.2
Other	4.4	4.4	4.4	4.3	17.6
PRE EFFICIENCY OPERATING EXPENDITURE					
Total	97.48	97.37	98.77	94.69	388.32
WATER NSWPROPOSED EFFICIENCY					
Total	-0.97	-0.97	-0.99	-0.95	-3.9
WATER NSW EFFICIENT PROPOSED EXPENDITURE					
Total	96.51	96.40	97.78	93.75	384.44

Source: WNSW SIR

Both Catchment Management and Water Delivery activities show a significant increase on the 2016 period expenditure. 'Other' expenditure shows a material reduction. While lower expenditure increases are reported for dam safety and environmental planning, the percentage increases are significant.

We discuss the reason for these variances and comment on their justification in the following sections.

5.6.2. Efficiency

WaterNSW has applied a 1% efficiency to the total operating expenditure in all four years. We have sought to benchmark WaterNSW's performance against bulk water supply comparators with limited success as the nature and operating environment of managed catchments is non-homogeneous. However, corporate and support activities are similar in scope across utilities. We have therefore compared expenditure for corporate and support as a proportion of total operating expenditure across utilities in New South Wales. We comment in Section 5.6.3. below.

5.6.3. Corporate expenditure and allocation

WaterNSW reports on its corporate expenditure in six functions as shown in Table 5-13 below. We do not have a dis-aggregation of expenditure for 2025 so have limited our analysis to the four years 2021 to 2024.

Table 5-13 Corporate and support expenditure by operational activity

CORPORATE EXPENDITURE 2020 PERIOD BY ACTIVITY AND EXPENDITURE					
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**
SUPPORT COSTS					
Customer and community	2.28	2.39	2.49	2.09	9.25
Safety, people and performance	3.62	3.70	3.83	3.17	14.3
Legal and governance	3.36	3.52	3.60	2.99	13.5
Business systems and information	7.80	8.35	8.69	7.79	32.6
Finance and commercial services	3.82	3.87	4.07	3.48	15.2
Executive team	2.32	2.34	2.44	2.07	9.2
SUB TOTAL SUPPORT COSTS					
Total	23.20	24.17	25.11	21.58	94.07
OPERATIONAL ALLOCATED COSTS					
Allocated costs	7.45	7.45	7.57	7.52	29.99
ALLOCATION OF TOTAL SUPPORT COSTS TO GREATER SYDNEY					
Total support costs	30.65	31.62	32.68	29.10	124.06
Allocation (%)	63.0	66.0	67.0	57.0	63.3
Proportion support/ total opex (%)	31.8	32.8	33.4	31.0	32.3

Source: WNSW submission Table 6.6

The expenditure shown is a proportion of the total corporate expenditure which is apportioned across all businesses: Greater Sydney, Rural Water Supply and WAMC. This apportionment is based on the proportion of totex in each business. This analysis of support to total costs adds to our view of catch-up efficiency rather than any specific adjustment.

This results in corporate expenditure for Greater Sydney being an average 32.3% of the total operating expenditure. This appears to be relatively high when compared with other utilities. For example, Central Coast (2019) was 20% and Sydney Water (2019) around 25% of total operating expenditure. When allowing for the reallocation of customer service costs, see below, this percentage is just below 30%. While we accept that Central Coast's business differs in part from WNSW, the comparison with Sydney Water is appropriate. The business structure was established on the merger of Sydney Catchment Authority and State Water Corporation From our review of the business and structures, and comparisons with frontier company structures, we found there is scope, over time, to further rationalise the business structure to more closely focus on its primary activities and deliver efficiencies. For example, the organisations structure shows nine executive director reports to the chief executive officer which is higher than we see in other water utilities and similar organisation structures. For example, Sydney Water has six executive directors reporting to the CEO.

We question whether Customer and Community expenditure should be included within corporate expenditure as management of customers is normally considered as an operational activity. This expenditure should be apportioned on an activity cost basis. Activities include customer relations, billing and dealing with complaints. The greater number of customers is in the rural water business with Greater Sydney having only four customers; one being Sydney Water. We noted that Sydney Water considers its customer service cost as an operational expenditure. We suggest these costs are excluded from the corporate expenditure and a customer operations line included separately. The impact of this adjustment is shown in Table 5-14 below.

In Section 5.3.9 we suggested that insurances and land tax were corporate expenditures and should be included in the analysis. We have included these costs in Table 5-14 below. WaterNSW commented that insurances and land tax should be excluded from the corporate expenditure analysis as it considers them to be operational in nature. Our view is that these costs were reported as 'other' expenditure and not allocated to operational functions. Our view is that these costs are corporate expenditures. For effective comparisons we have retained these costs in our analysis.

Table 5-14 Adjustment of corporate expenditure for customer operations

CORPORATE EXPENDITURE: 2020 PERIOD BY ACTIVITY AND EXPENDITURE					
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**
ADJUSTMENT TO CORPORATE COSTS FOR CUSTOMER OPERATIONS					
Total support costs	30.65	31.62	32.68	29.10	124.06
Deduct Customer and Community	-2.28	-2.39	-2.49	-2.09	-9.25
Add insurance	2.13	2.14	2.15	2.11	8.54
Add land tax	2.06	2.07	2.07	2.04	8.25
ADJUSTED SUPPORT COSTS					
Adjusted support costs	32.57	33.45	34.42	31.16	131.59
PROPORTION OF SUPPORT COSTS					
Proportion support/ total opex (%)	33.41	34.35	34.85	32.91	33.89

Source: WNSW spreadsheet and Atkins analysis

We have allocated customer and community costs directly to the Greater Sydney and Rural Valleys businesses.is shown in

Table 5-15 below. We have derived total customer and community costs and then apportioned to each business with 25% to Greater Sydney and 75% to the Rural Valleys business. The net impact is to reduce Greater Sydney corporate costs by $5.6m for the four years to 2024. We have insufficient data to carry out this analysis for 2025. WaterNSW commented that the proportion of customer and community costs is low compared with the number of customers it serves: Sydney Water, four local councils and 60 'minor' customers. We have increased the proportion of costs to 30% which only makes a marginal difference to our analysis. It would be helpful if WaterNSW allocates its customer service time and costs to each business.

Table 5-15 Adjustment of corporate expenditure

CORPORATE EXPENDITURE 2020 PERIOD BY CORPORATE AND SUPPORT					
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**
ALLOCATION OF CUSTOMER AND COMMUNITY COSTS					
Customer cost to Greater Sydney	2.28	2.39	2.49	2.09	9.25
Allocation to Greater Sydney (%)	63.0	66.0	67.0	57.0	
Gross customer costs to all businesses	3.62	3.62	3.71	3.67	14.62
Allocate 25-30% to Greater Sydney	0.90	0.90	0.93	0.92	3.65
Adjustment to GS costs	-1.19	-1.30	-1.37	-0.99	-4.86

Source: Atkins analysis

Business systems and information

This line of expenditure is equivalent to the Information, Communications and Technology heading under Capital Expenditure. A breakdown for the future price path for the total ICT operational expenditure is captured below, as well as a summary of the changes between the two price paths.

Evidence presented to us suggests that budget holders are focused on and appear to have a strong handle on ICT capital expenditure, but the same focus was not evident on ICT operational expenditure. This observation applies to both the current and future price paths. This indicates that there is scope for further efficiencies, which is reflected in 5.7.1 Scope for efficiency savings.

Table 5-16 Total ICT operational costs for WaterNSW

WATERNSW ACTUAL EXPENDITURE ICT (pre-allocation, pre-capitalisation					
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**
2020 DETERMINATION PERIOD PROPOSALS					
Administration – Overheads	1.48	1.40	1.40	1.40	5.69
Analytics Programme	0.37	0.29	0.23	0.18	1.07
Corporate Systems Program	0.00	0.50	0.50	1.40	2.40
ICT Business Process Automation programme	0.09	0.09	0.08	0.08	0.34
ICT Data Centre	1.28	1.28	1.28	1.28	5.10
ICT EUC & Collaboration	0.18	0.18	0.33	0.18	0.87
ICT Renewals and Replacement	1.68	1.68	1.68	1.68	6.73
Information Technology Support	11.63	11.77	11.82	12.70	47.92
Operational Systems programme	0.00	0.00	0.00	0.00	0.00
Organizational Development	0.00	0.00	0.00	0.00	0.00
Training OH&S	0.00	0.00	0.00	0.00	0.00
Training Technical	0.19	0.19	0.19	0.19	0.75
Ungrouped	0.00	0.00	0.00	0.00	0.00
Water Marketing Systems programme	0.00	0.00	0.00	0.00	0.00
SUB TOTAL ICT COSTS					
Sub-total	16.90	17.38	17.51	19.08	70.87
GREATER SYDNEY SPECIFIC COSTS					
Total	0.63	0.65	0.65	0.65	2.57
TOTAL ICT					
Total	17.52	18.03	18.16	19.73	73.45

Source: WaterNSW RFI response 189

Table 5-17 Changes in ICT operational costs between price paths

WATERNSW ACTUAL EXPENDITURE ICT (pre-allocation, pre-capitalisation			
$m 2020 Year ending June	**2017-2020**	**2021 - 2024**	Variance
2016 DETERMINATION			
Administration - Overheads	10.41	5.69	-45%
Analytics Programme	0.47	1.07	127%
Corporate Systems Program	3.81	2.40	-37%
ICT Business Process Automation programme	0.33	0.34	3%
ICT Data Centre	0.36	5.10	1312%
ICT EUC & Collaboration	0.87	0.87	0%
ICT Renewals and Replacement	3.95	6.73	70%
Information Technology Support	38.02	47.92	26%
Operational Systems programme	0.01	0.00	-100%
Organizational Development	0.06	0.00	-94%
Training OH&S	0.02	0.00	-89%
Training Technical	0.53	0.75	41%
Ungrouped	3.61	0.00	-100%
Water Marketing Systems programme	0.04	0.00	-100%
SUB TOTAL ICT COSTS			
Sub-total	62.50	70.87	13%
GREATER SYDNEY SPECIFIC COSTS			
Greater Sydney specific ICT costs	1.34	2.57	93%
TOTAL ICT			
Total	63.84	73.45	15%

Source: Atkins/Cando analysis of WaterNSW RFI response 189)

The major variances are due to:

- Administration Overheads ($5.6m) - The reduction in expenditure in the next price path reflects the improvement in direct costing to ICT projects rather than an efficiency;
- Data Centre ($5.1m) – There is a $4.7m increase in costs or 1,312% however we understand that prior opex spend on the Data Centre was not an accurate reflection of the true support costs. A portion of those costs were coded to the Information Technology Support area. In addition, there has been a conscious decision to minimise Data Centre costs leading up to the replacement project, which is due to be delivered by 2021. The ~$1.3m per year from 2021 reflects the annual costs for software, maintenance and subscriptions and internal staff costs opex of the new data centre solution. In WaterNSW's assessment this ". represents the lowest ongoing costs option which minimises cloud costs and optimises and automates ICT Infrastructure services.". Based on evidence presented to us by both WaterNSW and Sydney Water, we would concur that this represents a best value solution;
- Information Technology Support ($48m) – This budget line is for operational costs and support for ICT infrastructure, applications and networks including a large component for salaries for support staff ~$3m, telecommunications costs ~$4m, external level 3 support and health checks ~$820k as well as administration costs (e.g. $500k i.e. Rent, postage, travel, and printing. However, we do not have good visibility on why there is a $10m increase in costs in the future price path;
- ICT Renewals and Replacement ($6.7m) - These costs cover a large number of annual software maintenance and support agreements. The significant increase can be traced back to the last year of

the current price path, although in WaterNSW's explanation, they stated that "…The increase from prior period reflects the expected annual increment applied by software vendors as well as ongoing operational annual license costs for software initially implemented in the prior period (with that implementation capitalised).

The ICT operational expenditure represents 7.9% of total operational expenditure across the future price path. While there is a 13% increase at company level with a significant increase in 2023/24, this does not appear to be reflected in the ICT opex expenditure allocated to the Greater Sydney price control; we are not sure why this is the case. The Greater Sydney ICT expenditure is reasonably stable, between 7.6% and 8.4%, over the forecast years.

We have also benchmarked WaterNSW against other water utilities although we recognise there are limits to the analysis as we may not be comparing like for like and different companies are at different levels of maturity. IT expenditure for WaterNSW is an average 7.9% of operating expenditure over the 2016 and 2020 periods compared with Sydney Water at 7.2% and a mean of six Australian utilities with 6.6% (Source: IPART review of Sydney Water and confidential analysis). This places WaterNSW above the average at the upper end of the scale.

For the next price path, we acknowledge there is a global trend for ICT opex to be increasing, for example due to the shift to the Cloud and adopting Software as a Service (SaaS)[14], but WaterNSW is in the early days in this shift. Coupled with our observations on WaterNSW's focus on ICT capital expenditure in its plan and presentations, this further supports our conclusions on the potential for efficiencies in the future price path. However, the benchmarking has only been used for illustrative purposes, and the difference between the average has not fed directly into the efficiencies applied.

5.6.4. Catchment management

Catchment management expenditure is summarised in Table 5-18. The annual expenditure profile is shown for each activity and in total. The increase in total expenditure over the 2020 Determination period compared with the 2016 period is shown for each activity. Year 2015 is not shown as we do not have the disaggregated expenditure by sub-activity. We discuss below the reasons for the increase.

Table 5-18 Catchment management forecast expenditure

CATCHMENT MANAGEMENT 2020 PERIOD BY ACTIVITY AND EXPENDITURE						
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**	**> 2016 period**
CATCHMENT MANAGEMENT						
Source Water Protection	5.26	4.76	5.60	4.47	20.09	3.11
Land Management	16.99	17.26	17.21	16.64	68.1	3.78
Water Quality Science	2.37	2.52	2.62	2.50	10.0	4.68
Enforcement and Surveillance	0.87	0.90	0.90	0.87	3.5	1.61
Development Impact Assessment	2.61	2.62	2.67	2.61	10.5	-1.86
Engaged Communities	1.12	1.14	1.15	1.11	4.5	0.42
TOTAL CATCHMENT MANAGEMENT						
Total	29.22	29.19	30.15	28.19	116.75	11.74

Source: WNSW Spreadsheet

[14] Software as a Service (SaaS) is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. It is also referred to as "on-demand software", "web-based software" or "hosted software". SaaS is typically accessed by users using a thin client, e.g. via a web browser. SaaS has become a common delivery model for many business applications, including office, messaging, management, CAD, customer relationship management (CRM) and even enterprise resource planning (ERP) software.

Source water protection
An additional $3.11m (18%) increase is due in part to the $1.50m increase in expenditure on the grazing and erosion program following the drought. This expenditure is in the form of grants to farmers. We understand that the business case for this additional expenditure has yet to be approved.

In addition, the Catchment Decision Support System (CDSS) and climate change research costs has been included for the 2020 Determination period when allocated in Water Operations in the previous period.

WaterNSW commented that

> *[the] grazing properties and erosion are the top two water quality risks identified in the Pollution Source Assessment Tool and are the dominant risks for pathogens and sediment across the declared catchment.*

We have accepted the comments made by WaterNSW to enhance activity in this area of activity, there is still an opportunity to review and focus the source protection program to deliver clear benefits. To avoid double counting with catch-up efficiencies, we have not made any adjustment to these costs.

Our view is that the justification for increases in the source protection programs has not been made; we suggest an efficient level of expenditure is $18.6m, a $1.5m reduction on current proposals.

Land Management
This activity shows a net $3.78m increase above the 2016 period. This is due in part to an increase in fire risk management and a reduction in Reserve Management expenditure.

WaterNSW has outsourced its fire risk management activities to the Rural Fire Service (RFS). WaterNSW has assessed the costs of maintaining an in-house capability with the outsourcing option. The latter has the advantage of providing the skills and resources necessary for this activity. WaterNSW reports an increase in firefighting costs above the 2016 period for both an in-house and outsourcing option. The outsourcing to the RFS represents a $3.0m increase in expenditure However the estimates do not appear to offset the likely savings of in-house costs; in addition, the contingency applied appears to be high. We propose that an efficient level of expenditure is an additional $1.5m, half the contract value, and WaterNSW should look to absorb a proportion of the RFS additional costs through a reduction of in-house activities and reduce the level of contingency applied.

Water quality science
WaterNSW proposes an increase of $4.68m (86%) above the current program expenditure. We note that the 2016 period expenditure has been low and below planned levels due to resourcing. The proposed program includes a wide range of initiatives which have yet to be subject to the internal business plan process. In addition, we question whether there are sufficient resources available for the level of expenditure proposed. Our view is that an efficient and achievable level of expenditure is $2.0m/a which is a 50% increase on the average 2016 period expenditure and reflects the need to meet new Operating Licence requirements.

Enforcement and surveillance
There is $1.6m increase in operating expenditure which WaterNSW explains as a reallocation of labour costs previously in projects overheads.

5.6.5. Water delivery and other operations

Water delivery expenditure is summarised in Table 5-19. The annual expenditure profile is shown for each activity and in total. Year 2025 is not shown as we do not have the disaggregated expenditure by sub-activity. The increase in total expenditure over the 2020 Determination period compared with the 2016 period is shown.

Table 5-19 Water operations forecast expenditure

WATER OPERATIONS 2020 PERIOD BY ACTIVITY AND EXPENDITURE						
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**	**> 2016 period**
WATER OPERATIONS						
Operations	3.82	3.86	3.76	3.78	15.22	-3.91
Modelling	3.66	3.77	3.81	3.60	14.8	-1.82
Monitoring	13.48	14.17	14.61	14.12	56.4	12.85
Licences/ Fees	4.06	4.07	4.08	4.10	16.3	1.93
Total base operations	25.03	25.86	26.26	25.59	102.74	9.05
ADDIITONAL MONITORING						
Additional Monitoring	1.77	1.81	1.83	1.76	7.17	7.17
METROWATER and DROUGHT PLANS						
Additional Expenditure	1.20	1.22	1.25	1.71	5.37	1.43
TOTAL WATER OPERATIONS						
Total	27.99	28.90	29.34	29.06	115.28	17.65

Source: WNSW spreadsheet

The activities showing significant increases in operating expenditure are

- Monitoring;
- Additional monitoring at the request of Sydney Water; and
- Drought plan expenditure.

and a reduction in Operations expenditure. Any costs related to the Shoalhaven project are covered in a separate cost recovery arrangement so are excluded from this analysis.

Operations

The impact of the Rural Water Supply Determination in 2017 was to reduce the Fish River transfer costs by $1.5m when comparing the 2016 and 2020 Determination periods. The accounts for some of the $3.91m reduction in operations expenditure.

Monitoring

There is a proposed increase of $12.85m above the 2016 Determination period. WaterNSW explained that the 2016 period expenditure was lower than an average year due to drought conditions. For example, during drought conditions there are no significant inflows and non-routine sampling activity is reduced; this leads to a lower number of laboratory tests carried out. Flow monitoring of inflows and related field services is reduced. WaterNSW attributes these reduced activities to a $1m to $2m cost reduction in drought years. Given that drought did not occur over the full 2016 period, for example expenditure in 2017 was $11.56m, this does not fully account for the total increase in expenditure.

WaterNSW advised us at interview that it omitted $1.46m of monitoring expenditure which had been wrongly classified as capital. We accept this omission and take this into account in our assessment of future efficient expenditure.

We have made allowance for a reduction in sampling and testing activity during drought years in the 2016 Determination period, increasing costs to average year conditions. This leaves a significant variance of $10m which is unexplained.

In deriving an efficient level of expenditure, we have taken into account the ongoing level of monitoring costs in an average year. We have discounted year 2018, taken note of the impact of the drought on current period

expenditure and allowed for the under-reporting of some maintenance expenditure. We found the resulting monitoring expenditure has increased by some $8.7m in the 2020 period. We propose an efficient level of expenditure over the period of $52.9m, recognising some increase in monitoring activity above the current Determination period, resulting in an adjustment of $0.9m/a.

WaterNSW subsequently indicated that there are likely to be additional costs for monitoring the impact of mining in the catchment following a report from the Independent Expert Panel on mining. We understand that the additional costs will be met by mining interests and not be funded by customers.

Additional monitoring

Additional monitoring at $1.79m/a is included at the request of Sydney Water. This comprises a marginal increase of $1.15m plus an allocation of overheads of $0.64m. WaterNSW advised us that:

> *During the review of the RWSA, Sydney Water requested a material change to the Water Quality Monitoring Program. Sydney Water has identified, for each water filtration plant, additional monitoring which is intended to provide data that will enable Sydney Water to optimise the operations of its water filtrations plants. As this additional monitoring increases the frequency of sampling or range of analyses for a number of locations in WaterNSW lakes near the offtakes, or in WaterNSW delivery infrastructure,*

It further advised that:

> *Sydney Water has requested WaterNSW undertake the monitoring as this represents the most efficient way to gather the additional data. WaterNSW understands that Sydney Water has assessed that the resultant efficiencies in filtration plant operations will exceed the cost of the additional monitoring, resulting in lower costs to Sydney Water's customers, as outlined in Sydney Water's pricing proposal. WaterNSW and Sydney Water have agreed that the additional monitoring is subject to the cost being included by IPART in the WaterNSW's next pricing Determination.*

WaterNSW subsequently provided detailed sampling programs for the seven systems being monitored: Nepean, Illawara. Woronora, Macarthur, Cascade, Orchard Hills/ Woronora and Prospect. For each system, raw water samples are taken at defined locations and frequency. The programs identify which parameters are to be tested by WaterNSW and/or Sydney Water and the defined sampling frequency. The changes requested by Sydney Water are identified for each parameter. The main changes relate to increasing frequency of sampling from monthly to weekly in the Macarthur, Cascade and Prospect systems.

We noted from the sampling program that some of the sites were sampled and tested by both Sydney Water and WaterNSW. In addition, we asked to what extent WaterNSW was able to include this additional sampling and testing within its current program given that the annual costs have increased from the 2016 period. WaterNSW commented that synergies had considered and only the incremental costs have been proposed. It commented further that

> *The monitoring locations for WaterNSW are from the lakes (i.e. from a boat). The sampling locations for Sydney Water are generally from a pipe downstream of the lake, at the inlet to their water filtration plant. We note that these are not at the same location and therefore the logistics of taking samples are quite different.*

We have reviewed the sampling program again and in particular the sites where sampling is carried out by both Sydney Water and WaterNSW. The locations of the joint sampling points are immediately upstream of water filtration plants and not within lakes. There is no additional information provided by WaterNSW to change our view. We accept the need for monitoring of the new source at Duckmaloi Weir and have made an adjustment to our proposals.

In summary, we found that the additional monitoring for the defined parameters identified in the monitoring program was reasonable although we question why both Sydney Water and WaterNSW sample and test weekly for a range of parameters at each works inlet. It would appear more efficient to have one utility sample and test at these locations and use the resources to undertake the additional sampling and testing identified.

We consider that the level of savings would be sufficient to include the additional sampling identified in the programs. On this basis there is no requirement for additional expenditure.

In addition, we have not seen any information from WaterNSW or Sydney Water to demonstrate that the resultant efficiencies in filtration plant operations from additional monitoring will exceed the cost of these activities, and that these savings will be passed to Sydney Water's customers.

WaterNSW commented that these monitoring costs include an element of overhead expenditure distributed across direct expenditures which would need to be reallocated. We accept this comment and have amended the adjustment.

Metropolitan Water Plan

WaterNSW has included $5.37m additional expenditure to support the Metropolitan Water Plan and drought plan work carried out at the request of Government. It commented that

> *the proposed strategy projects are not dependent on a continuing drought. WaterNSW is subject to a regulatory requirement to maintain continuity of supply to the residents of Greater Sydney. To further these objectives, the strategy projects involve a significant amount of work to refine and update WaterNSW's infrastructure strategies to ensure their continued relevance within the context of both stakeholder and customer expectations as well as regulatory requirements*

We note that the expenditure is for the development of long-term supply strategies in addition to drought-related work. Staff have been reassigned from the Rural Valleys business to support the existing team.

While the short-term drought planning work is needed to support the capital projects proposed, the medium to long term planning is business-as-usual. We accept there is increased work to develop plans for the medium term, we question whether the level of additional activity would continue through the whole of the 2020 Determination period. On this basis we have reduced the level of expenditure in years 2023 and 2024,

5.6.6. Dam Safety

Dam safety activities are forecast to continue at a similar but higher rate of expenditure as shown in Table 5-20 below. Year 2015 is not shown as we do not have the disaggregated expenditure by sub-activity.

Table 5-20 Dam Safety Expenditure

WATERNSW OPERATING EXPENDITURE						
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**	**> 2016 period**
DAM SAFETY						
Portfolio Risk Assessment (PRA)	0.00	0.00	0.00	0.00	0.00	-4.51
Follow up PRA	1.56	0.80	0.80	0.54	3.7	2.20
Core Surveillance activities	2.32	2.38	2.27	2.35	9.3	1.25
Compliance Other	1.54	1.56	1.56	1.52	6.2	-0.64
Sub-total Dam Safety	5.43	4.74	4.63	4.41	19.21	-1.71
SITE SECURITY						
Site Security	3.33	3.21	3.24	3.10	12.9	7.03
TOTAL						
Total Dam Safety and Security	8.76	7.95	7.87	7.51	32.09	5.33

Source: WNSW dam safety costs

Follow up PRA
This is the opex component of the dam safety post-PRA risk evaluation and reduction program; code 5240 and 5116. This is to reduce the risk profile for Greater Sydney dams from intolerable societal risk into the 'low as reasonably practical category'. Capital works are planned for the Cataract, Cordeaux and Fitzroy Falls dams. The operating expenditure element is for the relevant studies and investigations which are unlikely to lead to dam upgrade safety works.

Surveillance activities and other compliance

Expenditure continues at a similar level as the 2016 Determination period.

Site Security
WaterNSW explained that the scope of the contract was changed from 2020 which results in expenditure increasing to $3.4m in 2020. It also explained that the cost of the Bendeela site, a recreational park and camp ground, is excluded from these costs after 2022.

The security costs under this contract are equivalent to [redacted] which on inspection appears to be high. [redacted] We suggest that operating expenditure could be reduced in the 2020 Determination period through the application of new technology and have assumed this is part of the continuing efficiency target set.

5.6.7. Environmental Planning and Protection

This activity is related to the management of contaminated land inherited at its inception through a proactive approach to identify and characterise contaminated sites using a risk-based approach to prioritise sites. There may be a need for some remediation. The project is also to manage and control hazardous building material risks including removal. A hazardous building materials survey is planned to commence shortly. The main focus is to make safe buildings and assets currently deemed unsafe for use or present a human health risk.

The work is to meet the contaminated lands Act and WaterNSW Act to manage contamination risks on its land and to prevent potential contamination of water sources.

This is a $4.5m capital project (5237C3) with operating expenditure support (3258O3) of about $1m/a through the 2020 Determination period with completion in June 2020.

5.6.8. Maintenance

A new maintenance plan has been prepared from CIMS, the new ERP system now in place. This has been used to develop the activity and expenditure program for the 2020 Determination period. A strengthened maintenance team is in place and a separate 'backlog' team is being implemented. There is a change in procurement approach from outsourcing maintenance to insourcing.

WaterNSW state that efficiencies will be delivered from:

- ensuring the correct maintenance at prudent frequencies by applying FMECA
- implementation of maintenance mobility solutions currently under development
- Improving the maintenance planning and scheduling

WaterNSW states that future efficiencies are not likely to result in a reduction in expenditure below current levels. Expenditure proposals are shown on Table 5-21.

Table 5-21 Maintenance Expenditure

MAINTENANCE 2020 PERIOD BY ACTIVITY AND EXPENDITURE						
$m 2020 Year ending June	**2021**	**2022**	**2023**	**2024**	**Total**	**> 2016 period**
MAINTENANCE						
Planned	20.63	20.57	20.60	19.64	81.44	7.14
Reactive	4.10	3.99	4.00	3.82	15.90	-6.27
TOTAL EXPENDITURE						
Total	24.73	24.56	24.59	23.45	97.34	0.88

Source: WNSW document

We were initially concerned about an apparent backlog in expenditure which WaterNSW advised had arisen from the takeover of the SCA maintenance program. The actual expenditure reported for 2019 showed an increase on the previous forecast and indicates that WaterNSW has responded to address some of this backlog. We noted a greater level of planned maintenance and a reduction in reactive costs. The profile of planned and reactive maintenance is shown in

Figure **5-3** below.

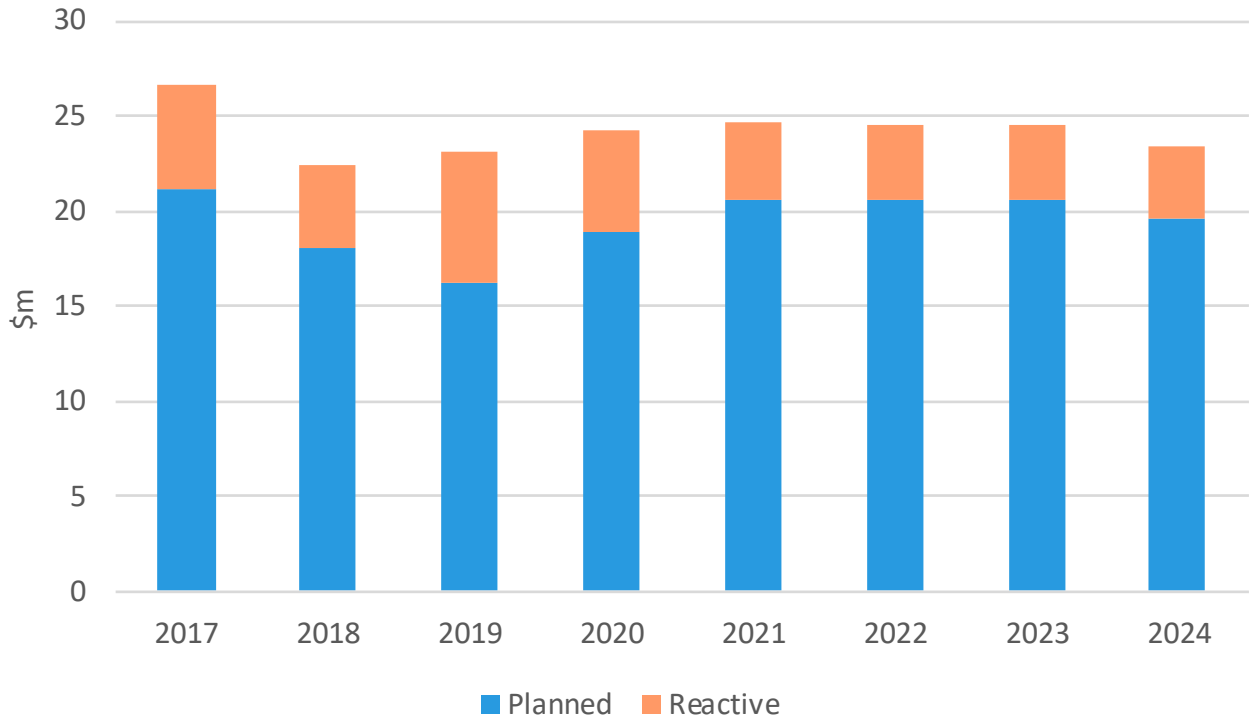


Figure 5-3 Maintenance Expenditure 2017 to 2024

Source: Atkins analysis of WNSW data

The level of backlog carried into the 2020 Determination period will depend on the work carried out in 2020. Expenditure proposed for the 2020 period is at a similar level as the 2016 Determination period. We are content with this approach to maintenance activities.

5.6.9. Other

We commented in Section 5.4.9 that 'Other' expenditure which are mainly insurance and land tax costs should be included within corporate activities.

5.7. Efficient Expenditure in the 2020 Determination period

5.7.1. Scope for efficiency savings

We set out our approach to assessing the scope for efficiency savings in Section 1.4. We take account of performance against the Operating Licence requirements and legislation.

WaterNSW has complied with its bulk water supply requirements in terms of volume and raw water quality. It has continued with catchment management and associated activities; the requirements here are qualitative where it is difficult to measure the benefits and whether there is over- or under-provision; there is a risk of gold plating solutions. This is 'business-as-usual' and we would not expect a significant change in activities and expenditure over a four-year period, although there may be some annual variances.

With the limited clarity is demonstrating benefits across operating activities, we suggest a risk-based approach should be developed to test all proposed schemes against a profile which balances risk between WaterNSW and its customers.

We have sought to benchmark WaterNSW's performance against bulk water supply comparators with limited success as the nature and operating environment of managed catchments is non-homogeneous. We have seen other catchments being managed with a lower level of activity where raw water treatment processes contain two or three barriers. As Sydney Water has only one barrier, the filtration process, we consider that it is appropriate to take a lower-risk but balanced approach involving higher levels of activity than where there are multiple treatment barriers.

In our interviews with a range of project managers, there appears to be little promotion of efficiencies. WaterNSW has applied a 1% efficiency across all the 2020 Determination period expenditure. Our analysis of efficient expenditure is based on the pre-efficiency expenditures proposed by WaterNSW.

Our assessment of a level of efficient expenditure is to make adjustments to activity-related expenditure and then apply efficiencies based our findings from an assessment of the whole expenditure proposals.

Our analysis of the information provided by WaterNSW at meetings and through subsequent questions and documentation has identified several areas where we believe there is scope for making efficiencies across the business. We also take note of the efficiencies proposed for to the 2020 Determination period. We discuss these areas below.

Corporate and support expenditure

Corporate expenditure, as included in Table 5-13 for the Greater Sydney business is an average 32.3% of the total operating expenditure. This appears to be relatively high when compared with other utilities. For example, Central Coast (2019) was 20% and Sydney Water (2016) around 25% of total operating expenditure. While the WaterNSW expenditure includes customer service, which we question, insurance and land tax should be included rather than an 'other' category. We question the efficiency of this proportion of expenditure but recognise that the new business structure has been evolving over the period.

We noted that customer service costs are included within corporate. This is unusual when comparing with other utilities where they are regarded as operational expenditure. Given the relative customer numbers in greater Sydney compared with the Rural Valleys and the level of customer engagement, it is appropriate to allocate these costs directly to the relevant businesses. Our estimate of this reallocation is to reduce the Greater Sydney customer service expenditure by $4.86m.

When allowing for the reallocation of customer service costs, this percentage is just above 30% which is still higher than comparative utilities. We consider there is scope for further restructuring to reduce costs in corporate and support activities and across the business.

There is scope for efficiencies which we discuss below as catch-up and continuing efficiencies.

Business Systems
Benchmarking of the Business systems and information (ICT) operational expenditure shows that WaterNSW is an outlier in that costs form 7.9% of total operating costs compared with 6.6% for other utilities. ICT opex represents 45% of all capital and operating expenditure. There is scope for efficiencies above those proposed by WaterNSW to catch up with the frontier company.

Catchment management – source protection
We have accepted the comments made by WaterNSW to enhance activity in this area of activity, there is still an opportunity to review and focus the source protection program to deliver clear benefits. To avoid double counting with catch-up efficiencies, we have not made any adjustment to these costs.

Catchment management – land management
The outsourcing of fire-fighting activities to the RFS represents a $3.0m increase in expenditure However the estimates do not offset the likely savings of in-house costs; the contingency applied is high. We propose that an efficient level of expenditure is $66.6m which is an increase of $2.2m above the 2016 Determination period, a reduction of $1.5m. WaterNSW should look to absorb a proportion of the RFS additional costs through a reduction of in-house activities and reduce the level of contingency applied.

Catchment management – water quality science
WaterNSW proposes an increase of $4.68m (86%) above the current program expenditure. We note that the 2016 period expenditure has been low and below planned levels due to resourcing. Our view is that an efficient and achievable level of expenditure is $8.0m/a over the 2020 period which is a 50% increase on the average 2016 period expenditure and reflects the need to meet new Operating Licence requirements compared with the doubling proposed. This results in a $0.5m/a reduction in proposed expenditure.

Water operations – monitoring
In deriving an efficient level of expenditure, we have taken into account the ongoing level of monitoring costs in an average year. We have discounted year 2018, taken note of the impact of the drought on current period expenditure and allowed for the under-reporting of some maintenance expenditure. We found the resulting monitoring expenditure has increased by some $8.7m in the 2020 period. We propose an efficient level of expenditure over the period of $52.9m, recognising some increase in monitoring activity above the current Determination period, resulting in an adjustment of $0.9m/a.

Additional monitoring for Sydney Water
Sydney Water has requested additional monitoring through the Bulk Supply Agreement. Sydney Water advised WaterNSW that this would deliver efficiencies at the Build, Own and Operate (BOO) treatment works. We found that the additional monitoring for the defined parameters identified in the monitoring program was reasonable although we question why both Sydney Water and WaterNSW sample and test weekly for a range of parameters at each works inlet. It would appear more efficient to have one utility sample and test at these locations and use the resources to undertake the additional sampling and testing requested by Sydney Water. We consider that the level of savings would be sufficient to include the additional sampling identified in the programs. On this basis there is no requirement for additional expenditure. We have therefore excluded the $7.2m direct costs proposed for this activity.

Drought Plan
WaterNSW has included $5.37m expenditure to support the drought plan work carried out at the request of Government.

Site security
We suggest that WaterNSW should be using more new technology to monitor sites [redacted] There is scope for reducing operating expenditure over time through new technology. We have assumed this saving will be included within the continuing efficiency adjustment.

Maintenance
There is a backlog in asset maintenance expenditure arising from the lower activity in the 2016 Determination period. The level of backlog will depend on the work carried out in 2020. Actual expenditure for 2019 was greater than the forecast. We are assured that WaterNSW is making progress to address this backlog and have not applied any adjustment for efficient expenditure.

5.7.2. Catch-up efficiency

Catch-up efficiency is the that is required of WaterNSW to achieve the performance of a Frontier Company over time. We have sought to benchmark its performance against other utilities with similar functions, but the diverse nature of each bulk supply business does not allow us to benchmark with any confidence. It is easier for other utilities who have similar water and wastewater networks, but this is not the case with WaterNSW.

Our view of catch-up efficiency is driven mainly by the scope for efficiencies we found in

- the Corporate and Support functions;
- the reallocation of customer service costs directly to the relevant businesses;
- benchmarking of the IT expenditure;
- the structure of the business and the technology put in place during the 2016 Determination period to drive efficiencies through the business.
- specific business activities such as catchment management, water operations and security where a reduction in scope was not applied.

Catch-up efficiencies are applied to pre-efficiency expenditures proposed by WaterNSW. This avoids any double counting with the efficiencies proposed by the business.

WaterNSW commented on our draft report that

> *… the cost categories which are uncontrollable [and] should therefore be excluded from the efficiency calculation. WaterNSW has identified approximately 9-9.4m p.a. in uncontrollable cost over the 2020-24 period. Backing out the Atkins efficiency applied to WaterNSW's uncontrollable costs results in approximately 1.948M in opex that is reinstated into the Determination cost base.*
>
> *In addition, should IPART decide to impose a catch-up efficiency, WaterNSW argues that the catch up efficiency should only apply to the areas identified by Atkins where there is further scope for efficiencies. For example, corporate and support functions and executive cost.*

Our view is that the all costs are controllable in some way through for example quantity and price. The scope for efficiencies should therefore be considered in all activities within the business; hence the catch-up efficiency should be applied across all expenditure.

WaterNSW also commented that:

> *, the scale of recommended efficiencies applied to WaterNSW on a cumulative basis excee*

ds the level of efficiencies applied in prior IPART Determinations. For example, a top down efficiency of approximately 8% of total opex was applied by Atkins in the 4th year of the upcoming regulatory period. WaterNSW argues that it takes time to achieve efficiencies of this scale (8%) without comprising on service standards/regulatory requirements.

We note this comment and have applied the catch-up efficiency over a five-year period compared with four years in the draft report. This would follow a profile of 0.9% per annum over the five-year period. These are applied cumulatively to the total operating expenditure, not including the efficiencies proposed by WaterNSW. The level of catch-up efficiency is about half of that applied to Sydney Water in 2016.

5.7.3. Continuing efficiency

Continuing efficiency, or Frontier Shift, relates to the ability of even the most efficient firms in the sector, those at the efficiency frontier, to become more efficient over time. In this regulatory context, a frontier shift estimate should reflect the pressures to become more efficient that utilities face in an open market. It reflects the continuing efficiencies being gained across all major sectors through process innovation and new systems and technologies that all well performing businesses should achieve.

A review conducted by the Organisation of Economic Cooperation and Development (OECD) in 2015[15] examined a wide sample of global firms and found that efficiency gains at the frontier have averaged 3.5% p.a. for firms in the manufacturing sector and 5.0% p.a. in the service sector. Across all firms.

Analysis of the Productivity Commission multi-factor productivity (MFP) data by IPART[16] suggests that a sustained average annual Multi-Factor Productivity (MFP) improvement of between 0.6% and 0.8% is achievable in Australia. These results include performance from 1975-76 to 2017-18. They reflect economy-wide performance: all industry sectors and all firms in each sector. The IPART review recommended the top end of that range: 0.8% per annum be adopted.

We also note the level of Frontier shift proposed by other water utilities in New South Wales.

In England and Wales, the regulator, Ofwat, undertakes econometric modelling of operating expenditure as part of its periodic review of prices. For the 2019 price review currently underway, Ofwat commissioned Europe Economics[17] to undertake an assessment of 'Frontier Shift'; that is the scale of frontier shift that can be expected to achieve over the five-year Determination period. The consultants use a TFP approach including a technical change component, a scale component and an allocative efficiency component. A recommended frontier shift ranges is derived for botex, that is the combination of wholesale operating and asset replacement expenditure, of 0.6% to 1.4% per annum.

In its final Determination in December 2019, Ofwat updated its assessment of Frontier Shift including the updated European Economics report and other reports to propose a level of Frontier Shift in its efficiency report forming part of its final Determination[18]. In this document it comments on the responses it received from the UK water sector. It allocated a 1.1% per annum efficiency to be applied across the five-year price control period to include for ongoing efficiency improvements in the wider economy and further efficiency improvements from water companies making greater use of the totex and the outcomes framework.

Our view, based on the information set out above, that a Frontier Efficiency of 0.8% per annum should be applied to proposed capital and operating expenditure as the analyses presented above applied to both.

[15] Frontier firms, technology diffusion and public policy: micro evidence from OECD countries, OECD Productivity Working Papers No. 02, November 2015.
[16] Ongoing productivity adjustment, IPART December 2019
[17] Real Price Effects and Frontier Shift, Europe Economics January 2018
[18] PR19 Final Determination -Securing cost efficiency technical appendix, OFWAT December 2019

We took account of the efficiencies proposed by WaterNSW by using the proposed pre-efficiency expenditure for our analysis.

5.7.4. Efficient level of operating expenditure

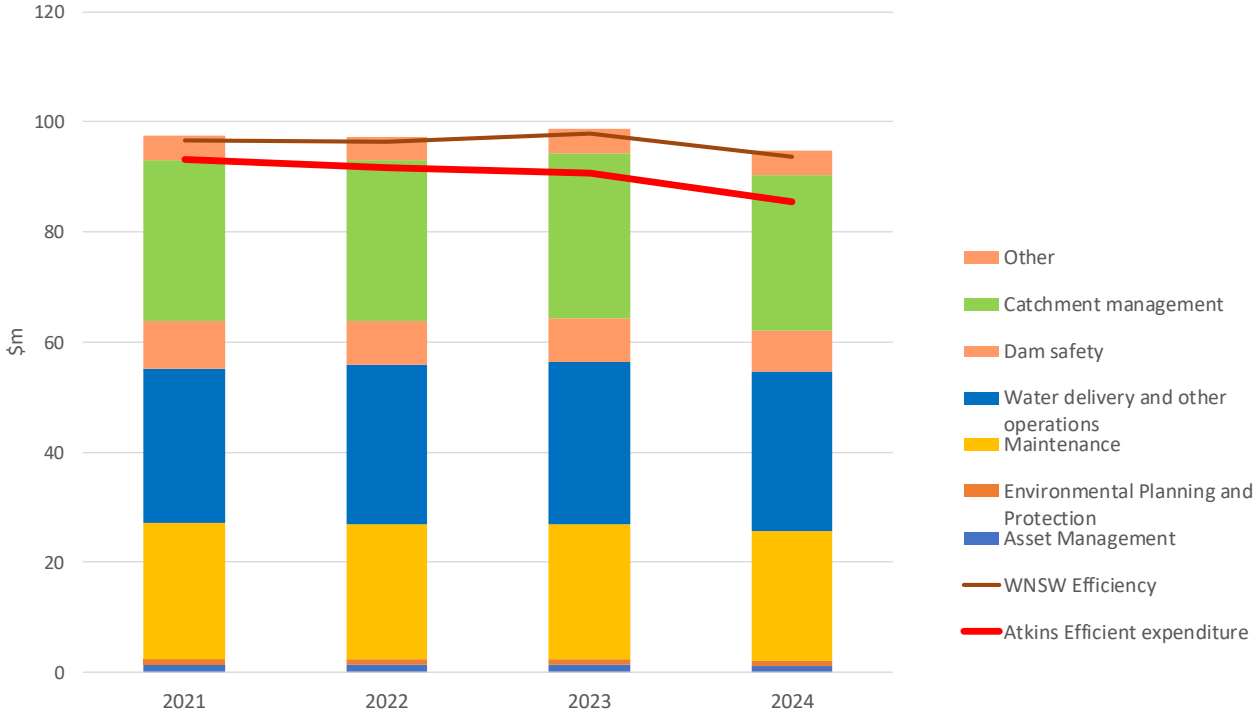
We present in Table 5-22 our proposals for an efficient level of operating expenditure for the period 2020 to 2025. Year 2025 assumes a continuing level of expenditure as submitted in the SIR with the same adjustments as applied in year 2024. The table includes the adjustments for the scope of activities discussed in Section 5.7.1 above. Catchup and continuing efficiencies are applied as set out in Sections 5.7.2 and 5.7.3 respectively.

Table 5-22 Efficient level of operating expenditure

WATERNSW EFFICIENT LEVEL OF OPERATING EXPENDITURE					
($m 2019/20) year ending June	2021	2022	2023	2024	Total 2021 to 2024
WATER NSW PROPOSED EXPENDITURE					
Catchment management	29.22	29.21	30.15	28.19	116.77
Dam safety	8.76	7.95	7.87	7.51	32.09
Water delivery and other operations	27.99	28.90	29.34	29.06	115.28
Maintenance	24.73	24.56	24.59	23.45	97.34
Environmental Planning and Protection	1.07	1.04	1.08	0.87	4.06
Asset Management	1.33	1.30	1.32	1.27	5.21
Other	4.39	4.41	4.42	4.35	17.57
PRE-EFFICIENCY OPERATING EXPENDITURE					
Total for Atkins efficiency assessment	97.48	97.37	98.77	94.69	388.32
WNSW EFFICIENCY PROPOSAL					
Total	-0.97	-0.97	-0.99	-0.95	-3.88
WATER NSW PROPOSED EXPENDITURE					
WaterNSW proposed expenditure	96.51	96.40	97.78	93.75	384.44
ATKINS SCOPE ADJUSTMENTS					
CM Land management	-0.40	-0.40	-0.40	-0.30	-1.50
CM Water quality science	-0.50	-0.50	-0.50	-0.50	-2.00
Monitoring	-0.90	-0.90	-0.90	-0.90	-3.60
Additional Monitoring for SWC	-1.00	-1.00	-1.00	-1.00	-4.00
Metro Plan and drought studies	0.00	0.00	-0.90	-0.90	-1.80
Total post-adjustments	94.68	94.57	95.07	91.09	375.42
ATKINS EFFICIENCY ADJUSTMENT					
Catchup efficiency	-0.85	-1.70	-2.57	-3.28	-8.40
Continuing efficiency	-0.76	-1.51	-2.28	-2.91	-7.47
Total efficiency adjustments	-1.61	-3.22	-4.85	-6.19	-15.87
Total post efficiency adjustments	93.07	91.36	90.22	84.90	359.55
ATKINS EFFICIENT OPERATING EXPENDITURE					
Catchment management	27.83	27.35	27.77	25.55	108.50
Dam safety	8.61	7.68	7.48	7.02	30.80
Water delivery and other operations	25.63	26.04	25.10	24.36	101.12
Maintenance	24.32	23.75	23.39	21.92	93.37
Environmental Planning and Protection	1.06	1.01	1.03	0.81	3.90
Asset Management	1.30	1.26	1.25	1.18	5.00
Other	4.32	4.27	4.20	4.06	16.85
ATKINS TOTAL EFFICIENT EXPENDITURE					
Total	93.07	91.36	90.22	84.90	359.55

Source: Atkins analysis`

We show below the proposed efficient expenditure compared with the WaterNSW submission and efficiency proposals.



Source: WNSW submission and Atkins analysis

Figure 5-4 Efficient level of operating expenditure

6. Capital expenditure

We are required to review capital expenditure incurred over the 2016 Determination period. In undertaking this we must:

- *Assess the reasonableness of the utility's capital expenditure program as a whole, within the context of its long-term plans and the assumptions underlying them, including the scale, scope and planning of the entire capital expenditure program. That is, the consistency of the utility's proposed 5-year capital expenditure program with its longer-term program of capital expenditure, and the implications of and risks associated with the 5-year program for the longer-term program.*
- *Undertake a detailed investigation into the outcomes and project planning for a sample of the utility's capital projects above an agreed materiality threshold (to be agreed with IPART, but generally at least 10% of capital projects above a $10 million materiality threshold).*
- *Advise on the appropriateness of the cost allocation method used to allocate operating costs to capital projects.*
- *Review the appropriateness of the asset lives used to calculate regulatory depreciation (or 'return of capital') in the utility's pricing proposal, and recommend adjustments where appropriate.*
- *Review the allocation of any common capital costs between monopoly services and other parts of the business and assess whether there has been any inappropriate allocation of common capital costs.*
- *Advise on the robustness and effectiveness of the utility's ring fencing of capital costs where relevant[19] from its other operations, and identify opportunities for improvement (IPART will advise the consultant upon appointment where ring-fencing applies).*

We are also required to review the efficiency of forecast capital expenditure for the 2020 Determination period. In undertaking this task, we must:

- *The consultant must review the efficiency of actual and forecast capital expenditure for the 2016 and 2020 Determination periods. In undertaking this task, the consultant must:*
- *Report and comment on actual and forecast capital expenditure for each year, including the variations in actual capital expenditure from what was allowed in the 2016 Determination.*
- *Provide recommendations as to the efficiency of the utility's level of capital expenditure and provide annual estimates of the level of capital expenditure that is required to efficiently supply the regulated monopoly services.*
- *Identify any consequential impacts on operating expenditure (i.e., increased or reduced costs) based on the assessment of capital expenditure.*
- *Identify the potential for and recommend efficiency savings to be achieved within the capital expenditure budget, and provide evidence and reasoning to support the recommended savings.*
- *Where appropriate, have regard to productivity benchmarking analysis when identifying potential efficiency savings.*
- *Audit and assess the accuracy with which the utility has classified its historical and planned capital expenditure into asset classification classes [for example, Sydney Water's assets are categorised as Civil, Electrical, Mechanical, Electronic and Non-depreciating (or 'CEMELND'), each with different asset lives] and make recommendations regarding:*
- *the efficient capital expenditure on new assets in each classification class by business area*
- *the average remaining life of existing assets by classification class and business area*
- *the expected life of new assets by classification class and business area.*

[19] For example, ring-fencing applies to a recycled water scheme where it represents a higher-cost means of servicing customers than a 'traditional' network based servicing strategy.

6.1. Summary

6.1.1. 2016 Period

Capital expenditure reported in the 2016 Determination period includes actuals for 2017, 2018 and 2019; forecast expenditure is included for 2020. WaterNSW is forecasting a total overspend for capital expenditure of $72m in the period compared to the 2016 IPART Determination. $57m of the overspend has been attributed unforeseen expenditure on drought response schemes and in particular the planning costs which are identified within 'new projects' in Figure 6-1. Capital expenditure was significantly below IPART's capital expenditure allowances in the first two years of the period before the onset of the drought.

Throughout our project reviews we noted a number of instances of underspending compared to the previous IPART Determination. WaterNSW is a project orientated business with the capital program largely made up of specific one-off projects. These by their nature are harder to draw on historical comparable unit cost estimates. Unlike linear assets the majority of WaterNSW projects tend to be bespoke in time, location and scope which may also have been a contributing factor to the underspending compared to the IPART Determination.

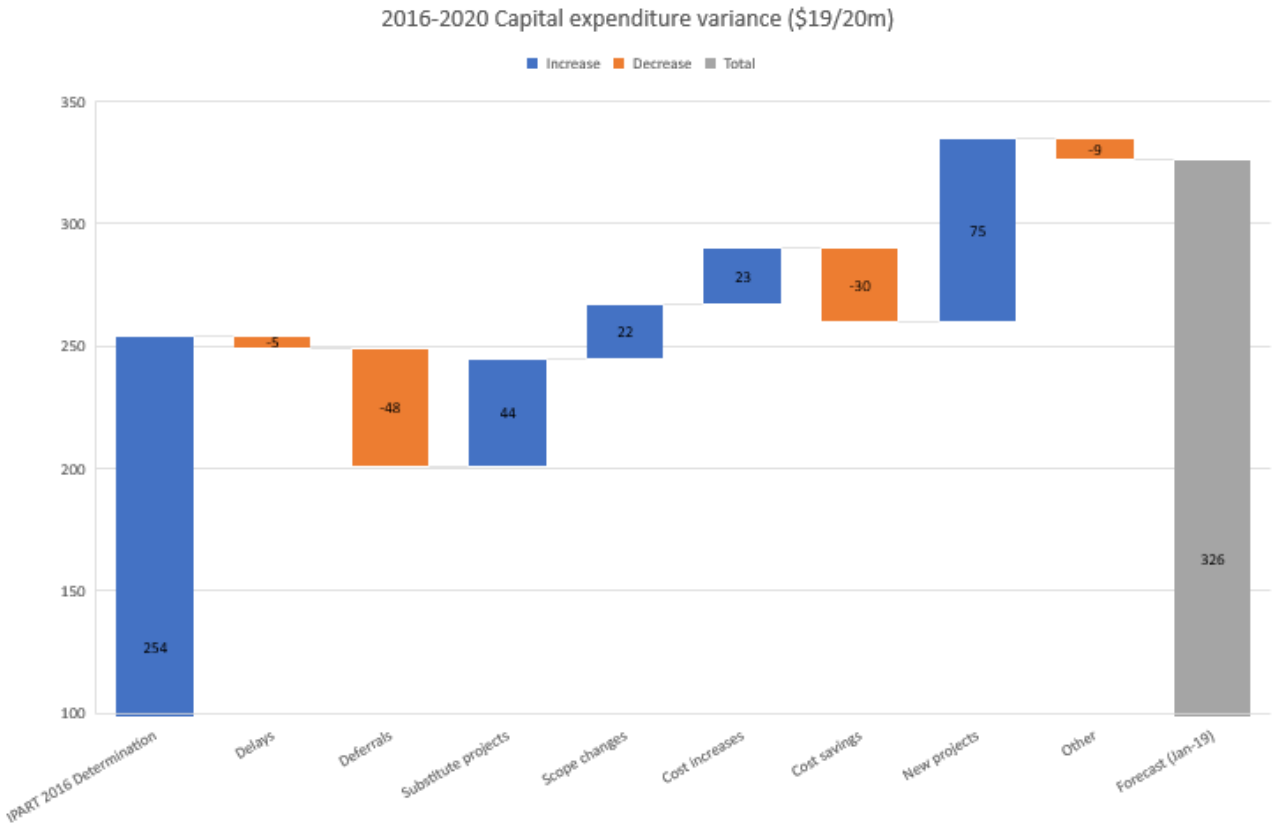


Figure 6-1 Capital expenditure variance 2016-2020

Within the current Determination period we recommend two significant adjustments to arrive at our recommended level of efficient capital expenditure for the current period. These adjustments are:

- A $25.9m reduction to reverse the change in capitalisation policy and a number of project level changes to take account of updated 2020 estimates;
- A $34.3m reduction [redacted].

We provide our view on the efficient level of capital expenditure in the current period in Figure 6-2.

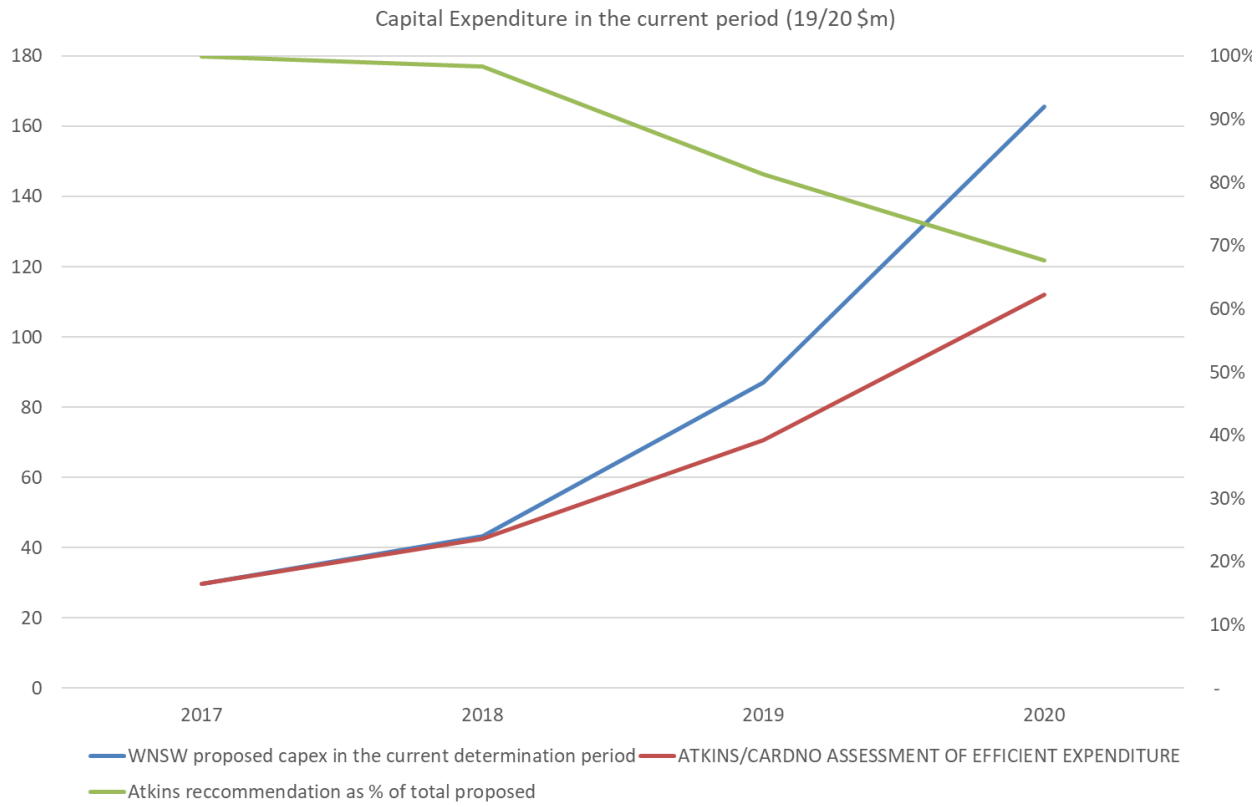


Figure 6-2 Efficient capital expenditure 2016-2020

Cost estimating has been undertaken on a project by project basis with estimates built bottom-up. However, because of this approach there is a need to challenge expenditure at a portfolio level to optimise the program. We did not see evidence of any formal, business-wide approach to internal efficiency challenge of the capital expenditure program. WaterNSW does not demonstrate strong links between their performance expectations and how it is able to manage its physical infrastructure to meet these expectations. Important business processes such as renewals forecasting, and procurement have been improved in recent years but are yet to become business as usual.

Overall our findings are that:

- Total capital expenditure is masked by drought response schemes and a change in the capitalisation policy;
- There is systemic capex underspending across many projects which in our view could benefit from a formal top down efficiency challenge process;
- Performance and measures of success are not always well defined within the business overall and are not linked to expenditure.

6.1.2. 2020 Period

In the current Determination period capital expenditure is $81.4m per annum. WaterNSW has proposed to more than double this to just over $170m per annum for the 2021-2024 period with significant expenditure proposed for drought response schemes (government programs and growth drivers).

WaterNSW's Greater Sydney capital expenditure program for the forward period is generally based on bottom up discreet and often unique projects. We have not been provided evidence of a formal approach to internally challenging the capital program expenditure at a whole of program level.

We have made a number of specific recommendations adjustments to the proposed capital program of which the most significant are:

- Warragamba Dam Environmental Flows – we recommend deferring significant expenditure on this project until towards the end of the next period to commence in 2022 in order to resolve the uncertainty around the potential raising of the Warragamba dam wall and to focus corporate attention on drought related projects. We recommend an adjustment within the future period of $89.3m;
- DRS A – the WNSW submission is based on a proposed Option 1 with a considerably higher estimated cost than Option 2 which is considered to be feasible to achieve the same outcomes. We recommend a $87m adjustment for this project;
- Greater Sydney Resilience provision – this project does not appear to be prudent based on the resilience that already exists within the system. We recommend a $17m expenditure adjustment;
- 2025 – should IPART wish to make a five-year Determination we recommend uplifting pre-efficiency expenditure by $28.6m which is based on the average capital expenditure proposed expenditure for 2020-2024 excluding any expenditure for drought schemes.

We have further made some minor adjustments for areas of imprudence identified in corporate capital projects, in particular for ICT. We then recommend adjustments to reflect catch-up and continuing efficiency, Catch-up reflects the efficiency need to be achieved over time to catch up with a frontier company.

We have recommended catch-up efficiencies across four specific areas:

- Improvements to capital program development, optimisation and prioritisation
- Improvements to value engineering
- improvements in cost estimating and the management of contingencies,
- the impact of new procurement processes and the likely savings from more effective program management.

The continuing improvement element of efficiency relates to the increased productivity derived from process innovation and new systems and technology that all well performing businesses should achieve. We have applied the results of recent analysis for Ofwat, the water regulator in England and Wales, which has been applied to frontier water companies. We have applied a continuing efficiency of 0.8% per annum which is the lower quartile of the range proposed.

Our view of efficient capital expenditure is summarised in Table 6-1 below.

Table 6-1 Efficient level of capital expenditure

WATERNSW PROPOSAL - CAPEX - WATER SERVICE							
($M 2019/20) year ending June	2021	2022	2023	2024	2025	2021-24 Total	2021-25 Total
Existing mandatory standards	79.8	69.3	63.6	64.1	44.2	276.8	321.0
New mandatory standards	11.7	10.3	15.6	6.6	0.8	44.2	45.0
Discretionary standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by other	20.9	98.2	108.5	10.5	0.0	238.1	238.1
Government programs	34.8	39.1	29.2	20.3	6.6	123.3	130.0
Business efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	147.2	216.9	216.9	101.5	51.6	682.4	734.0
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2019/20) year ending June	2021	2022	2023	2024	2025	2021-24 Total	2021-25 Total
Existing mandatory standards	75.5	59.3	52.1	52.9	62.1	239.8	301.9
New mandatory standards	13.8	11.9	14.1	5.8	0.7	45.5	46.2
Discretionary standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by other	19.7	91.6	97.5	9.2	0.0	218.0	218.0
Government programs	2.5	0.0	9.8	32.0	23.5	44.3	67.8
Business efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Efficient Expenditure	111.5	162.8	173.5	99.9	86.3	547.6	633.9

6.2. Methodology

This section presents the results of our review of the efficiency and prudency of WaterNSW's Greater Sydney capital expenditure. We identify below the major investment drivers and explain the variances in the current Determination period expenditure against the 2016 Determination. We comment on the efficiency and prudency of capital expenditure in the current Determination period and our view of future efficiency. We explain our methodology in Section 1.5.

The methodology for the review of capital expenditure has focused on gaining an understanding of WaterNSW's external and internal environment as well as reviews of large projects and programs. Our views are guided by the evaluation of asset management and capital investment processes through interviews and WaterNSW presentations, which we discussed in Section 3 of this report. We have commented on the main asset management systems and processes used to budget, track, monitor and report capital expenditure.

We then make an assessment of an efficient level of expenditure for the next Determination period. We discuss the cost drivers and efficient cost level recommendations for each of the capital drivers (Existing Mandatory Standards, New Mandatory Standards, Growth, Government Programs and Business Efficiency) and the specific activities contained therein.

We have selected a representative sample of capital projects from the 2016 Determination and proposed for the next Determination period to gain an understanding of the efficiency and prudence of the investment.

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

6.3. Overview

Total capital expenditure proposed by WaterNSW for the 2021-2024 period is $682M compared to $326M in the current period marking a 110% increase. Increased expenditure proposed is primarily driven by expenditure on the Drought Response Scheme (government programs and growth drivers), discussed in more detail in Section 6.8. $315M has been included in the submission for Drought Response Schemes between

2019-2024. Expenditure proposed over the 2020 Determination period amounts to $259M. Excluding the Drought Response Schemes, $423M has been proposed in the future period marking a 32% increase on comparable projects in the current period.

WaterNSW was established in 2015 from the previous Sydney Catchment Authority and the State Water Corporation and, as shown in Figure 6-3, like for like comparisons between the previous and current price Determination periods was challenging.

Capital expenditure on Existing Mandatory Standards represents 63% of total capex in the current period and a reduced proportion of 40% in the future period due to the significant expenditure proposed on DRS in the future period. WaterNSW propose a 34% increase on Existing Mandatory Standards from the current to future Determination periods.

WaterNSW have proposed a four-year Determination period, 2021-2024. Only specifically defined project expenditure is proposed in the year 2025 which is why there is a significant drop off shown in Figure 6-1. IPART are to decide on whether a four or five-year Determination is appropriate.

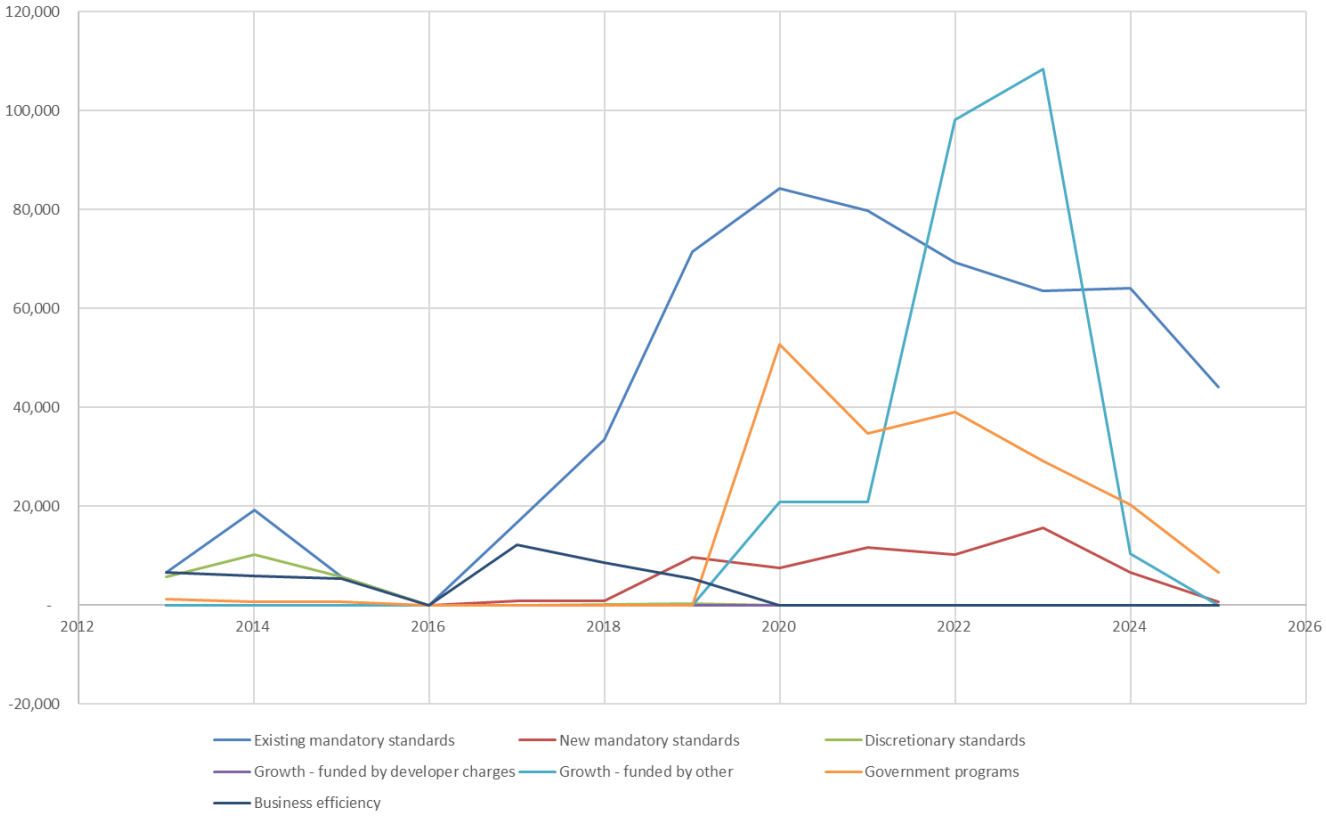


Figure 6-3 Capital expenditure by driver

6.4. Existing mandatory standards

Capital expenditure on Existing Mandatory Standards represents 63% of total capex in the current period and a proposed 40% in the future period. WaterNSW propose a 34% increase on Existing Mandatory Standards from the current to future Determination periods.

6.4.1. 2016 Determination Period

Upper Canal Interim Works Stage 2 (WEM038)
The Upper Canal is a critical water supply infrastructure asset and the primary method of transferring water from the four Upper Nepean dams to the Prospect Water Filtration Plant, supplying on average approximately 20% of Greater Sydney's water. The Upper Canal and an essential component of the water supply system for Sydney. The Upper Canal will continue to provide the only system redundancy to the Prospect supply node (including Warragamba Dam and Pipelines), which is the single largest supply node for Sydney, supplying about 80% of Greater Sydney demand now and in the future.

The Upper Canal is susceptible to stormwater and groundwater contamination from: agricultural activities; septic systems from unsewered residential dwellings; increased urbanisation along part of the corridor (contaminated run-off and security).

In some locations, drainage systems are inadequate, resulting in surface run-off inflows or groundwater infiltration into the canal. In addition, several sections of canal have been temporarily propped to prevent walls from collapsing inwards, resulting in an increased likelihood of pathogens entering the canal from weather-related incidents and groundwater ingress through the deteriorated canal walls.

The Business Case for Upper Canal Works Stage 1 was approved in 2013 to undertake immediate rehabilitation work. The Stage 1 work formed the initial works, augmented with Stage 2 works to improve the canal's reliability in the short to medium term, until a long-term strategy for the canal is implemented.

Total project expenditure proposed at the 2015 IPART submission by WaterNSW was $70.8M in real prices with a post Determination adjusted expenditure forecast of $65.6M total of which $62.9M was allowed over the current period. According to the 2015 submission works were due to commence in 2016 however only minor works occurred in 2017 with a significant ramp up in activity 2018. With the project due for completion in December 2019 outturn expenditure is forecast to be $43.1M.

WaterNSW approved an internal budget of $56M at the last Determination period. We note that in the business case produced in December 2017 there was a management reserve allocated of $4.5M, this was allocated on top of a project contingency of $2.4M. WaterNSW inform us that the majority of projects are costed at a P50 including some risk components (latent conditions, weather delays etc.) the latter forming the risk based contingent amount. The reasons for the variation are attributed to the cost estimate of original scope being far higher than budgeted and scope reductions.

Cost reductions have been achieved throughout the project lifecycle through the main contract partner including mobile relining across the canal as well as some scope adjustments. WaterNSW have out-turned for this particular project at $21.8M less than the 2016 IPART Determination in real terms in the current period. This indicates that at the time of project inception that efficiencies were not factored into the project planning phase and that the cost estimating process was not challenged effectively.

Burrawang Pumping Station Elect System Stage 3 (WEM046)
The Burrawang Pumping Station is a component of the Shoalhaven Transfer Scheme, a dual-purpose water supply and hydro-electric power generation scheme. Water is pumped from Tallowa Dam storage (Lake Yarrunga) by Origin Energy to Fitzroy Falls reservoir via Bendeela Pondage. Burrawang Pumping Station transfers water from Fitzroy Falls Reservoir to Wingecarribee Reservoir for water supply purposes. Wingecarribee Reservoir supplies water to Wingecarribee and Goulburn-Mulwaree Councils, and releases water by run-of-river to Warragamba and Nepean dams. The Burrawang Pumping Station is thus a critical piece of infrastructure supporting the role of WaterNSW in ensuring the supply of raw water to Sydney Water Corporation and other customers.

The Pumping Station is equipped with various electrical, electronic, instrumentation and control assets which are integral to the reliable operation of the station. The bulk of the electrical equipment is original infrastructure installed over 35 years ago. A formal condition assessment completed in 2011 found the electrical, electronic, instrumentation and control equipment at the Pumping Station to be operational, but only in fair condition. The following deficiencies were identified in the current systems:

- A number of items of electrical equipment are aged and do not conform with current statutory requirements;
- Spare parts are no longer available for critical items of electrical equipment;
- There are Work Health and Safety (WHS) issues for operation and maintenance personnel relating to the arrangement and configuration of the electrical equipment;
- The switchgear mechanisms and springs are beyond their expected life and may not operate when required.

Total capex for the scheme to date has been $16.2M according to the SIR submitted in June 2019. According to the variation business case (November 2017) the total expenditure forecast is $19.8M. The original business case was for $12M with a subsequent variation of $6.4M; $2.8M for pump refurbishment and $3.6M for commissioning costs including water and energy costs through operations outside standard pumping protocols. WaterNSW had to pay Origin Energy $3.6M in energy costs to pump the water and are unable to recover these costs as opex as it was not an operational requirement, these costs have not yet been fully capitalised, and we expect the expenditure numbers to change when outturn 2018/19 expenditure is reconciled.

We consider the expenditure to be prudent and we have considered the cost underestimate within our overall efficiency assessment we have not made any specific adjustments for this specific project.

Metropolitan Dams Electrical System (Stage 3 Execution) (WEM036)
This project was initiated to replace the electrical equipment at the six metropolitan dams the project appears to have been delivered as planned within the final business case. Within the previous 2016 IPART Determination $29.4M (real 19/20$) was allowed, this compares to a forecast outturn of $21.2m or a 38% overestimate at the last Determination. This indicates that the efficient level of expenditure set at the last Determination was too high. The project had significant amounts of scope rationalised including dam safety instrumentation, security and facility upgrades and automation renewals, through a strategic review in line with WaterNSW asset management system. This represented the primary driver for underspend. We consider this scope reduction in making our overall catch-up efficiency assessment for the future Determination period.

6.4.2. Projects covering both 2016 and 2020 periods

Warragamba Pipeline Restoration Program
This program comprises of seven separate project line items:

- Warragamba Corridor & Pipeline - Tranche 1-WEM107
- Warragamba Internal Lining Restoration Project-WEM109
- Warragamba Embankment Upgrade-WEM126, WDS031
- Warragamba Pipeline Corridor Restoration Planning-WEM127
- Warragamba Pipeline ancillary valves upgrade - WEM032, WDS003

Total expenditure for the whole program over five years is $155.5m with $28.2m proposed in the current period and $108.1m proposed in the future period. The expenditure profile as per the SIR is provided in Table 6-2 below. We discuss the Warragamba Pipeline ancillary valves upgrade project in more detail in the section below.

Table 6-2 Warragamba pipeline restoration program proposed capital expenditure

Year ending (price base $m 19/20)	SIR ID	2018	2019	2020	Sub Total 17 to 20	2021	2022	2023	2024	2025	Sub Total 20-24	Sub Total 20-25	Total Project
Planned (SIR)													
[redacted]													
Total Capex			**6.50**	21.74	**28.23**	31.62	24.88	22.08	29.50	19.22	**108.08**	**127.30**	**155.53**

The Warragamba Pipeline is a critical system providing 80% of Sydney's drinking water supply from the Warragamba Dam. The pipeline is 40km long and covers undulating terrain. In recent years it has experience issued with the pipeline corridor and a failure to maintain drainage due to a build-up of sedimentation and siltation caused by embankment subsidence. The pipeline is expected to last a further 50 years through proper maintenance. The pipeline has been designed to move and flex with temperature changes however there are now some restrictions on the pipeline movement due to the siltation and water not being able to drain away around the stabiliser rods which has also caused significant corrosion.

WaterNSW have undertaken a number of asset condition assessments over recent years which indicated that capital expenditure is required to avoid significantly more ongoing expenditure on reactive maintenance on the pipelines. This led to the development of the Warragamba Pipelines and Corridor Restoration Programme Master Plan with the aim to improve maintenance strategies for ongoing management; as well as capital works in the short term to remediate significant issues. This Masterplan does not appear to be driven by any corporate level Asset Management Plan and is bespoke to the Warragamba Pipeline.

WaterNSW engaged external consultants to undertake the business case and optioneering for four options. Comprehensive NPV analysis followed by multi-criteria analysis lead to the preferred option of the "full restoration program".

This is an ongoing program of work that ramps up into the future Determination period. While the basis for the selection of the preferred option seems sound, we have not seen any evidence of the internal challenge of the cost estimates within the business cases or Masterplan so consider there to be scope to achieve efficiencies within the delivery of the program. The move WaterNSW have made towards a more vertical project management and project delivery organisation should help to realise savings within this program. We have not

made any specific adjustments for this program of works but consider this within our overall catch-up efficiency challenge to WaterNSW within the capital delivery assessment.

6.4.3. 2020 Determination Period

Warragamba Pipeline ancillary valves upgrade (WEM032 and WDS003) (ongoing)
The Warragamba Pipelines consist of two parallel pipelines (No 1 & 2) that deliver raw water by gravity from Warragamba Dam to Sydney Water's Ferrers Road Outlet Works, approximately 27 km from the Dam, for treatment at the Prospect Water Filtration Plant. The two pipelines have three major cross connections and two minor cross connections which enable various configurations of the Pipelines to be operated for maintenance or in the event of a failure.

The Warragamba Pipeline was constructed over 50 years ago and has had no major upgrades undertaken since then. We are informed that many of the critical valves, primarily the hydraulically actuated valves are approaching the end of their design lives of 50 years and are becoming unreliable in operation and have developed major defects including major corrosion and currently supported on props and slings. The hydraulically operated valves especially, due to their design for operating under flow, are used in setting up various pipeline configurations to meet demand considerations and effective maintenance shutdowns.

WaterNSW terminology refers to upgrading the valves however the scope of the project is to renew (existing mandatory standards) (rather than upgrade (enhance)) the valves. The scope of the project includes:

- Removal and replacement of 21 Hydraulic or Electric Actuated Valves (noting 6 of these Valves have been procured ahead of installation)
- Major refurbishment of 2 existing valves
- Decommission and remove 4 existing valves
- Associated ancillary works including controls upgrade, pipework, access facilities, electrical and hydraulic connections, CCTV and pressure monitoring systems

The project was originally scoped and scheduled between 2018 and 2022 however the principal contractor went into receivership after the first two valves has been completed.

[redacted]. We have not made any specific adjustment for this but consider this within our recommended cost estimation catch-up efficiency. We consider that the expenditure remains prudent despite the significant scope and expenditure increases noted since the 2015 pricing submission to IPART.

Greater Sydney Renewal Provision (WEM086)
The Greater Sydney Water Infrastructure Renewals program is a portfolio of needs assessed to maintain capability of existing water infrastructure assets in Greater Sydney. These renewals activities must to be undertaken to allow WaterNSW to continue to maintain its level of service obligation in delivering water to its customers reliably, consistent with the WaterNSW Operating License Design Criteria. For reference, design criteria refer to the levels of service for security, robustness and reliability of water available for supply to customers that WaterNSW is required to provide.

Investments in Water Infrastructure are driven by risks of failure as evidenced by assets in deteriorating conditions (poor or worse), in consideration of asset criticality and cost of remediation. In some instances, assets are refurbished whilst in fair condition (for example, valve refurbishments) to protect against more costly replacements later in their lives. In order to identify potential needs, WaterNSW held workshops in late 2018 with its key internal stakeholders to identify needs for future investments in all regions of Sydney. Following these workshops, WaterNSW planning team reviewed the needs, and engaged independent consultant

(SMEC and GHD) to review the proposed needs and identify preferred refurbishment or replacement options and cost estimates where the need is valid.

The consultants undertook site assessments with the asset managers and operators and captured the preferred option and costed these options. In considering the preferred option, the options were assessed or prudency against the need, with the cost of individual options and their effectiveness in meeting the need efficiently being an integral part of the assessment process.

The renewals budget under this project is exclusive of projects covered under other programs in the Greater Sydney IPART submission (e.g. SCADA, roads and bridges), irrespective of whether they were initially assessed by SMEC. Close to half the budget for the program can be categorised as civil works.

Greater Sydney Resilience Provision (WEM169)
This program has been developed with the aim to improve operational resilience of WaterNSW in the water supply network. A study has been undertaken to identify areas of vulnerability within the water supply network. The resilience study identified a project to address a high-risk failure scenario where both Warragamba pipelines fail upstream of the Orchard Hills offtake due to terror attack or unforeseen rupture. Works would include a new pipeline and infrastructure from Prospect reservoir to Orchard Hills offtake.

WaterNSW have not demonstrated any link to any particular performance measures which would identify a need for the project. Although this project is identified as an 'existing mandatory standard' it more readily appears to be a discretionary spend project i.e. it is not linked to any deterioration in asset performance. -

We consider this to be imprudent on the basis that there are two existing pipelines with interconnectors already in existence and this would appear to be a gold-plating project. We were not provided with significantly robust evidence on the need for this project to justify its expenditure. We recommend not including any expenditure for this particular project as per our recommended adjustment in Table 6-3 below.

Table 6-3 Greater Sydney Resilience provision- recommended capital expenditure

GREATER SYDNEY RESILIENCE PROVISION (WEM169)							
2019/20 $ 000k	**2021**	**2022**	**2023**	**2024**	**2025**	**2021-2024**	**2021-2025 (Total Project)**
Proposed June 2019 SIR	1,920	5,687	5,531	3,861	1,963	17,000	18,963
Atkins recommended adjustment	(1,920)	(5,687)	(5,531)	(3,861)	(1,963)	(17,000)	(18,963)
Atkins proposed expenditure	0	0	0	0	0	0	0

6.5. Growth

WaterNSW did not classify any of its capex as growth prior to 2020[20]. Two projects have now been identified as growth expenditure. These are:

- Greater Sydney Supply Augmentation (WGO002). $13.9M spread between 2020 and 2021;
- Greater Sydney DRS A (WGO002). $245.2M between 2020 and 2024. This relates to the Avon Deep Water Access Project.

Both of these projects are reviewed below. We note that other Drought Response Schemes (DRSs) have been classified by WaterNSW under the 'government program' driver and are discussed in Section 0.

[20] Except for negative $19k assigned to Warragamba Dam Raising

Greater Sydney Supply Augmentation

This project line refers to identification and planning work for options to augment the water supply for Greater Sydney. The studies undertaken in the current Determination period has identified the Burrawang to Avon Tunnel (BAT) project as the preferred option.

WaterNSW commissioned a consultant to develop the Greater Sydney Augmentation Plan 2100. This identified a number of water supply "portfolios" which were subjected to economic optimisation and prioritisation using Multi-Criteria Analysis (MCA).

The chosen portfolio has the lowest Net Present Cost although we note that it does not score highly against operability, safety and greenhouse gas production.

[redacted]

The submission includes two project lines with this title. One, WNM003, incorporates [redacted] between 2017 and 2019, which was classified as 'new mandatory standards' rather than 'growth'. The other, WGO002, incorporates [redacted] shared between 2020 and 2021.

The costs in the submission relate to planning and business case preparation. WaterNSW is currently drafting the Infrastructure NSW Strategic Business Case for which it is aiming to have internal approval by the end of 2019, to submit to the NSW Expenditure Review Committee (ERC) in mid-2020. The aim is to finalise the business case in 2021.

It its Preliminary Business Case[21], WaterNSW requested Board approval for expenditure of [redacted] to undertake detailed planning activities and preparation of a Final Business Case, in addition to [redacted] already approved in September 2016 to undertake preliminary planning. The price base of the approvals is not clear, but these amounts are approximately equivalent to the [redacted] in $19/20 incorporated in the submission.

The [redacted] included [redacted] of overheads, equivalent to [redacted]% of direct costs. This appears to be a very high level of overhead allocation and compares to recent projections provided by WaterNSW of [redacted] for this project. We have applied an adjustment of [redacted] to take account of the difference between a [redacted] and [redacted] overhead allocation and applied this to the projected expenditure for 2020 and 2021.

[21] The document is not dated but appears to have been prepared in 2017 based on the document reference.

Table 6-4 Greater Sydney Supply Augmentation - recommended capital expenditure

GREATER SYDNEY SUPPLY AUGMENTATION								
2019/20 $ 000k	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**Total Project**	**2021-2024**
Proposed June 2019 SIR	[redacted]							
Atkins recommended adjustment								
Atkins proposed expenditure								

Greater Sydney DRS A- Avon Deep Water Access Project (WGO003)

A drought options study was prepared to examine the actions which could be undertaken to tackle the drought. The study recommended that preliminary planning proceed for a number of interventions, including the Avon Deep Water Access Project in the first tranche. It also identified trigger levels for detailed planning and commencement of construction, although we understand that these are being reviewed in the light of more recent outturn reservoir depletion rates.

The Avon Deep Water Access Project is the only scheme for which WaterNSW has included construction costs in the submission. The study provided indicative timescales suggesting that construction may need to start in early 2020. WaterNSW's latest view is that it is likely construction may need to start in mid-2020 if the drought continues.

At the time of interview WaterNSW was planning to submit the strategic business case to Infrastructure NSW and for the project to be taken to ERC in 2019. It was expected that a detailed business case would be complete by February or March 2020, including detailed concept design.

The submission includes $245.2M, of which $9.1M falls in the current Determination period. WaterNSW has conducted an options appraisal which examined a number of lower capex options, involving submarine pipe routes. It has concluded that the higher cost, conventional, overland pipe route options is preferable because of the program impact and technical risks of the piling required to construct submarine pipework. We consider this reasonable.

WaterNSW has undertaken a study of the water quality implications of the scheme. This has concluded that it expects the water quality to be acceptable except if there is a major nutrient inflow caused by major rainfall whilst dam levels are low. It is understood that Sydney Water is looking at the ability of the Illawara WFP to treat the anticipated water volume and quality.

It is not possible to predict how the drought will evolve. However, we consider that the project is prudent as it reduces the risk of water deficits for a number of years and may help to defer or reduce the scale of major investments [redacted], which would be much more costly. The scheme will also remain in place to improve resilience to future droughts.

We therefore consider that, if the drought continues, this is likely to be prudent expenditure. However, the trigger point for commencement of construction will require significant consideration and the construction contracts will need to be structured to take account of the potential for the decision to be reversed if the drought breaks. It will also need to be subject to confirmation of treatment capacity.

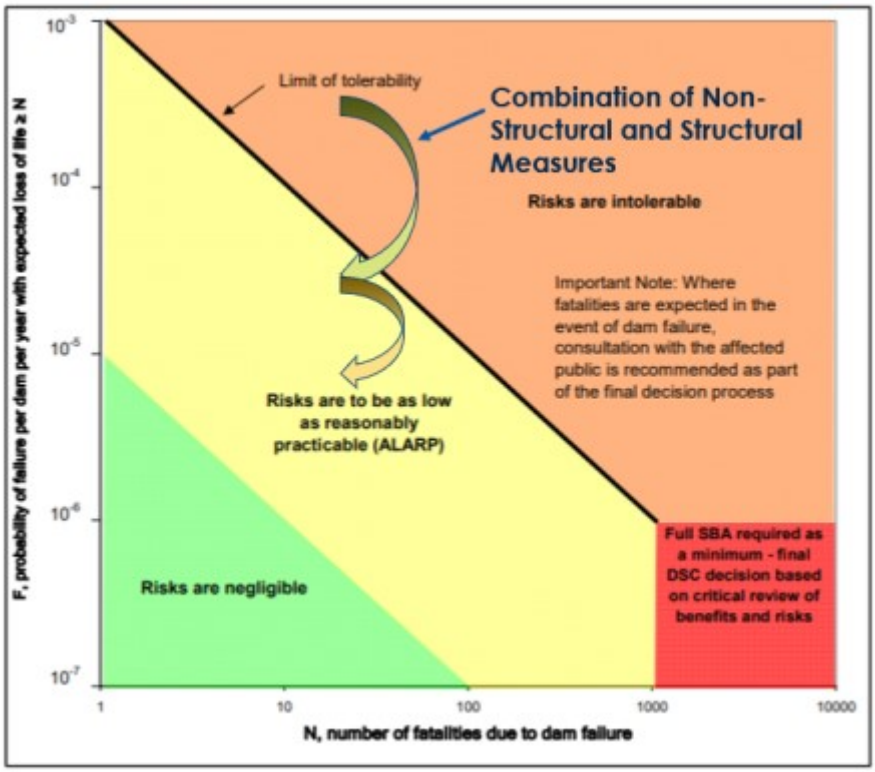
We have not recommended an adjustment to the cost in the submission for the scheme.

6.6. New mandatory standards

'GS Post-PRA Dam Safety Upgrade Program (WNM007)

The NSW Dams Safety Committee (DSC), as the dam safety regulator, sets the framework and principles for dam safety requirements, and sets the risk tolerance criteria for public safety. Contemporary practice within Australia and overseas has moved towards a risk-based approach for the management of dam safety risks, rather than purely on a deterministic standard.

In 2002 and 2012, WaterNSW (then State Water) carried out a Portfolio Risk Assessment (PRA) on its portfolio of rural dams. The initial PRA of rural dams in 2002 provided a systematic review of WaterNSW's rural dams with a confident understanding of the risk profile. The outcome was a risk mitigation program by undertaking staged dam safety upgrades which are prioritised to mitigate any intolerable risks. WaterNSW is now at the end of a 10 year ~$320 M capital works 'Dam Safety' program, which has reduced the societal risks at the 7 highest risk rural dams to a tolerable level.



Source: Risk management policy framework for Dam safety

Figure 6-4 DSC's Societal Risk (F-N Curve) illustrating Progressive Staged Risk Reduction approach

To align the risk-based approach to dam safety management, WaterNSW commenced a PRA project for the Greater Sydney dams in 2017 and is currently in the process of finalising and closing out this project. The outcome of the Greater Sydney PRA identified four dams (Cataract, Cordeaux, Fitzroy Falls and Woronora Dams) above Limit of Tolerability; i.e.; plotting within the intolerable risk zone on the DSC's societal risk chart for existing dams. As a result, dam safety upgrade has been recommended to reduce overall risk below the line of tolerability, thus meeting regulatory conditions set by the DSC.

The fully loaded (including capitalised overheads) expenditure proposed for the program is [redacted] of which [redacted] is in the future Determination period. WaterNSW has undertaken a comparative cost estimate for the program utilising the historic standards-based decision making framework which would have required nine dams not meeting the criteria and a total expenditure of some $185M. WaterNSW has established supply

chain partners have frameworks in place including in-house capability with significant experience in delivering comparable projects in the rural dams' space. The dam safety program therefore appears to deliver value for money we have not made any program specific adjustments to this.

6.7. Discretionary expenditure

Only $482k has been classified as discretionary expenditure during the current Determination period (related to Warragamba Embankment Upgrade) and WaterNSW has not proposed any expenditure against this driver for the next period. We have not therefore reviewed any discretionary expenditure projects.

We note that the categorisation of Warragamba Embankment Upgrade appears to be inconsistent, with $482k of expenditure classified as discretionary expenditure (WDS031) between 2017 and 2019 and then $5.9M in 2020 classified as existing mandatory standards (WEM126). The 2016 final report on the IPART Review of Prices for WaterNSW listed this project as 'mandatory standards- renewals.

We have not recommended an adjustment as the expenditure is relatively minor and the driver classification does not significantly affect the expenditure review. We would, however, recommend that WaterNSW adopts a more consistent approach to classification of expenditure.

6.8. Government programs

Warragamba Dam Environmental Flows (WGP008)

This project supports State Government policy as documented in the Metropolitan Water Plan. Outcome 4 of the Metropolitan Water Plan is that "Rivers downstream from dams are healthy". The purpose of the project is to improve the health of the Hawkesbury-Nepean River be introducing a variable environmental flow regime through releases of water from Warragamba Dam.

The following new infrastructure and modifications to existing infrastructure are required to deliver the environmental lows:

- Modifications to pipe work within the disused Hydro Electric Power Station (HEPS) to allow for environmental flow releases and accommodate for a potential new turbine installation;
- Modification of the existing HEPS offtake on the upstream of the dam to include a multi- level offtake, with additional benefits from better management of cold-water pollution risks.

The design of the environmental flow regime is being led by WaterNSW. The flow regime has been determined by government and will be will be directed to WaterNSW as a policy position. The flow regime is expected to require flows in the range of 0 to 6750 ML/day with 95% of release being less than 500 ML/day. Design of the infrastructure is currently in progress. Design of the environmental flows project is being progressed alongside the design of the raising of the wall of Warragamba Dam to ensure that any constraints and synergies are identified and accounted for in the design.

Planning and design of the environmental flows project has been brought forward into the current period to align with dam wall raising design. The internal business case has the following program for delivery:

- Detailed design, obtain environmental approvals and submission of final business case – Quarter one 2021;
- Award delivery contractor -Quarter 4 2021;
- Project completion – late 2026.

We queried how any potential delays to the timing of the dam raising project would impact this project to which WaterNSW responded:

The implementation timing of Warragamba e flows is dependent on the Warragamba dam raising being approved by the Government, with no decision expected until quarter 1 2021. If the dam raising does not proceed, the e flows procurement of delivery contractor would start quarter 2 in 2021 and construction quarter 1 2022. As advised in the interviews, the timing is very fluid at the moment and current timings are subject to the NSW Government's approval for the dam raising.

[redacted] We therefore consider it likely that the environmental flows project will need to be delivered separately to the dam wall raising. WaterNSW estimates that this will lead to a one-year delay in delivery. However, we think that this timing is also optimistic. We consider that the following factors make it more likely than not that this project will not commence until outside the current period:

- The amount of uncertainty and opposition to the raising of the dam wall will lead to more time being required to decouple the two projects. We understand that WaterNSW has progressed each as separable portion for design and approvals but there will be some planning, approval and design items that need to be separated. Also, there will be a need to engage with stakeholders (including the community) as to the different drivers for each project;
- WaterNSW's corporate focus in coming years will be primarily on the drought response. Its capacity to deliver the drought response will also extend its overall ability to deliver capital works. This project does not have the same urgency for delivery and therefore given its scale, deferral will better enable WaterNSW to respond to the drought.

The above represent our opinion of the most likely circumstances that will influence delivery of this project based on the information available to us. On this basis, we recommend that the capital expenditure for delivery of this project be deferred to commence in 2023/24 as a likely timing for commencement. We consider that the planning and design costs in the current period are justified.

We identified that the SIR includes direct costs of $105.6m which is $6.9 million higher than the latest cost estimate in the preliminary business case. Without justification for this $7 million increase, we recommend that the efficient expenditure be aligned with the business case

Our recommended expenditure following adjustment to align with the SIR and deferral of expenditure is shown in Table 6-5 below.

Table 6-5 **Warragamba Environmental Flows - recommended capital expenditure**

WARRAGAMBA E-FLOWS (WGP008)								
2019/20 $ 000k	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2021-2024**	**2021-2025**
Proposed June 2019 SIR	5,264	11,633	39,052	29,189	20,283	6,638	100,156	112,058
Reduction in line with business case	0	0	0	-756	-2,539	-1,898	-1,319	-432
Deferral adjustment	0	-11,633	-39,052	-17,556	18,770	22,551	20,283	6,638
Total Atkins recommended adjustment	0	-11,633	-39,052	-18,312	16,231	20,653	18,964	6,206
Atkins proposed expenditure	5,264	0	0	10,877	36,513	27,291	18,964	6,206

Drought Response Schemes

WaterNSW has included $70.6M for four drought response schemes in 2020 and 2021. All of the costs relate to planning works rather than construction costs. The expenditure consists of four project lines:

- $8.3M for DRS K- this relates to [redacted]. We understand from WaterNSW that this project has now been put on hold and there will be no expenditure in 2020;
- $9.3M for DRS L- this relates to [redacted];
- $25.5M for DRS [redacted]- planning for [redacted];
- $27.5M for DRS [redacted]- planning for [redacted].

We have recommended adjustments to reflect:

- The halt put on DRS K meaning that no expenditure is expected in 2020;
- The estimate of [redacted] for expenditure on [redacted] in 2020 rather than the [redacted] indicated in the submission.
- Continuing and catch-up efficiencies in 2021 as set out in Section 6.11 below. These efficiencies reduce the recommended [redacted]. As with other capex projects, these program-wide adjustments are not reflected in the project level expenditures in this section but are applied to derive the total recommended efficient expenditure shown in Section 6.11.

These adjustments are summarised below:

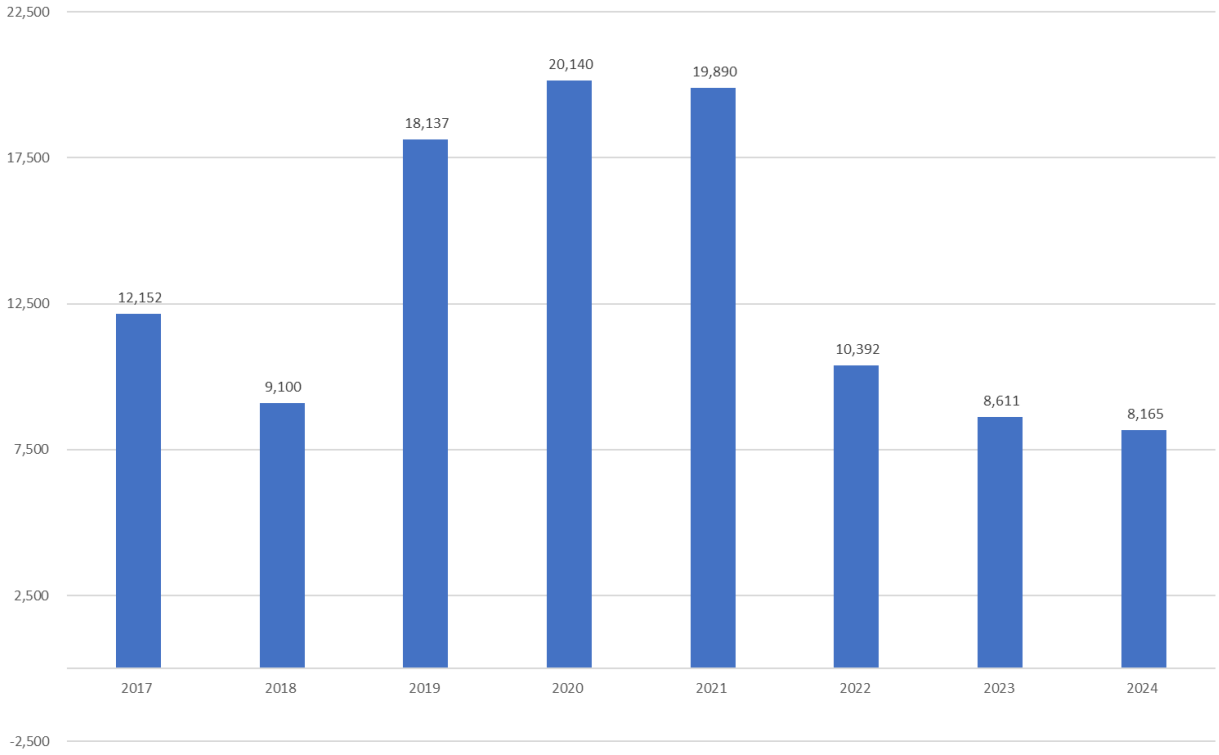
[redacted]

[redacted]

6.9. Corporate Expenditure

The other significant area of capital expenditure is corporation-wide projects. Corporate functions include the costs and systems associated with running WaterNSW to achieve its core functions for Greater Sydney, including ICT, Property, Fleet, Human Resources and Finance.

WaterNSW's approach to capitalising overheads across the price controls means that corporate expenditure is only identified at individual line item level in the SIR rather than being separately identified under a Corporate program. We have made a coarse analysis of what we understand to be the Corporate items to allow for comparison between years and between price paths, which is summarised below.



Source: Atkins Cardno analysis

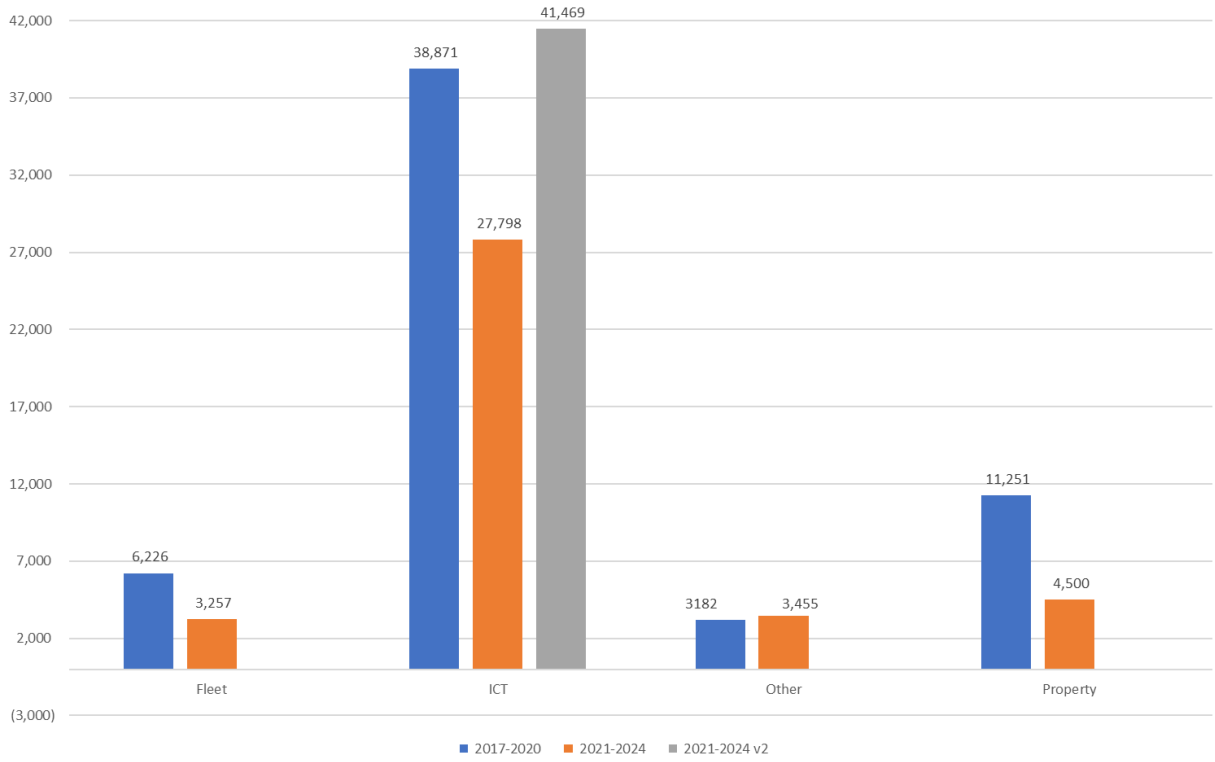
Figure 6-5 Corporate expenditure by year (inferred)

Capital expenditure on corporate projects in the current price path is forecast to exceed the amount in the 2016 Determination. This has been driven by $12.6m increase in ICT expenditure which we discuss in Section 6.9.1.1.

The capital expenditure in the next price path is forecast to begin a downward trend from 2021 driven by significant savings on Fleet, a return to BAU expenditure on Property after the one-off office consolidation in Parramatta, as well as a small reduction in ICT expenditure which returns to a level of total expenditure similar to the first two years of the current price path.

We have focused our analysis on the three key areas of corporate expenditure in the current and future price plans: ICT, Property and Fleet. The breakdown by program in the current and future Determination periods is shown in Source: *Atkins/Cardno analysis of SIR*

Figure 6-6. The same assumptions have been made as in the above analysis when analysing the SIR. We have queried the treatment of Systems and Controls and whether this should be included in ICT expenditure, which is discussed in 6.9.1.1.



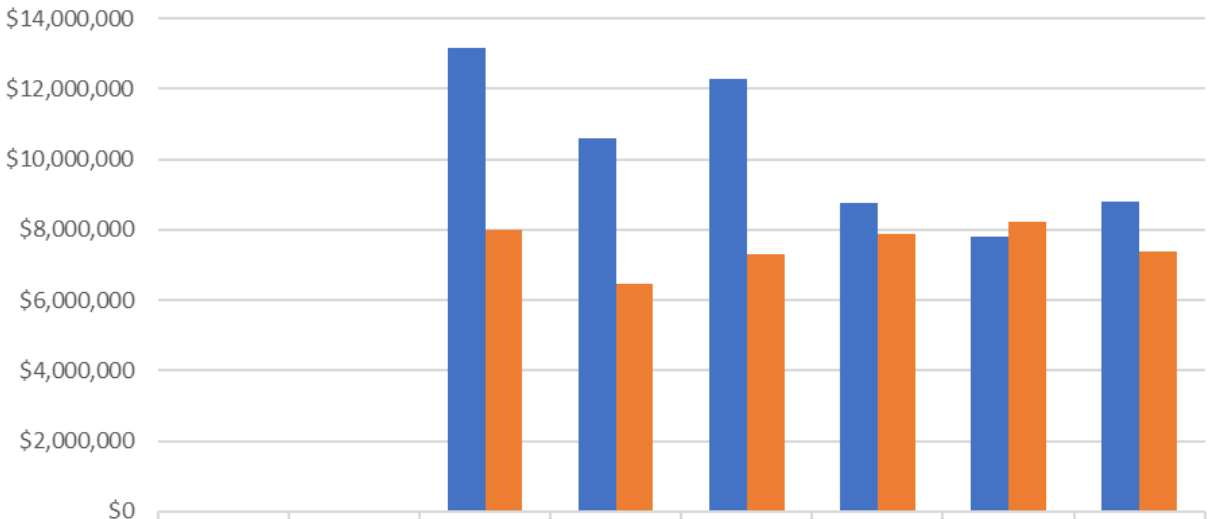
Source: Atkins/Cardno analysis of SIR

Figure 6-6 Corporate expenditure by program (inferred)

We are unclear on the drivers as the majority of the expenditure is assigned to a Business Efficiency driver in the current price path but then to Existing Mandatory Standards in the next path. This does not appear to be an accurate reflection of the actual drivers.

6.9.1. Information and Communication Technologies (ICT)

IT expenditure does not easily lend itself to focusing only on capital investment. In the current Determination period, the split is approximately 60% capex to 40% opex and in the next Determination period this is forecast to move to 55% capex and 45% opex. The levels of expenditure are therefore very similar and hence why it is important to assess ICT projects on a totex basis. The onus is on WaterNSW to demonstrate that its optioneering does not contain a capex bias but considers the lowest whole life cost solution. Operating expenditure may relate to direct costs for the implementation of capital projects or to recurrent expenditure associated with licences and support for new projects.



Source: WaterNSW RFI response 146

Figure 6-7 ICT expenditure over two price paths

6.9.1.1. 2016 Determination Period

WaterNSW is forecasting that capital expenditure will be $35.7m, which is $12.6m higher than the IPART Determination.

Table 6-6 WaterNSW ICT capital expenditure in current price path

($M 2019-20)	2017	2018	2019	2020	Total 2017-2020
ICT Capital expenditure	5.27	8.50	13.16	10.59	37.52

Source: WaterNSW RFI response 146

2017 and 2018 were missing from WaterNSW's submission however based on our analysis, expenditure for these years when added equates to $37.5m.

While at face value, this is a significant increase, it was foreseen by WaterNSW at the time of the last review. A proposal was submitted to IPART to invest a further $15m ($nominal) as no consideration had been made at the time of the original submission for ICT requirements as a result of the SCA-State Water merger. This was rejected as it was determined that IPART and external stakeholders did not have the opportunity to assess the prudency and efficiency of the proposed additional ICT capital expenditure. In reality, WaterNSW's capital expenditure is forecast to be ~$4m under the total amount subsequently requested.

WaterNSW's submission is thorough and comprehensive in its commentary and analysis of expenditure in the future price path, however the same visibility and level of detail is not reflected in the current price path. This has made it more challenging to review the current price path and this is an area for improvement in future submissions.

In terms of the major items of expenditure, they relate to:

- Corporate Systems - $17m, which includes $13m on CIMS, against an allowance of $3m;
- Renewals - $5m against an allowance of $9m;

- Data Centre - $3m compared with less than $0.5m in the allowance;
- Analytics - $3.5m compared with a nominal amount in the allowance.

There was no expenditure originally allowed for Business Process Automation, Operational Technology or Security, which incurred ~$4m. To offset this expenditure, there were significant savings in telecommunications and renewals compared with the allowance. We also saw evidence where projects were either withdrawn as they were no longer required or deferred to the next price path as they were not critical or needed to be implemented sequentially after delivery of another project.

6.9.1.1. 2020 Determination Period

Capital expenditure of $27.8m represents projects that are "purely ICT". The figure is $41.5m if investment in Dam Instrumentation Automation Telemetry, Geospatial Equipment & Software, WaterNSW Seismic Monitoring Network and Plant Scada Upgrade are included. These are "operational projects that are related to ICT assets (for the purpose of determining asset life)" and a "dam safety telemetry project which maps to the Systems/Control asset class".

We have also added, a column to confirm the percentage allocated to the Greater Sydney area. We had originally noted some variation but WaterNSW explained that our costs excluding captialised and operational overheads, whereas the Greater Sydney numbers are inclusive of these overaheads. In WaterNSW's words, this "…yields a consistent average allocation of approximately 37%". Dam Instrumentation Automation Telemetry and Plant Scada Upgrade are not Corporate wide projects so the allocation to Greater Sydney is thus 100%. Meanwhile Geospatial Equipment and Seismic Monitoring Network relate to Greater Sydney and Rural only, hence they have a higher allocation of 66% relative to other projects which would also be split across the WAMC business unit.

Table 6-7 ICT expenditure in the future price path including and excluding Operational projects

Item	Ref	2021	2022	2023	2024	Greater Sydney Total	GS % of Total
ICT Data Centre	WEM093	432	379	377	375	1,563	37%
ICT Renewals and Replacement	WEM122	1,130	940	1,027	1,025	4,122	37%
ICT Telecomunications	WEM152 & WEM155	872	316	317	318	1,823	37%
ICT Operational Technology	WEM153 & WEM158	2,038	990	992	944	4,964	37%
ICT Corporate Systems incl. CIMS	WEM156 & WEM123	853	749	743	773	3,117	37%
ICT End User Computing & Collaboration	WEM157	780	668	613	694	2,755	37%
ICT Water Market Systems	WEM159	1,378	859	566	426	3,228	37%
ICT Business Process Automation Program	WEM162	308	243	178	176	905	37%
ICT Cyber Security	WNM008	274	228	229	228	960	37%
ICT Analytics	WNM009	1,467	1,069	1,003	822	4,361	37%
Total		**9,533**	**6,441**	**6,043**	**5,781**	**27,798**	37%

Item	Ref	2021	2022	2023	2024	Greater Sydney Total	GS % of Total
ICT Data Centre	WEM093	432	379	377	375	1,563	37%
ICT Renewals and Replacement	WEM122	1,130	940	1,027	1,025	4,122	37%
Dam Instrumentation Automation Telemetry	WEM146	2,074	1,759	1,201	1,360	6,395	100%
ICT Telecomunications	WEM152 & WEM155	872	316	317	318	1,823	37%
ICT Operational Technology	WEM153 & WEM158	2,038	990	992	944	4,964	37%
ICT Corporate Systems incl. CIMS	WEM156 & WEM123	853	749	743	773	3,117	37%
ICT End User Computing & Collaboration	WEM157	780	668	613	694	2,755	37%
ICT Water Market Systems	WEM159	1,378	859	566	426	3,228	37%
ICT Business Process Automation Program	WEM162	308	243	178	176	905	37%
Geospatial equipment and Software	WEM165	550	156	149	14	868	66%
WaterNSW Seismic Monitoring Network	WEM166	237	274	274	-	785	66%
ICT Cyber Security	WNM008	274	228	229	228	960	37%
ICT Analytics	WNM009	1,467	1,069	1,003	822	4,361	37%
Plant Scada Upgrade	WEM131	637	642	1,342	3,002	5,623	100%
Total		**13,031**	**9,273**	**9,009**	**10,156**	**41,469**	62%

Source: SIR combined with costs provided in FY21-24 GS Funding Submission: BSI Meeting Presentation, September 2019

In summary:

- Data Centre - The major investment in the DC infrastructure occurs in the last year of the current price path so the focus returns to BAU expenditure to account predominantly for capacity growth as well as some investment in asset renewals, disaster recovery capability as well as technical uplift on server operating systems and databases;
- Corporate Systems – The focus is on augmenting field service mobility, automating HR systems and peripheral system integration Benefits and efficiencies;
- Analytics – This focuses on WaterNSW's ability to perform descriptive, predictive and prescriptive analytics across the data WaterNSW uses to perform its duties and meet its objectives. Investment is identified in the Corporate Dashboard & Reporting, automating the Customer Insight Portal, replacement and consolidation of the Water Data Management and Modelling capacity and creating a single repository for all water corporate data to ensure a 'single source of truth', referred to as the Information Catalogue, and which will also be made available to external stakeholders (BOM, DPIE, NRAR, external researchers, large customers);
- Telecommunications – The focus of this program is on reviewing the technology in the field and replacing where it is either not fit for purpose or at end of its useful life, asset life replacement cycle of voice communications assets, data network improvements and site-based local network improvements. For Greater Sydney, the level of investment in this area is less as a proportion than for the rest of the business as geography is not such a challenge compared with other parts of NSW.

The level of detail sitting behind the investment being sought varies. For some areas, such as asset renewals or investment in the Data Centre, there is a very strong audit trail to justify the need, identify the costs and demonstrate the benefits. On some areas, they are too early in their development to provide the same level of detail not least in terms of quantifying the benefits that will be achieved. For some of more adventurous areas of digital transformation, there was little in the way of utility collaboration and partnering presented to us: there is plenty of good practice and innovative projects being developed both in Australia and internationally for WaterNSW to tap into and which would minimise the risks associated with investment in new capabilities. A reverse example of this is DamGuard, which WaterNSW has developed and for which there has been considerable interest from other States in Australia to purchase.

6.9.1.2. Benefits and efficiencies

One of the drivers of digital expenditure is to deliver benefits including business efficiencies, which are particularly pertinent to this review where they translate into capital or operating expenditure savings or avoided expenditure. WaterNSW recognises as much in its latest strategic document: 'Improved Productivity' is one of the five strategic drivers underpinning the ICT program: Aim[s] to reduce inefficiencies and duplication, giving our people the right systems and technologies to support their work".

In our opinion, it is not easy to track the benefits and thus there could be a clearer line of sight to demonstrate if ICT investments successfully achieve what is set out in business cases. Part of the issue is that benefits may not be realised until the next Determination period (so efficiencies in 2016-20 may actually be realised from ICT investments made in the 2012-16 Determination period). Another challenge is that it is generally not the BSI team's responsibility to track those benefits, although from our perspective they should form part of the submission made to justify the ICT investments. Clearly if the efficiencies set out in a business case are not realised, or only partially delivered, this may lead one to conclude that some or all of the expenditure was not prudent hence why this is critical in our view to have visibility on the outcomes of the investments.

We recognise that benefits are not only financial. There is scope to improve how business cases identify operational outcomes that will be delivered and then track those, such as improving operational performance or customer metrics as measured by WaterNSW's Operating Licence. CIMS and DamGuard are good examples where one would expect there to be metrics on an upward glidepath as a result of the new systems and processes that have been put in place.

Overall, this is an area in WaterNSW's submission (and subsequent presentations made to the review team) in which we believe there is room for improvement.

6.9.1.3. Strategic Overview and Project Review

A strategic overview and detailed analysis of a sample of projects can be found in Appendix A ICT Expenditure Additional Analysis.

6.9.1.4. Benchmarking

We have considered benchmarking as useful to inform the appropriateness of WaterNSW's level of ICT investment. As shown in Table 6-7 below expenditure as a percentage of its total expenditure averages at 4.1% if we only consider purely ICT projects (or 6.1% if the wider interpretation discussed in 6.9.1.1 is used)[22].

Table 6-8 ICT expenditure as percentage of total capital expenditure

ICT as % of total capital expenditure	2021	2022	2023	2024	2021-2024
Capital ICT expenditure ($2019-20) v1	9,532	6,441	6,043	5,781	27,798
Capital ICT expenditure ($2019-20) v2	13,031	9,273	9,009	10,156	41,469
Total capital expenditure ($2019-20)	147,155	216,865	216,903	101,489	682,411
ICT capex as a proportion of total capex v1	6.5%	3.0%	2.8%	5.7%	4.1%
ICT capex as a proportion of total capex v2	8.9%	4.3%	4.2%	10.0%	6.1%

There are some factors that need to be taken into consideration:

- A major limitation of benchmarking a business's expenditure within a relatively short timeframe is that businesses may be at different points in their investment cycles. In WaterNSW's case it is going through a significant transformation as a result of the merger over two Determination periods with multi-year capital projects and as such, it is to be expected that WaterNSW's expenditure will trend upwards in comparison to the benchmark during this period;
- It is not generally possible to drill down into the detail of benchmarking data to confirm there is a like for like comparison. For example, it varies between utilities whether telemetry and SCADA are included under Corporate expenditure or within the Water/Wastewater/Recycled expenditure[23];
- There is a new trend when compared with the last two Determination periods whereby we are witnessing a transition in the digital sphere to Software as a Service operating expenditure solutions where in the past capital infrastructure solutions would have been the norm. There are likely to be adjustment costs associated with the transition with some upward pressures on both capital and operating expenditure in the short term but over time the move to opex-based services should lead to lower combined operating and capital expenditure profiles.

For the data that we have available for Australia over a seven-year period, the mean ICT capital expenditure is 6.0%. This suggests that WaterNSW's ICT expenditure represents an efficient level of expenditure of the next price path.

6.9.1.5. Conclusions

For the current price path, we have taken into account the challenges posed by the merger and how effectively the new strategy has been implemented and we concluded with only one exception that there were no grounds to challenge the prudency and efficiency of the expenditure. The exception relates to some imprudent expenditure relating to the CIMS implementation discussed in 6.9.1.3.

In terms of the future price path, the challenge from an efficiency review perspective is that individual projects often do not have a robust business case to justify them. We have therefore focused on satisfying ourselves that WaterNSW has the capacity and capability to develop and manage these programs of work by considering

[22] For the purposes of benchmarking, we believe it is more appropriate to exclude telemetry and SCADA.
[23] For example, Sydney Water had historically captured telemetry and SCADA expenditure under Wastewater but for its 2020-2024 submission, this now sits together under Digital ICT Corporate expenditure.

its overall strategy and assessing its track record in the current price path combined with our observations on benchmarking. We are not therefore proposing any capital efficiency adjustments for specific projects.

In addition, we also identified some areas for improvement:

- Management of ICT opex should mirror the focus on ICT capex with clear demonstration that:
  - Whole life costs are considered to select the lowest totex solution (this appears to be the case);
  - Opex costs are understood and being minimised (this was not clear from the focus of the submission and presentations made to us).
- Benefits, especially relating to efficiencies, delivered by ICT investments may be set out in business cases but the approach to tracking and demonstrating their achievement needs to be mainstreamed more effectively by the business. In many cases, this will not sit with BSI as their responsibility is for implementation. At present, there is not a clear line of sight between many of the benefits highlighted by ICT investments to the efficiencies being presented by WaterNSW
- There is potential for horizon scanning, collaboration and partnering on areas of emerging or unproven technology which may be happening but was not clearly identified by WaterNSW as occurring.

6.9.2. Property

The costs associated with the Property portfolio are summarised in Table 6-9. Expenditure across the two price paths is dominated by two large items, the office consolidation project at WaterNSW's new headquarters in Parramatta (55% in 2016-20) and the South West Corridor Depot project (40% in 2016-20 and 100% of capital expenditure in 2021-24).

Table 6-9 Property expenditure in current and future price paths

	Current Price Path					Future Price Path				
$2019/20	**2017**	**2018**	**2019**	**2020**	**Total**	**2021**	**2022**	**2023**	**2024**	**Total**
CBD Office Relocation		2			**2**					**0**
Tamworth Relocation			2		**2**					**0**
Dubbo - Refit / Refurbishment				107	**107**					**0**
Nepean Office furniture			18		**18**					**0**
South West Corridor Depot	[redacted]					[redacted]				
Sydney office consolidation project	6,136	34		-	**6,170**					**0**
Replacement Warragamba Conf Centre Heritage F	199	0	1		**200**					**0**
South West Corridor Depot			0		**0**					**0**
Water Hub Fitout		202			**202**					**0**
Albury Office Setup - C3		56			**56**					**0**
Total	[redacted]					[redacted]				

Source: WaterNSW June 2019 SIR

Sydney Office Consolidation Project – Current Price Path

One of the direct results of the merger was the need to identify a suitable location for the new organisation. While the Business Case was almost neutral in terms of cost benefit analysis, the real driver and benefit is the social capital that has been created by bringing together three organisations, facilitating collaboration and creating an identity for the new business.

Four options were considered - Campbell Town, Penrith, Australia Square in the Central Business District (CBD) and Parramatta. Ultimately Parramatta was selected as the preferred location and it was at the time the only major construction site in Parramatta although its popularity as a workspace hub has grown significantly in a very short space of time. The building is rated as 5 star for the condition assessment, the highest rating. WaterNSW completed its move in May 2017. A headcount of 350 was originally assumed and we looked into the prudence of this footprint because there is a balance to achieve otherwise there is a risk of having either under capacity and incurring unnecessary costs or over-capacity which may require additional investment to expand the location or seek an alternative. Evidence suggest it has been right sized because some extra

capacity has been required but WaterNSW has been able to remove some open areas in order to maximise the space available to meet its needs.

The final outturn costs were very similar to the original business case of $10.5m. $6.2m represents the allocation to Greater Sydney. There was also a significant discount negotiated with its landlord, the Western Sydney University, which was taken upfront rather than as a reduction on future lease costs thereby reducing significantly the fit-out costs.

Overall, we believe that the consolidation of the various offices and move to Parramatta appears to have been managed in line with good practice and has been undertaken in a prudent and efficient way.

South West Corridor Depot – Current and Future Price Paths

Following on from establishing its HQ, the next strategic priority identified in the Property program has been focused on providing personnel in the field with office and workshop facilities which are suitably located and satisfactorily equipped to facilitate effective working. This has translated into establishing a centre of operations servicing six dams in the South West corridor by consolidating multiple WaterNSW offices and depots to one location.

WaterNSW undertook a feasibility study to review the options as well as providing indicative costs. A refurbishment of the current site at Nepean dam was forecast to cost [redacted] due to the stringent heritage requirements but it would not have had the required capacity; leasing new premises at another location was another option considered but the most advantageous from a financial and operational perspective was a new build at Nepean at a cost of [redacted] as well as addressing WaterNSW's on-going heritage obligations at Nepean.

[redacted]

In order to cater for the daily depot operations and the staff that will be occupying the site, it has been established that four structures and two open and secure vehicle parking areas will be required:

- Office Building
- Warehouse Workshop

- Carport Vehicle Storage
- Secure Vehicle Storage
- WaterNSW Secure Open Vehicle Parking
- Personal Open Vehicle Parking

All the expenditure associated with this project is allocated to Greater Sydney. There are also considerable efficiencies cited from delivery of the project but as yet they have not been quantified. This makes it difficult to assess the prudency of the investment although we note that business efficiency is only one of the drivers. We understand that the preliminary business case was being completed at the time of writing and a decision on approval will be made by the Board in November 2019.

One of the reasons that the project can be implemented relatively very swiftly is that WaterNSW has selected a pre-fabricated build for the main office structure which will be built off site and then assembled in Nepean. This will also maximise efficiencies in costs. However, we challenged the profile of expenditure which anticipates major expenditure in the last year of the current price path and completion by the end of the first year of the future price path:

- There is a preliminary design but this still needs to be worked up into full and final agreed design
- Heritage approval is required under the Heritage Act NSW (1977) and while WaterNSW has sounded out the authorities who have indicated their buy-in, it will still take time to complete the due processes
- Investigations need to be completed into the land and groundworks are required on site to be ready to receive the building – the assumption that has been made is that there will be no need for any land remediation as no contamination will be identified
- The building needs to be pre-fabricated

The expenditure should therefore be re-profiled as it is unlikely that there will be significant spend in this financial year.

We also queried the total capital expenditure being sought as the financial summary feeding into the draft business case referred to capital costs of [redacted]. WaterNSW confirmed that the SIR figure was an earlier estimate and the current forecast outturn is therefore 40% higher. This is a substantial increase and we believe WaterNSW should look for opportunities to reduce the scope, seek more innovation in the design or procurement and/or reduce the corporate overheads associated with this project to minimise this increase. We suggest that half of the [redacted].

Table 6-10 Re-profiled and increased capital expenditure recommended for South West Corridor Depot expenditure in current and future price paths

[redacted]

6.9.3. Fleet

Fleet was a specific output measure for the 2016 Determination. It was stated that WaterNSW should achieve a reduction in vehicle changeovers of at least 4 vehicles on average per year until 2020-21 with the rationale that this would deliver an efficiency gain.

It is fair to say that there has been a complete transformation in the approach to fleet management and there is a step change in investment when compared with the recommended allocation at the last Determination ($10.2m in $19/20 prices), the forecast outturn ($6.2m) and the requirement for the next price path ($3.6m).

Table 6-11 Fleet expenditure in current and future price paths

	Current Price Path					Future Price Path				
Fleet ($19/20)	**2017**	**2018**	**2019**	**2020**	**Total**	**2021**	**2022**	**2023**	**2024**	**Total**
Recommended expenditure (2015 review)	2180	2799	2223	3034	**10236**					
June SIR expenditure	543	287	2790	2605	**6226**	1465	596	596	600	**3257**
Revised expenditure profile	543	287	2790	2605	**6226**	1465	596	596	920	**3577**

Sources: WaterNSW SIR, 2015 Review by external consultants, RFI response 180

While for the purposes of this review, we find the expenditure to be both prudent and efficient, it does suggest that in the past that there was some inefficiency with a reluctance to sweat the assets. The new management has undertaken a thorough review, including considering the option of leasing; the result is that it has been justified to continue the program of capital purchases but the policy decision has modified from renewal every 3 years or 100,000 kilometres to 5 years or 150,000 kilometres from 2018. The assumption on this new basis is that only 49 vehicles will be replaced over the next price path (2021: 20, 2022: 8, 2023: 8, 2024: 13) for Greater Sydney against a total of 151 vehicles for WaterNSW as a whole.

We were also satisfied that the method of procurement is efficient. WaterNSW accesses cheaper bulk rates through the purchasing power of the Whole of NSW Government discount structure as well as negotiating an additional rebate with one vendor in the master purchasing agreement. There is also a fleet management provider, the contract of which is tested in the market every three years. Revenue from disposals is per the IPART disposal rules.

In its Greater Sydney pricing submission, WaterNSW slightly underestimated the number of vehicles required, so there is an increase required to cover five additional vehicles in the Greater Sydney Determination, which results in an increase of $320k investment. We support this investment, which is reflected in the revised profile in Table 6-11..

6.10. Efficient Expenditure in the 2016 Determination period

The IPART brief requires us to comment on the efficiency and prudence of capital expenditure in the current Determination period. The prudence test relates to how decisions are made on the basis of information available at that time and how the investment was executed. We have considered the efficiency and prudence of capital investments during the 2017-20 Determination period.

On the whole, WaterNSW has demonstrated prudent expenditure across its capital program and we have not seen any evidence of any significant imprudent expenditure within the current period. We have made some

adjustments in Table-12

WATERNSW PROPOSAL - CAPEX - WATER SERVICE				
($M 2019/20) year ending June	2017	2018	2019	2020
Existing mandatory standards	16.7	33.5	71.5	84.4
New mandatory standards	0.9	0.9	9.8	7.5
Discretionary standards	0.0	0.1	0.4	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0
Growth - funded by other	0.0	0.0	0.0	21.0
Government programs	0.0	0.0	0.0	52.7
Business efficiency	12.2	8.7	5.5	0.0
Total	29.8	43.2	87.0	165.6
Atkins/Cardno recommended adjustments for specific programs or projects				
Capitalisation policy RAB adjustment			-13.6	-12.3
Supply Augmentation Overhead Adjustment				-3.6
Warragamba E-flows				0.0
DRS K project on hold				0.0
[redacted]				
CIMS adjustment (43% allocated of total WNSW expenditure)		-0.592		
Property - South West Corridor Depot adjustment	[redacted]			
Existing mandatory standards - June 2019 SIR and Nov 2019 AIR reconciliation			-5.0	
New mandatory standards - June 2019 SIR and Nov 2019 AIR reconciliation			-4.3	
Discretionary standards - June 2019 SIR and Nov 2019 AIR reconciliation			-0.1	
Growth - funded by developer charges - June 2019 SIR and Nov 2019 AIR reconciliation			0.0	
Growth - funded by other - June 2019 SIR and Nov 2019 AIR reconciliation			0.0	
Government programs - June 2019 SIR and Nov 2019 AIR reconciliation			0.0	
Business efficiency - June 2019 SIR and Nov 2019 AIR reconciliation			6.7	
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE				
($M 2019/20) year ending June	2017	2018	2019	2020
Existing mandatory standards	16.7	32.9	52.9	72.1
New mandatory standards	0.9	0.9	5.4	4.3
Discretionary standards	0.0	0.1	0.3	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0
Growth - funded by other	0.0	0.0	0.0	17.3
Government programs	0.0	0.0	0.0	18.4
Business efficiency	12.2	8.7	12.1	0.0
Total Efficient Expenditure	29.8	42.6	70.8	112.1
[redacted]				

below.

WaterNSW has followed logical asset management processes to support the development of prudent and efficient expenditure however we have noted that there are deficiencies around cost estimation and prioritisation of works at a program level. Whilst individual projects appear to be justified in isolation a strategic line of sight is not always obvious. We comment below on our view of specific areas where we consider there is scope for efficiencies to be made in the future Determination period.

In Section 5.4 we comment that WaterNSW had changed its capitalisation rules in 2019 resulting in $25.9m operating expenditure being capitalised. This was a change in assumption originally made in the 2016 Determination when this amount was allowed as operating expenditure. While there may be good reason to change the capitalisation policy, we need to compare expenditure using the rules applied when the Determination was made. To avoid double counting this amount both in operating and the RAB for the 2016 period, we have applied a prudent approach and reversing capital expenditure by the same $25.9m, allocating $13.6m to 2019 and $12.3m in 2020.

Table 6-12 Total capital expenditure in current Determination period

WATERNSW PROPOSAL - CAPEX - WATER SERVICE				
($M 2019/20) year ending June	2017	2018	2019	2020
Existing mandatory standards	16.7	33.5	71.5	84.4
New mandatory standards	0.9	0.9	9.8	7.5
Discretionary standards	0.0	0.1	0.4	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0
Growth - funded by other	0.0	0.0	0.0	21.0
Government programs	0.0	0.0	0.0	52.7
Business efficiency	12.2	8.7	5.5	0.0
Total	29.8	43.2	87.0	165.6
Atkins/Cardno recommended adjustments for specific programs or projects				
Capitalisation policy RAB adjustment			-13.6	-12.3
Supply Augmentation Overhead Adjustment				-3.6
Warragamba E-flows				0.0
DRS K project on hold				0.0
[redacted]				
CIMS adjustment (43% allocated of total WNSW expenditure)		-0.592		
Property - South West Corridor Depot adjustment	[redacted]			
Existing mandatory standards - June 2019 SIR and Nov 2019 AIR reconciliation			-5.0	
New mandatory standards - June 2019 SIR and Nov 2019 AIR reconciliation			-4.3	
Discretionary standards - June 2019 SIR and Nov 2019 AIR reconciliation			-0.1	
Growth - funded by developer charges - June 2019 SIR and Nov 2019 AIR reconciliation			0.0	
Growth - funded by other - June 2019 SIR and Nov 2019 AIR reconciliation			0.0	
Government programs - June 2019 SIR and Nov 2019 AIR reconciliation			0.0	
Business efficiency - June 2019 SIR and Nov 2019 AIR reconciliation			6.7	
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE				
($M 2019/20) year ending June	2017	2018	2019	2020
Existing mandatory standards	16.7	32.9	52.9	72.1
New mandatory standards	0.9	0.9	5.4	4.3
Discretionary standards	0.0	0.1	0.3	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0
Growth - funded by other	0.0	0.0	0.0	17.3
Government programs	0.0	0.0	0.0	18.4
Business efficiency	12.2	8.7	12.1	0.0
Total Efficient Expenditure	29.8	42.6	70.8	112.1
[redacted]				

6.11. Efficient Expenditure in the 2020 Determination period

6.11.1. Continuing efficiency

In line with our recommendations on operational expenditure continuing efficiency we further recommend that WaterNSW be set a continuing efficiency target of 0.8% per annum for capital expenditure. Further detail on this can be found in Section 5.7.3 above.

6.11.2. Catch-up efficiency

We have applied our judgement to determine the level of catch-up efficiency that could be achieved by WaterNSW based on our assessments of the capital processes and the review and analysis of sample projects representative of the capital program as a whole. We have identified four areas where WaterNSW should be able to make material improvement to its processes to move towards the efficiency frontier utility level over time and deliver material efficiencies over the next Determination period. These are:

1. Improvements to capital program development, optimisation and prioritisation
2. Improvements to value engineering
3. improvements in cost estimating and the management of contingencies
4. the impact of new procurement processes and the likely savings from more effective program management

Each of these areas is defined and briefly discussed in the following sections.

Capital Program Development, Optimisation and Prioritisation

Effective capital program development helps to identify synergies, to challenge expenditure and to optimise capital programs by improved targeting of expenditure to areas where it is most required and prioritised according to needs. It usually involves a mixture of culture, incentives, systems and processes. It reflects our view that WaterNSW can improve the way it manages and prioritises expenditure at a program level for delivering optimal outcomes.

We consider there to be scope for efficiency savings via the move from a horizontal project lifecycle delivery structure at the previous pricing submission which has now been made more vertical. Previously project managers were engaged with the project throughout the whole lifecycle. Subsequent to an internal WaterNSW review it was recognised that separate skill sets were required within different stages of the project lifecycle. This approach is in the process of being rolled out across the capital delivery structure and we consider this to be a move towards a more effective and efficient capital program delivery.

We have not seen evidence that these efficiency savings have been factored into the wider capital expenditure program so recommend that these efficiencies are applied to a proportion of capital expenditure, that is, expenditure which is not allocated towards significant discreet projects.

WaterNSW contends that the proposed application of this generic efficiency across the entire capital program is not appropriate due to the significant expenditure proposed on large, discrete infrastructure projects. We agree that there is limited opportunity for realising the types of synergies referred to program optimisation when there is such focus on specific projects. We have applied a gross catch-up efficiency of 0.5% p.a. however we have only applied this to 13% of total capital expenditure giving a net catch up efficiency of 0.065% p.a. across the whole program.

The efficiency has been applied in a uniform incremental approach over the 2021-24 period, recognising that change can take time and the capital program in the early years is already partially committed.

Value engineering

Moving from the program level to the scheme-specific level, value engineering looks to reduce the cost of delivering a given scheme by challenging scope and methods and looking for alternative ways to achieve the outcome required.

We have seen that WaterNSW has carried out some value engineering both internally and through challenging its engineering consultants for a number of its major schemes, particularly where costs have exceeded initial expectations. This efficiency allows for value engineering to become more widespread to ensure that schemes are delivered at an efficient cost for customers.

Cost estimation

WaterNSW's approach to cost estimation is at an early stage of maturity. WaterNSW has a cost estimating framework to guide preparation of cost estimates. It also has unit rates database and has on staff a cost estimator responsible for updating the unit rates database using contract values. The regulatory submission has been based on a mix of internal estimates and external estimates. Business case's for capital project expenditure within WaterNSW all appear to include an expenditure item identified as a "management reserve".

This tends to sit over and above contingency and capitalised business unit overhead amounts which are also included above the direct capital costs.

We have applied a catch-up efficiency to reflect the potential for recent cost estimates to fail to capture efficiency improvements and for estimates to routinely include conservative assumptions. This has been phased in so that it does not apply to spend in 2020 where the program is generally already reasonably well advanced.

Procurement

Procurement efficiency involves finding better ways to purchase capitalised goods and services. It can involve packaging of works, incentivisation and contractual arrangements, such as alliancing and partnering.

It is evident that WaterNSW has invested in improving its procurement approach and supporting tools and systems. The current framework appears stricter (i.e. less procurement control with the business) than for comparable agencies. However, this is likely appropriate for WaterNSW's maturing business processes. The improved procurement function should provide greater insight into the overall program and identification of opportunities for efficiencies.

We have therefore applied an additional procurement efficiency adjustment equal to 3% from 2023 onwards. The efficiency is phased in in 2021 reflecting the fact that a significant proportion of capital expenditure in the first year of the next price path may already be procured.

Overall Efficiency Recommendation

Our assessment of the level of continuing and catch-up efficiencies achievable in the future price path is shown in Table 6-13 below.

Table 6-13 Future Price Path – Proposed Capital Efficiencies (Source: S Atkins/Cardno analysis)

Cumulative efficiency challenge (%)					
	2021	**2022**	**2023**	**2024**	**2025**
Continuing efficiency at the Frontier	***0.80%***	***1.60%***	***2.40%***	***3.20%***	***4.00%***
Catch-up: capital program development, optimisation and prioritisation	0.07%	0.13%	0.20%	0.26%	0.33%
Catch-up: value engineering	0.50%	1.00%	1.50%	2.00%	2.50%
Catch-up: cost-estimating	0.50%	2.00%	3.00%	4.00%	4.00%
Catch-up: procurement	1.00%	2.00%	3.00%	3.00%	3.00%
Catch-up efficiency	***2.07%***	***5.13%***	***7.70%***	***9.26%***	***9.83%***
Total efficiency	**2.87%**	**6.73%**	**10.10%**	**12.46%**	**13.83%**

6.11.3. Conclusions on the efficient level of expenditure

We have derived an efficient level of capital expenditure for WaterNSW's Greater Sydney submission. All projects come under the 'Water' service and are 'fully loaded' costs. i.e. they included project direct costs and allocated capitalised corporate overheads. We have re-scheduled some program outputs and hence expenditure for defined programs and projects. We have included the 5th year 2025 and recommend an appropriate level of expenditure should IPART which to apply a five-year Determination period. We then apply the continuing and catch-up efficiencies to reflect the catch-up potential in investment planning, cost estimating and contingency management and procurement.

We have formed the opinion that WaterNSW has the resources and capability to realise these capital efficiencies through the asset management processes, systems and strategies in place or being developed.

We have quantified the adjustments and efficiencies that we believe WaterNSW will be able to make over the coming Determination period and we will apply these to our recommendations to derive the efficient expenditure for the future Determination period. We summarise our proposals for prudent and efficient capital expenditure in Table 6-14 below.

Table 6-14 Total recommended capital expenditure in the future Determination period

WATERNSW PROPOSAL - CAPEX - WATER SERVICE							
($M 2019/20) year ending June	2021	2022	2023	2024	2025	2021-24 Total	2021-25 Total
Existing mandatory standards	79.8	69.3	63.6	64.1	44.2	276.8	321.0
New mandatory standards	11.7	10.3	15.6	6.6	0.8	44.2	45.0
Discretionary standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by other	20.9	98.2	108.5	10.5	0.0	238.1	238.1
Government programs	34.8	39.1	29.2	20.3	6.6	123.3	130.0
Business efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	147.2	216.9	216.9	101.5	51.6	682.4	734.0
Atkins/Cardno recommended adjustments for specific programs or projects							
Supply Augmentation Overhead Adjustment	-0.6					-0.6	-0.6
Greater Sydney Resilience Provision	-1.9	-5.7	-5.5	-3.9	-2.0	-17.0	-19.0
Warragamba E-flows	-11.6	-39.1	-18.3	16.2	20.7	-52.8	-32.1
[redacted]							
Data Centre (43% allocated of total WNSW expenditure)	-0.1	-0.1	-0.1	-0.1	-0.1	-0.4	-0.6
[redacted]							
Fleet - error adjustment				0.3	1.3	0.3	1.6
ADJUSTED EXPENDITURE BEFORE APPLICATION OF EFFICIENCY TARGETS							
Existing mandatory standards	77.7	63.5	57.9	60.5	72.1	259.7	303.1
New mandatory standards	14.2	12.8	15.6	6.6	0.8	49.2	50.0
Discretionary standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by other	20.3	98.2	108.5	10.5	0.0	237.5	237.5
Government programs	2.6	0.0	10.9	36.5	27.3	50.0	77.3
Business efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	114.8	174.5	192.9	114.1	100.1	596.3	696.4
Atkins/Cardno recommended additional capital efficiency targets (beyond those applied by the company)							
Continuing Efficiency (%)	0.80%	1.60%	2.40%	3.20%	4.00%		
Continuing Efficiency ($M)	-0.92	-2.79	-4.63	-3.65	-4.01	-12.0	-16.0
Catch-up efficiency (%)	2.07%	5.13%	7.70%	9.26%	9.83%		
Catch-up efficiency ($M)	-2.37	-8.95	-14.85	-10.56	-9.84	-36.7	-46.6
ATKINS/CARDNO ASSESSMENT OF EFFICIENT EXPENDITURE							
($M 2019/20) year ending June	2021	2022	2023	2024	2025	2021-24 Total	2021-25 Total
Existing mandatory standards	75.5	59.3	52.1	52.9	62.1	239.8	301.9
New mandatory standards	13.8	11.9	14.1	5.8	0.7	45.5	46.2
Discretionary standards	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by developer charges	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth - funded by other	19.7	91.6	97.5	9.2	0.0	218.0	218.0
Government programs	2.5	0.0	9.8	32.0	23.5	44.3	67.8
Business efficiency	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Efficient Expenditure	111.5	162.8	173.5	99.9	86.3	547.6	633.9
[redacted]							

7. Asset lives

IPART requested us to

> *Audit and assess the accuracy with which WaterNSW has classified its existing assets and planned capital expenditure into the following asset classification classes: Civil, Electrical, Mechanical, Electronic and Non-depreciating assets (or 'CEMELND') and make recommendations regarding*
>
> - *the efficient capital expenditure on new assets in each classification class by business area;*
> - *the average remaining life of existing assets by classification and in each business area; and*
> - *the expected life of new assets by classification class and business area*

Our approach to this task focused on a discussion and analysis of WaterNSW's methodology and assumptions. We discussed the changes in asset life assumptions from 2016 and inspected documents in support of asset life assumptions and analysis by service area to identify and assess in the various classification classes:

- the value of all existing assets;
- the efficient expenditure on new assets;
- the average remaining life of existing assets;
- the expected life of new assets.

Confirmation that the values entered against each asset are accurate is outside of the scope of this audit. It is our understanding that this exercise is carried out internally and subject to audit by the financial auditors.

Assumed Life of New Assets
In the 2016 Determination, IPART applied a useful life of 60 years for both existing and new assets over the 2016 Determination period. This was based on the assumption that the capital investment profile would not materially change between the two periods.

WaterNSW has proposed 16 asset life categories in its SIR[24] plus land which is not depreciated. The capital projects in the SIR are mapped to one of these categories. The weighed annual asset life is then calculated by the sum product of the life and expenditure for each year in the period. The weighted asset life by year is shown in Table 7-1 below.

Table 7-1 Average asset life for new assets

	2021	2022	2023	2024	Weighted average
New assets – average asset life (years)	45.54	68.11	69.08	52.07	61.16

Source: WNSW submission table 7.4

The increase in weighted asset life in 2022 and 2023 is due to the high level of expenditure on pipelines and dams.

The weighting calculation is influenced by high expenditure on pipelines (38% of total expenditure) with a life of 80 years, dams (20%) and roads/minor civils (26%). Conversely the annual depreciation charge is driven by IT (30% of the annual charge), roads and minor civils (28%) and pipelines (28%).

[24] SIR June 2019 worksheet *Fixed asset lives hard code*

We question the life assumption for dams, pipelines and IT assets. Dams are significant structures and are assumed to have a long life and certainly longer than the 100 years assumed by WaterNSW. Our experience of these major structures suggests an asset life of at least 200 years. We note that the asset life used for accounting purposes is 200 years. WaterNSW commented that

> *… prior to 2009 the average asset life applied by the then Sydney Catchment Authority for dams was 200 years. In 2009 a technical consultant review of asset lives used a 100-year asset life for dams. IPART accepted the findings of the technical consultant. The accounting life was not revised based on the results of this technical review, yielding the mismatch between regulatory life and accounting life. Therefore, the accounting life applied for dams is not evidence that the regulatory asset life for dams should be 200 years, on the contrary it reflects the history where the originally applied life of 200 years was revised due to further analysis down to 100 years.*

We noted that the technical consultant's report commented that

> *SCA has advised that the asset life for this category may not have been reviewed as the organisation considers it unlikely that any new dams will be built in the foreseeable future. Given the nature of SCA's dams, an economic asset life of 200 years may be justified*

WaterNSW commented that some projects classified as 'dams' include a range of assets including major capital works, pipelines and pumping stations. For these examples, it is important to disaggregate the capital costs into civil, electrical and mechanical assets to derive a reasonable asset value and estimate of depreciation. We suggest below that expenditure on large capital projects should be disaggregated to its major components.

For pipelines, the assumed asset life of 80 years appears low. For example, Sydney Water assumes a life of 140 years. We suggest an asset life of 120 years is assumed.

IT assets assume an average life of 6 years. WaterNSW commented that

> *… it had applied an asset live of 6 years for new ICT assets. [It noted] that 4-5 years is very common and generally accepted for minor ICT assets. On the other hand, we note that specialised fit for purpose software and hardware could have a longer asset life of around 6-8 years. The 6 years was based on a mid-point of the two. Furthermore, we note that we have recorded an asset life for CIMs of 5 years for financial* purposes.

We have not seen a weighted asset life calculation to support the asset life proposed by WaterNSW. Out view on a weighted asset life is from the scope of IT assets being procured for major and smaller systems and a comparison with the assumptions made by Sydney Water in the 2016 review.

Our view based on what we have seen in WaterNSW and elsewhere is that there is a tendency to invest in larger IT corporate systems with longer asset lives. Our view is that the weighted average should be 10 years which is similar to the Sydney Water assumption.

The proposed [redacted] assets have been included within the WaterNSW submission termed 'major facilities' and allocated an asset life of 30 years. We see 30 years as a reasonable assessment of asset life for this type of asset class however as we have recommended reporting this expenditure separately, we have also removed the weighted capital expenditure from our asset life analysis.

We have reflected the incremental changes in weighted asset lives in Table 7-2 below.

Table 7-2 Recommended average asset life for new assets

New assets – average asset life (years)	2021	2022	2023	2024	Weighted Average
Increasing dams to 200 years	57	90	89	77	81
Increasing pipelines to 120 years	53	87	90	58	76
Increasing IT to 10 years	46	68	69	52	61
Increasing dams, pipeline and IT	65	110	110	84	96
Increasing dams, pipeline and IT [redacted]	70	110	110	84	**98**

We tested the sensitivity of these potential adjustments to annual depreciation. Increasing IT life to 10 years reduces depreciation by 12%; an increase in dam asset life reduces depreciation by 3% and pipelines by 5%.

This suggests that an increase in asset lives may be appropriate to better reflect the asset portfolio.

We suggest that an asset life assumption should be disaggregated for large project expenditure as this enables large components to a project to have their appropriate lives assigned.

Residual Life of Existing Assets

WaterNSW has demonstrated how the asset values are rolled forward through the current price path from 2016 to 2020 taking opening asset values, adding new capital expenditure and subtracting depreciation. The analysis allows for asset disposals although these are shown only for non-depreciable assets. An adjustment is made for a change in price base each year.

The residual asset life over the 2016 Determination period is relatively even at 55 years.

Efficient expenditure

We report in Table 7-3 below our findings on efficient capital expenditure by service and asset type. We have made a specific adjustment for the removal of the 'major facilities' asset class as these relate to the proposed expenditure on [redacted] which we recommend are reported separately.

Table 7-3 Recommended efficient expenditure by asset type

Asset Class (Capital Expenditure $m)	Recommended Asset Life	2021	2022	2023	2024	2025	Total 2021-2024	Total 2021-2025
Dams	200	14.84	36.06	34.86	25.39	17.47	111.15	128.62
Other storages	80	1.76	0.00	0.00	0.00	0.34	1.76	2.09
Meters	15	1.08	0.94	1.00	1.25	0.73	4.28	5.00
ICT systems	10	10.66	6.56	6.24	8.65	5.58	32.12	37.70
Vehicles	5	1.27	0.45	0.48	0.59	0.49	2.79	3.28
Buildings	40	5.98	1.72	1.21	1.50	1.86	10.40	12.26
Plant and Machinery	12	1.21	0.82	1.36	0.61	0.64	4.00	4.64
Pipelines	120	24.12	77.96	91.19	14.16	29.40	207.43	236.84
Major mechanical	30	6.58	5.62	2.00	0.00	2.27	14.19	16.45
system controls	10	3.79	1.86	1.25	1.70	1.50	8.59	10.09
roads/ minor civil	30	39.96	30.66	33.64	45.59	25.83	149.85	175.68
5-year inspections	5	0.25	0.12	0.24	0.42	0.19	1.03	1.22
Major Facilities	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00

8. Special review items

8.1. The causes and effects of historic opex underspending

Operating expenditure reported in the 2016 Determination period includes actuals for 2017, 2018 and 2019; forecast expenditure is included for 2020. WaterNSW reports an overall under-expenditure of $42.3m.

There have been changes to accounting assumptions. The capitalisation rules changed from 2019 resulting in a $25.9m reduction in operating expenditure. The allocation of corporate and support expenditure across the regulated businesses accounts for a further $7.1m reduction compared with the assumptions made at the 2016 Determination. This leaves a net variance of -$9.3m.

Our review of maintenance expenditure has identified a 'backlog' of work and a shortfall in the asset management process which may explain the main reason for this net under-expenditure. This backlog should be resolved in the 2016 Determination period. WaterNSW is not claiming any efficiency savings; this suggests that planned work has not been fully completed While the business has restructured in the period, there is still a requirement to maintain assets.

8.2. The causes and effects of historic capex underspending

We consider there to have been a number of instances of cost estimations overestimation at the previous submission where projects have subsequently out turned at significantly lower expenditure than was originally proposed. We have not seen any evidence to suggest that there have been any significant deficiencies or drop in performance or outputs which would have also been a contributing factor for any underspending.

We are informed that the majority of capital projects are costed at a P50 including some risk components (latent conditions, weather delays etc.) the latter forming the risk based contingent amount. WaterNSW apply a 'management reserve' which effectively takes the estimate to the P90 level. In this instance variations to the original project contract costs are required to go through a more robust approval process before they are permitted to continue. Such items include changes to contracted works due to unknown issues arising on site beyond simple site conditions, or changes to the work scope in order to deliver the originally intended project outcome. In some cases, it also includes some provisional sum items. This management reserve is applied across all projects individually so gives rise to inflated expenditure proposed across the capital program overall as it takes the estimate to greater than P50 in aggregate.

Other factors may include a move from a horizontal project lifecycle delivery structure at the previous pricing submission which has now been made more vertical with project managers engaged at specific parts of the project lifecycle. This may have helped to contribute to some efficiency savings throughout the project lifecycle although this approach is not fully rolled out across the business. We consider there to be further efficiencies can be realised as all new projects are delivered using this approach.

We are cognisant of the fact that WaterNSW is a project orientated business with the capital program largely made up of specific one-off projects. These by their very nature are harder to draw on historical comparable unit cost, cost estimates. Unlike linear assets the majority of WaterNSW projects tend to be bespoke in time, location and scope which may also have been a contributing factor to the underspending compared to the IPART allowance.

8.3. Forward-looking capital works programs – Raising the Warragamba dam wall

This project proposes to raise the wall of Warragamba Dam by approximately 14m to provide increased mitigation of the impacts of flooding on the Hawkesbury-Nepean Valley. Flood mitigation is the only driver for

this project as the notion of raising the dam wall for increased water supply security has been rejected. The Full Suppy Level (FSL) of the dam will not be increased.

The NSW Government has prepared the Hawkesbury-Nepean Valley Flood Risk Management Strategy (Strategy) that has identified the option that provides the greatest benefit for flood mitigation to be raising of the dam wall. The Strategy states:

> *The Taskforce found that raising the Warragamba Dam wall by around 14 metres is the infrastructure option with the highest benefit. This would reduce flood risk by creating airspace in the dam to temporarily hold back and slowly release flood waters coming from the Warragamba River catchment. Raising the Warragamba Dam wall would reduce flood damages by 75% on average. It would reduce the flood damages for a 1 in 500 chance per year flood for current levels of urban development from $5 billion to $2 billion. In 2041, it would reduce flood damages for a 1 in 500 chance per year flood from $7 billion to $2 billion.*

The benefit of raising the dam wall is also documented in the Strategy as:

- Reducing the impact of a 1 in 100 flood event to 1,000 homes from 5,000 homes after raising of the dam wall
- Reducing the impact of the largest flood since European colonisation to 5,000 homes from 12,000 homes after raising of the dam wall

The Strategy provides a summary of the costs and benefits of the various options considered for providing increased flood protection. The option of raising the dam wall has the highest net benefit of $170 million based on a cost of $590 million and benefits of $760 million.

Therefore, the project is justified within the Strategy based on the positive economic benefit.

Options for the overall strategy for flood mitigation are detailed in the Taskforce Report. The options considered included lowering the full supply level of the dam, raising to 14m and 20m and upgrading roads to improve evacuation. The costs and benefits of the options considered are summarised in the table below.

Figure 11 Net benefits, costs and benefits of infrastructure options in order of decreasing net benefits ($millions)

	Million dollars net present value		
Flood mitigation infrastructure option	**Costs**	**Benefits**	**Net benefits**
14 metre Warragamba Dam wall raising	-590	760	170
Permanently lowering dam full supply level by 5 metres	-260	320	60
20 metre Warragamba Dam wall raising	-750	800	50
Dredging the Hawkesbury River	-640	390	-250
Permanently lowering dam full supply level by 12 metres	-1100	610	-490
Currency Creek diversion channel	-640	120	-520
Major regional evacuation road upgrades	-950	40	-910

Source: Taskforce report

Various options for the location and construction method for the dam wall raising were considered within the Taskforce report. These are summarised in the table below. A multi-criteria analysis found that raising the wall at the site of the existing dam was most favourable. Of the construction approaches, a mass concrete dam had the lowest estimated cost ($692 million) compared to the lowest MCA scoring option of a hardfill buttress ($1.2 billion) and so has been identified as the preferred option.

Table 6.1 Alternative 14-metre construction options

Site	ID	Dam type	Spillway solution
3B (existing dam)	A	Concrete faced rockfill dam	New 90 m abutment spillway + aux spillway
	B	Fill buttress	New 90 m abutment spillway + aux spillway
	C	Hardfill buttress	New 90 m abutment spillway + aux spillway
	D		Spillway in dam + Existing aux spillway
3A (800 metres downstream of existing dam)	E	Concrete faced rockfill dam	Spillway in abutment
	F	Asphaltic core rockfill dam	Spillway in abutment
	G	Hardfill buttress	Spillway in abutment
	H		Spillway in dam + abutment
	I	Roller compacted concrete	Spillway in abutment
	J		Spillway in dam + abutment
3 (1300 metres downstream of existing dam, at weir)	K	Concrete faced rockfill dam	Spillway in abutment
	L	Asphaltic core rockfill dam	Spillway in abutment
	M	Hardfill buttress	Spillway in abutment
	N		Spillway in dam + abutment
	O	Roller compacted concrete	Spillway in abutment
	P		Spillway in dam + abutment

Source: Taskforce report

The Taskforce report states that "the preferred construction method of mass concrete buttressing was estimated to cost $692 million for a 14-metre raising". This cost estimate is at a 2015 price base and is stated to include a 25% contingency.

[redacted]

[redacted] On

[redacted]

[redacted]

The State Government has provided $30 million for detailed planning, environmental assessments and community consultation to WaterNSW. WaterNSW's SIR includes $9 million in 2017/18 and -$27.6million in 2018/19. No other costs for this project are included in WaterNSW's SIR.

WaterNSW, as the owner and operator of the dam, has commenced the environmental impact assessment statement (EIS) and detailed concept design for the proposal. The environmental impact statement is due to go out for public consultation in late 2019. I-NSW states that a detailed Business Case is due to be considered by the State Government in 2020 and that construction will take four years. WaterNSW states that the current delivery program is for construction to commence from early 2021.

Based on the current level of project development and need to gain project approvals, State Government approval and undertake procurement. We consider it highly unlikely that that construction will commence in early 2021 (if all approvals were gained). A more likely timeframe is that construction will commence from mid-2022 if all approvals are received.

Infrastructure NSW is the lead agency for the dam wall raising. I-NSW is preparing the detailed business case which is anticipated to be complete by the end of 2019. The scope of the business case considers flood mitigation across the Hawkesbury-Nepean valley more widely with the dam wall raising the key infrastructure option.

Delivery will be subject to planning and environmental approvals. The environmental impacts include increased inundation of sensitive environmental and cultural sites including the Greater Blue Mountains World Heritage Area.

As the dam owner and operator, it is very likely that WaterNSW will be responsible for delivering the dam wall raising. The contractual approach for delivery has not been decided by WaterNSW at this time.

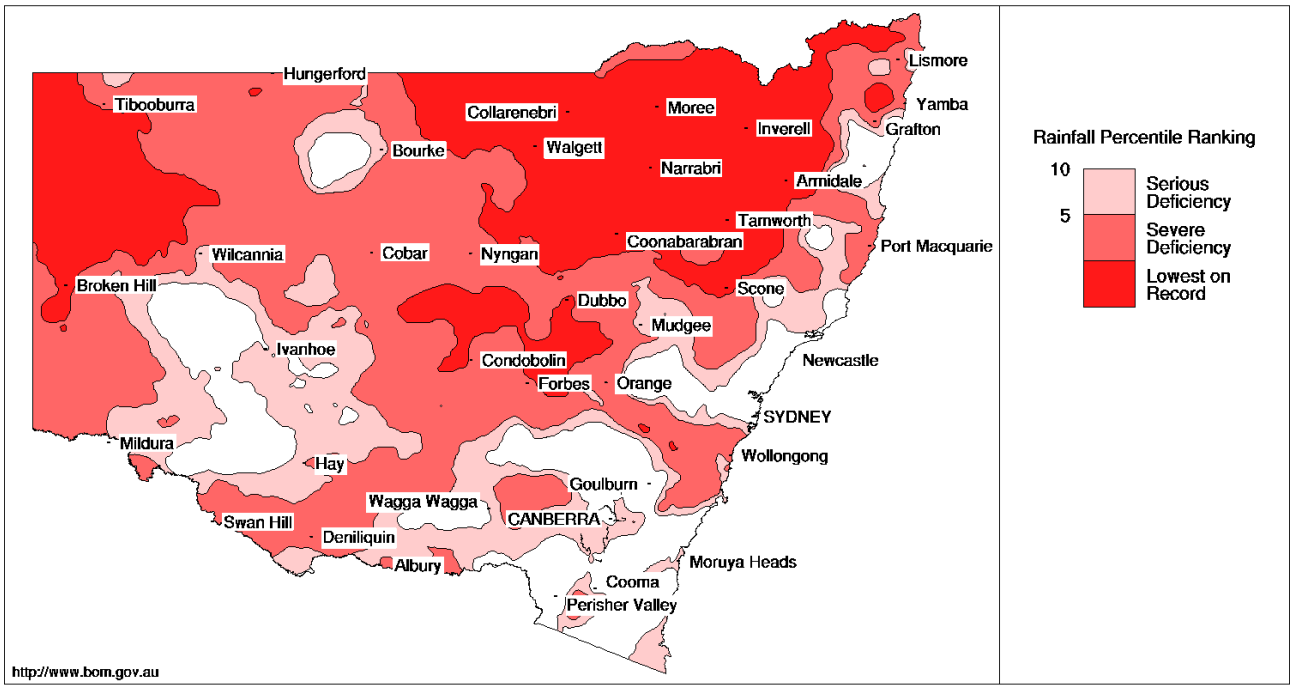
This purpose of the raising of raising the Warragamba Dam wall is to provide greater flood protection in the Hawkesbury-Nepean Valley. The State Government is the proponent for the project with WaterNSW likely to act as the delivery agency. The project has been justified in the Hawkesbury-Nepean Valley Flood Risk Management Strategy on cost benefit grounds with net benefit of $170 million based on a cost of $590 million and benefits of $760 million. [redacted]

8.4. Forward-looking capital works programs – Shoalhaven transfer

We discuss the Burrawang to Avon Tunnel project in Section 6.5 under the heading Greater Sydney Supply Augmentation as this was the terminology used by WaterNSW in its June 2019 SIR submission.

8.5. Forward-looking capital works programs – Drought Response Measures

Greater Sydney is currently experiencing a significant drought, especially in the inland areas which act as the watershed for the water supply of Greater Sydney as can be seen below. In early November 2019 dam storage levels were at just over 47% compared to approximately 62% a year before and approximately 82% at the start of 2018. This rapid drop in storage levels has led WaterNSW and NSW Government to put in place a number of drought response measures.

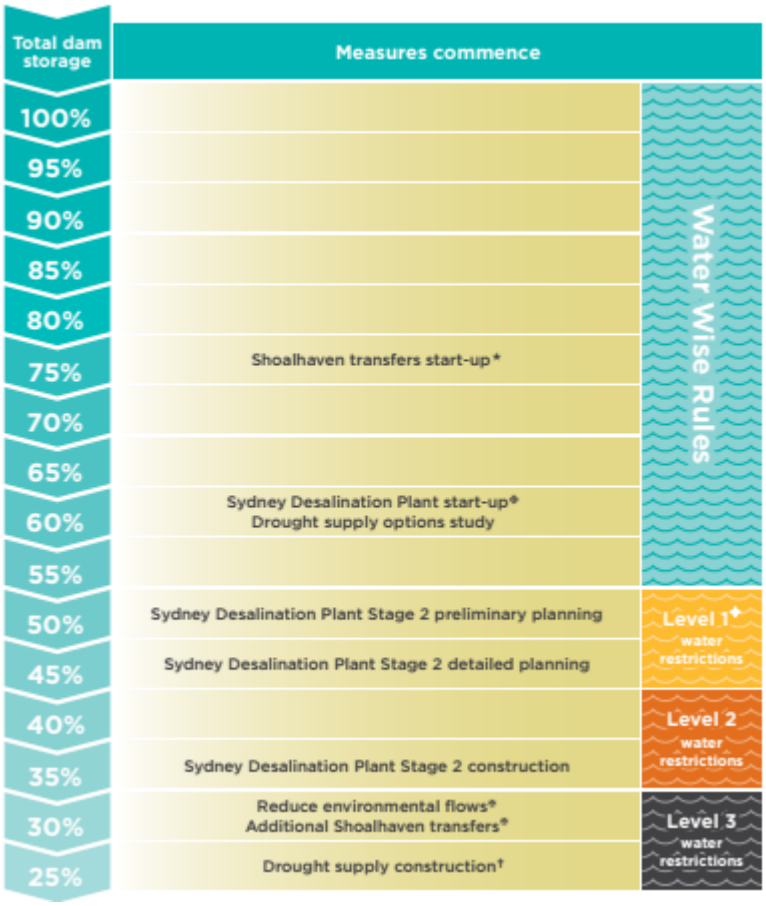


Source: BOM[25]

Figure 8-1 Drought in NSW (rainfall deficiencies 1 November 2017 to 31 October 2019)

The 2017 Metropolitan Water Plan (MWP) sets out the suite of measures and trigger points based on total Greater Sydney dam storage as summarised below:

[25] http://www.bom.gov.au/web03/ncc/www/awap/rainfall/drought/24month/colour/latest.ns.hres.gif



Source: MWP

Figure 8-2 MWP measures and trigger levels

WaterNSW has commenced drought planning work in advance of the triggers envisaged in the MWP. We challenged WaterNSW to justify this early commencement. WaterNSW was able to produce a written instruction from DPIE asking WaterNSW and Sydney Water to commence the study in July 2018 (when storage levels were at approximately 67.2%[26]).

This is consistent with other actions being taken in advance of the MWP triggers. As well as commencing planning before reaching the 60% MWP trigger, the NSW Government also introduced Level 1 water restrictions in 1 June 2019, when storage levels were at approximately 53.1% rather than the 50% envisaged in the MWP. Level 2 restrictions are coming into effect on 10 December 2019 when storage levels are expected to be at approximately 45% rather than the 40% envisaged in the MWP.

The drought options study, completed in January 2019, defined a suite of measures and trigger levels which WaterNSW has been using as the basis for its subsequent planning works. We understand that the trigger levels in the drought supply options study are subject to review and are likely to change as outturn inflows and water demands feed through to revised reservoir depletion curves.

The options study was completed in short timescales. It does not incorporate sophisticated economic optimisation or set out a clear process of options identification and evaluation. However, our view is that the first two Tranches of interventions it proposes are reasonably sensible and robust. We consider it would be

[26] Source: https://www.waternsw.com.au/__data/assets/pdf_file/0006/134709/Greater-Sydney-Water-Storage-Thursday-26-July-2018.pdf

useful for a more sophisticated study to be undertaken to examine the justification of the third Tranche of interventions.

Having reviewed the options study, including the potential timescales by which measures may need to be in place under certain drought scenarios, we are satisfied that the early commencement of drought response planning works is prudent.

We discuss the Drought Response Measures incorporated in WaterNSW's submission in Sections 6.5 and 6.8 under the headings 'Greater Sydney DRS A- Avon Deep Water Access Project (WGO003)' and 'Drought Response Schemes'.

The Avon Deep Water Access Project is the only drought response scheme for which WaterNSW has included construction costs in the submission. We consider that, if the drought continues, this is likely to be prudent expenditure. However, the trigger point for commencement of construction will require significant consideration and the construction contracts will need to be structured to take account of the potential for the decision to be reversed if the drought breaks. It will also need to be subject to confirmation of treatment capacity.

In its submission, WaterNSW has also included the costs of planning (but not construction) for four drought response schemes. We consider that these are prudent but have recommended adjustments to take account the halt of [redacted] and updated cost estimates for [redacted].

We have separated out the expenditure on the planning for [redacted] as we consider that there is significant uncertainty over who should own any future assets and whether these costs should be borne by WaterNSW customers in the meanwhile.

9. Output measures

Efficiency is typically defined as a relationship between inputs and outputs. Typical inputs include capital and labour resources, while typical outputs for a water business include maintaining required standards, meeting customer expectations and growth in demand. A business can be more efficient if it produces the same outputs for reduced inputs. Cost savings that are achieved at the expense of required outputs are not efficiency savings. Outputs are therefore good indicators to assess whether a business has achieved the efficiency targets that it has been set. Output Measures are used as a means of monitoring the progress of the water business in delivering its plans. They enable the assessment of efficient expenditure and they allow reporting of variance from targets and are therefore helpful indicators for future efficiency reviews. The Output Measures are not in themselves targets to be achieved in the price control period as there may be good reasons for variance. The main issue is to be able to identify actual outputs achieved against the related expenditure to provide greater clarity on any efficiency gains.

9.1. Past performance in the current Determination

In its submission to IPART WaterNSW outlined its progress against output measures in the current Determination period. Overall WaterNSW is making reasonable progress against its output measures with, we comment on each of these in Table 9-1 below.

Table 9-1 Progress against output measures in the current Determination period

Project	Capital expenditure ($2019-20)	Output measure	Expected completion	Activity to end 2018- 19	Atkins comment
Tallowa Dam Preliminary Risk Assessment and Design (WEM009)	$2.6m approved $0 actual	Completion of the project meeting budget and outcomes	N/A	The Greater Sydney Dam Safety Portfolio Risk Assessment resulted in the proposed works being deferred pending further investigation. Other dam safety works have been prioritised in their place.	Project deferred
Upper Canal Interim Works Phase 2	$63m approved $43.1m actual / forecast	Completion of the project meeting budget and outcomes	May 2019	The current packages of works are complete, and WaterNSW is transitioning to a 'monitor and respond' phase which will include some minor further works on drainage	On track to complete by 2020
Metropolitan Dams Electrical system (Stage 3) (WEM028)	$29.4m approved $21.2m actual / forecast	Completion of the project meeting budget and outcomes	December 2019	Following a strategic review of the scope of works in line with current organisational priorities in 2016, the scope was refined to provide a more targeted response to WaterNSW risks. The rationalised scope of works will be delivered by December 2019.	On track to complete by 2020
Warragamba Pipelines valves and controls upgrade	$10.5m approved: $15.6m actual / forecast:	20% of total planned valve upgrades completed per year	June 2023	Some delays have resulted from the main contractor on these works going into receivership. There are ongoing delays associated with constraints on shutdowns arising from ongoing drought conditions and shutdown constraints arising from Sydney Water treatment works upgrades.	To be completed in the next future period

Project	Capital expenditure ($2019-20)	Output measure	Expected completion	Activity to end 2018- 19	Atkins comment
Motor vehicle fleet – procurement	$9.6m approved: $2.6m actual / forecast:	Achieve a reduction in vehicle changeovers of at least 4 vehicles on average per year until 2020-21	Ongoing	On target. 24 disposals and 15 additions in 2017.	On track to complete by 2020
Hydrometric Renewals Program (WEM001)	$3.8m approved: $4.5m actual / forecast:	Detailed asset management plan in place for the program	31 December 2016	Completed.	Project completed
Blue Mountains Electrical Monitoring and Control	$3.7m approved: $5.6m actual / forecast:	Project completion	31 December 2019	Works are underway with completion expected prior to the end of 2019.	On track to complete by 2020
Warragamba Embankment Upgrade	$7.5m approved: $6.4m actual / forecast:	Progress towards project completion	June 2020	Completion of works to address highest priority issues is underway, with completion expected prior to the end of June 2020.	On track to complete by 2020
Burrawang Pumping Station Elect System Stage 3	$3.3m approved: $16.3m actual / forecast:	Project completion	June 2019	The project has completed physical construction and is undergoing performance testing with final handover following completion of site works (due for final handover prior to the end of June 2019).	On track to complete by 2020
Future augmentation of Sydney's water supply	$21.0m approved: $19.1m actual / forecast:	Substantial progress required in identifying and planning the next augmentation for Sydney's water supply	Planning phase completed by the end of June 2021.	Planning phase activities for the identified next investment tranche are now underway on the preferred option (a Burrawang to Avon Tunnel), with construction phase to follow based upon the outcomes of the upcoming NSW Government Greater Sydney Water Strategy 2020.	To be completed in the next future period

9.2. Future price path performance

The seven proposed output measures represent the major capital projects that WaterNSW is proposing to undertake during the 2020-24 Determination period. We provide WaterNSW's proposed output measures for the 2020-24 Determination period and our view on recommended completion dates based on our assessment and recommendations on capital expenditure below.

Table 9-2 Proposed output measures for the 2020-24 Determination

Project	Output measure	WNSW Proposed completion date	Atkins Recommended Completion date
Fitzroy Falls Dam Safety Upgrade	Completion of Stage 1 works, internal erosion interception trench	June 2022	June 2022
Cataract Dam Safety Upgrade	Completion of Stage 1 works, installation of foundation relief drains and access ramp	June 2024	June 2024
Cordeaux Dam Safety Upgrade	Completion of Stage 1 works, completion of foundation relief drain expansion and upgrade	June 2024	June 2024
Warragamba Pipelines valves and	All valves in program installed and commissioned	June 2023	June 2023
Avon Deep Water Storage	Practical completion of infrastructure that enables access to 'dead storage' of Avon Dam to the Illawarra Water Filtration Plant	June 2024	June 2024
Dam Safety Telemetry	Automation and telemetry of relevant instrumentation for selected metropolitan sites listed under project	June 2024	June 2024
Warragamba E-Flows	Commissioning and proving period commenced for Warragamba E-Flows to provide capability to release increased environmental flows from Warragamba Dam	December 2024	December 2026 - Outside Determination period

WaterNSW have developed an internal measure called the Overall Measure of Delivery (OMD) which is essentially an earned value measures to assist in understanding project and program level capital expenditure against progress. We would consider it helpful for WaterNSW to include an output measure which reflects the OMD measure so that total program level expenditure can be assessed as well as individual projects. This would also assist in providing WaterNSW scope and flexibility to alter and prioritise projects within the capital program especially in consideration of the ongoing drought situation where focus should be given to drought related projects to ensure swift implementation.

The is a further need for operational expenditure outputs which would cover catchment management activities and water operations. These are currently qualitative and it is difficult to measure outputs and efficiencies. We suggest a risk-based approach should be developed. If there is a risk profile to be achieved then proposed activities would aspire to deliver against this target. Other activities which do not deliver this target risk reduction would be deferred because of insufficient benefit.

Appendices

Appendix A. Capex Projects Reviewed

The total project expenditure (actual and forecast in 2016-24) identified in WaterNSW SIR Capex 2 is just over $1,000M.

The RFP required us to review 10% of the capital program by total value and by number. We based the selection primarily on the projects listed in SIR Capex 2. In total we reviewed 17 projects/programs which accounts for c75% of the total capex over the period 2016-2024. We have focused on a range larger projects which are considered to be representative.

	SIR ID No.	Cross Reference	2017-2020	2021-2024	Total Capex (2016-2024)
Warragamba Pipeline ancillary valves upgrade	WEM032	WDS003	15,376	17,555	32,931
Metropolitan Dams Electrical System (Stage 3 Execution)	WEM036		20,694	0	20,694
Upper Canal Interim Works Stage 2	WEM038		41,729	0	41,729
Burrawang Pumping Station Elect System Stage 3	WEM046		15,420	0	15,420
Greater Sydney Renewals Provision	WEM086		42	45,689	45,732
Warragamba Corridor & Pipeline - Tranche 1	WEM107		8,602	21,643	30,244
Warragamba Internal Lining Restoration Project	WEM109		410	66,474	66,884
Upper Canal Maintenance Provision	WEM150		0	13,383	13,383
Greater Sydney Resilience Provision	WEM169		0	17,000	17,000
GS Post-PRA Dam Safety Upgrade Program	WNM007		1,799	34,380	36,179
Greater Sydney Supply Augmentation	WGO002		18,880	2,022	20,902
Greater Sydney DRS A	WGO003		9,124	236,067	245,191
	WGP008		9,088	100,156	109,244
[redacted]					
ICT Renewals and Replacement - P6	WBE052		4,740	4,122	8,862
WaterNSW CIMS	WBE069		12,572	50	12,622

Appendix B. ICT Expenditure Additional Analysis

B.1. Strategic overview

Business Systems & Information (BSI) is the department with responsibility for the provision of all information and communications technology and services required to meet the needs of WaterNSW. In terms of scale and responsibilities, it supports[27]:

- Over 900 end users
- Several hundred software applications delivered across internal and external networks (see 0 for more information on key systems and applications)
- 96 locations across metropolitan and regional NSW

There is no doubt that the merger of three entities to establish WaterNSW resulted in a complex and antiquated ICT environment which needed a root and branch assessment and subsequently a programme of transformation to make it fit for purpose for the organisation. This resulted in the development of a four year $70m Enterprise Architecture roadmap which was approved by the Board in July 2016.

The roadmap baselined the architecture landscape, defined the strategic intent and created a Business Capability Model which described the services, customers, value chain and required capabilities of WaterNSW. In terms of the application architecture, this allowed WaterNSW to identify the current state and target state, the highlights of which were:

- Technology landscape was generally good but there was considerable duplication
- Opportunities to reduce applications from ~450 to ~270, a 40% decrease but most importantly equivalent to a ~50% decrease in “core” technologies
- Telephony technologies that are no longer in the mainstream investment lifecycle and thus unsupported
- Opportunities to take up emerging technologies so that replacement will not be on a like for like basis but provide enhanced capability
- Five strategic programs identified: Customer Value, Insightful Information, Improved Productivity, Proactive Planning & Governance, Healthy IT Assets
- Benefits and risks clearly identified
- High level estimates created to provide a funding envelope for the Strategic Roadmap initiatives and provide good visibility on financial impact of pursuing this strategy

[27] This is the end user and location breakdown for the whole of WaterNSW not for Greater Sydney.

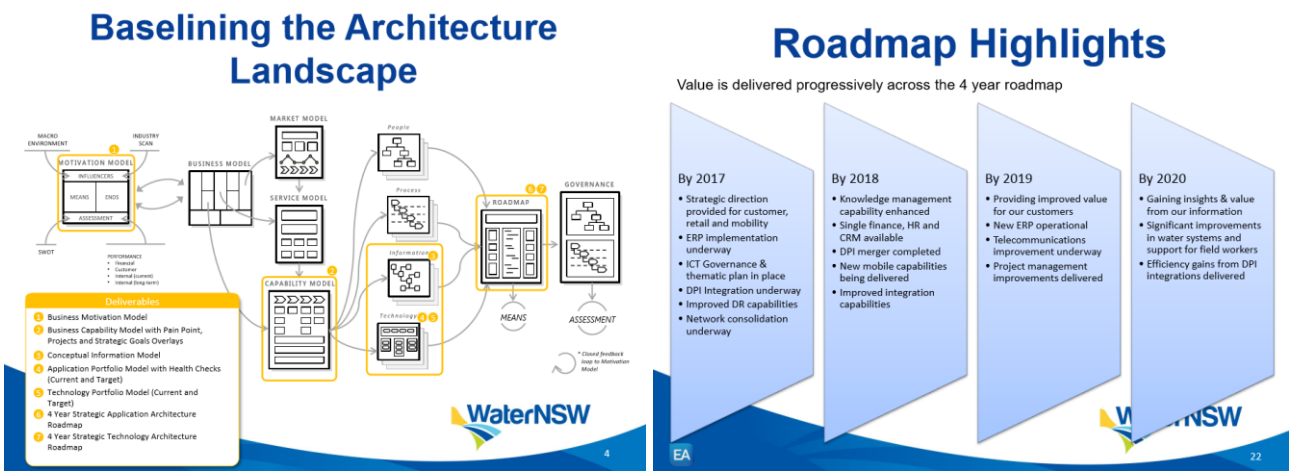


Figure 9-1 WaterNSW Enterprise Architecture (Source: Final Report Presentation to Business Stakeholders June 2016)

Overall, we formed the view that the merger from a digital perspective has been managed efficiently and effectively. There is strong evidence to show that there was a clear strategic direction, that needs and gaps were identified and understood, that the organisation has planned and prioritised within a constrained budget envelope and that the implementation of projects has generally been delivered within the original program.

Investment priorities for the future price path are informed and underpinned by the ICT Strategic Plan 2020-2029, which was refreshed in February 2019 with the support of KPMG who had been commissioned to carry out a review of progress on implementation of the original roadmap. The plan identifies that the level of expenditure will increase over the next 10 years from current levels, although it is important to note that this is only reflected in the ICT operational expenditure, this is not specifically borne out by WaterNSW's Greater Sydney ICT capital expenditure proposals for the next price path. It is also positive to note that the program costs identified ($207m) take into account both the capital and operational expenditure (79% and 21% split respectively).

Having established the foundation by putting in the back-office infrastructure for information management in 2016-20 price path, the focus then shifts to operations and information access in the next price path. In essence, this is about replacing, simplifying and rationalising operations systems with benefits linked to optimising information to improve the customer experience and enabling digital processes (customer journeys, field force mobility, back office, etc.). This has been translated into 9 strategic programs supporting four themes focused on the customer, supporting WaterNSW's staff, efficiency and maintaining the technology foundation. This is summarised in Figure 9-2.

Figure 9-2 WaterNSW ICT Strategic Programs (Source: ICT Strategy from 2019 to 2029)

The third phase, which is identified as from 2024 will focus on optimising and improving, leveraging technology capabilities to transform operational delivery, driving business decisions using machine learning based forecasts.

Overall, WaterNSW's strategic priorities and programs reflect similar trends and priorities being identified or already implemented across the water sector in Australia and also in other advanced countries. In terms of the pace of its digital transformation, WaterNSW would probably be considered as slightly behind the curve on leveraging technology to transform operational delivery (areas like Machine Learning, Artificial Intelligence, Internet of Things) but there are also risks associated with being an early adopter and investing in unproven technology. In our opinion, the pace identified is appropriate given WaterNSW's current level of ICT maturity and its capacity to deliver large programs of change, when also combined with its need to prioritise within the constraints of a budget envelope.

B.2. ICT Projects

CIMS – Current and Future Price Paths

Need

The need for change and potential inefficiencies were underlined at the time of the last IPART review with the "…generally poor state of our information and communications management systems. Our key water accounting systems, by way of example, are more than 10 years out of vendor support period and require a high level of manual intervention to deliver reliable customer account and billing outcomes. Similarly, WaterNSW does not currently have a Program Management Office nor any systems and tools usually provided by such a function. The absence of such systems necessarily means that delivery requires manual input and intervention."[28].

The business case and Board presentation back in June 2016 underlined the mix of legacy systems and processes from State Water, Sydney Catchment Authority and the soon to be integrated Department of

[28] Quoted in Aither's WaterNSW Greater Sydney expenditure review (December 2015), source: WaterNSW, Confidential Supplementary Information - WNSW Organisation Design and Benchmarking, page 3, provided via email on 16th October 2015

Primary Industries functions. This resulted in a complex environment with no 'single source of truth' which caused at least five major 'pain points':

1. Lack of CRM inhibiting 'single customer view' and ability to provide expected levels of customer service, information & analysis
2. Unsupported billing system (>20yrs old) and lack of centralised contracts management system are risks (latter raised by Audit Office as risk in 2016 Management Letter)
3. Lack of Project Delivery System impairing reporting efficiency and adoption of better project management techniques
4. Current multiple systems (such as asset management, HR, timesheet, payroll) causing duplication of tasks and significant time spent performing manual reconciliations to ensure data accuracy
5. Current lack of integration between systems also driving inefficiency from manual processes, reconciliations, reporting and analysis

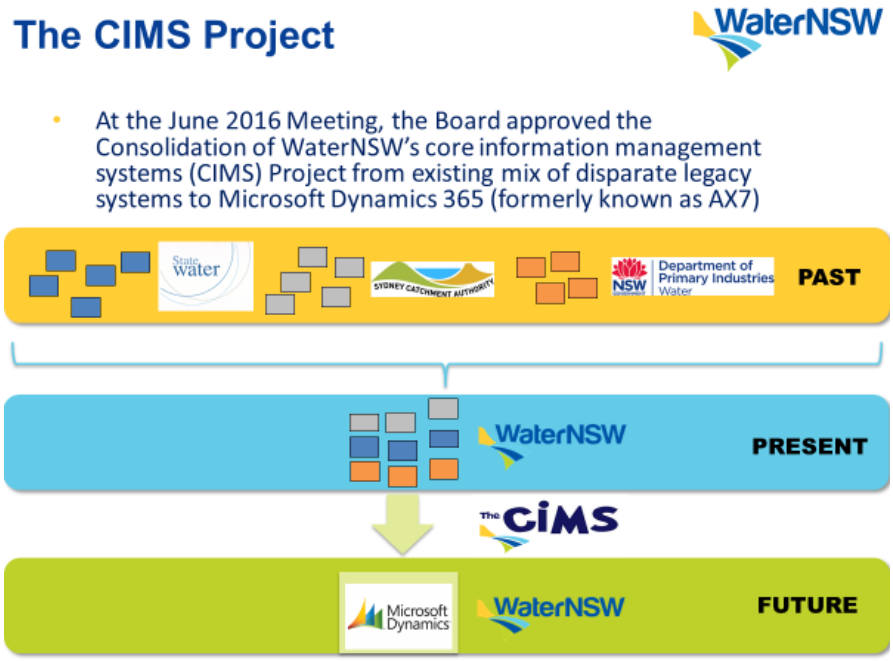


Figure 9-3 CIMS Final Business Case (Source: WaterNSW)

Optioneering

All the evidence suggests that WaterNSW followed a rigorous process to arrive at the chosen solution: the Microsoft Dynamics AX7 application. This involved a Needs Analysis and Shortlist of suitable systems for a mid-sized utility using Gartner Magic Quadrant:

- Consolidate to one of existing system platforms (such as TechnologyOne on-premise)
- Implement new system (TechnologyOne Ci5 or MS Dynamics 365 – both "in the Cloud")
- Do nothing (retain risks, capability gaps, duplication, manual processes and pain points)

The evaluation of options considered the following:

- Consolidating to existing system (TechnologyOne on-premise) would require custom integrations with several 3rd party applications due to capability gaps (i.e. such as CRM, Rostering, Risk) and also require an upgrade to the new Ci5 platform (a rewrite and effectively an entire re-implementation) within next 10 years, making it more expensive than implementing a new system now, with significantly lower quality outcome.

- MS Dynamics was evaluated as being superior to TechnologyOne Ci5, meeting a greater number of business needs and significantly greater "valuable upside and innovation" capabilities, for a similar cost. TechnologyOne Ci5 would also require the same 3rd party integrations as on-premise version, making it more expensive in long run.
- MS Dynamics is also a more "open" platform, and will more easily integrate with other essential applications in the future, such as an upgraded Water Accounting System (forecast for next price path)

Cost

[redacted] however our initial reaction was that the original cost estimation appeared low for this type of project. The early estimates were based on feedback from the market on buying the product and estimated time inputs for internal resources as well as a fixed price lump sum contract with the external implementation consortium.

It was subsequently identified that the early business cases "…did not sufficiently address the true complexity and change impacts of implementing an ERP solution for [redacted] (this is discussed in more detail below).

For the Greater Sydney price control, this translates into the following expenditure profile:

	Current Price Path				Future Price Path	
(millions)	2017	2018	2019	2020	2021	Total
CIMS	$ 2,352	$ 4,558	$ 6,071	$ 98	$ 50	$ 13,130

Table 9-3 CIMS expenditure allocated to Greater Sydney (Source: WaterNSW SIR)

Benefits

The table below highlights how CIMS has transformed the digital landscape within WaterNSW.

Functional Area	Previous State		Current State	Implemented?
	Rural (former SW)	Greater Sydney (former SCA)	WaterNSW	
Finance	TechnologyOne Financials		MS Dynamics AX7 (Standard system)	Yes
Asset Management	• T1 Fixed assets register • Smart Asset	• Maximo • T1 Fixed assets register • Asset Datamart	MS Dynamics AX7 (Standard system)	Yes
	Note: No link between finance system and asset management systems – maintained manually by staff.			
Project Management	*No fit for purpose system*	*No fit for purpose system*	MS Dynamics AX7 (Standard system + MS Project Online)	Yes
Procurement and Contract Management	• Purchase orders in T1 • Purchase cards	• Maximo for legacy SCA contracts • Purchase orders in T1 • Purchase cards	MS Dynamics AX7 (Standard system)	Procurement – Yes Contract Management – Yes
	Note: No centralised contracts register – an Excel version maintained.			

Travel and expense management	• Paper expense forms • Travel arranged by BSOs and AP • Concur		MS Dynamics AX7 (Standard system)	No, de-scoped.
Billing and Customer Relationship Management	• Billing: Proclaim	• MS Excel • No CRM	MS Dynamics AX7 (Standard system)	Billing – Yes CRM – No de-scoped and to be implemented in next price path (see benefits no.4)
HR, Payroll and Timesheets	• Payroll: TechnologyOne • Human Resources Management: Paper forms and spreadsheets. • Time Recording: Kronos • Recruitment: Scout	• Payroll: Chris 21 Payroll • Human Resources Management: Chris 21 HR • Time Recording: TRS • Recruitment: Scout	MS Dynamics AX7 (Standard system)	Human Resources - Yes Payroll and timesheets – No, de-scoped, utilising Chris21.
Risk Management and Compliance	Tickit		MS Dynamics AX7 (Standard system)	Yes
Cross-application workflow	None / HP-TRIM used for approval workflows.		MS Dynamics AX7 (Standard system)	Yes
Business intelligence	• Data kept within systems • No centralised data warehouse		MS Dynamics AX7 (Standard system)	Yes

Table 9-4 WaterNSW Key changes in ICT landscape as a result of CIMS implementation

The June 2018 Board Paper identified the following tangible and intangible benefits to the WaterNSW business:

1. *Financial Benefit:* Implementing Dynamics 365 is $4.9 million cheaper than do nothing option. This included a hard savings reduction of the costs of 15 FTEs valued at $2.3m per annum when fully implemented and following redundancy costs anticipated to be by June 2021
2. *Financial Benefit:* Avoided periodic upgrades, replacements and costly integrations of current systems, avoided licence, software maintenance and support costs from current / alternative providers, and avoided infrastructure costs from maintaining applications on on-premises hardware (largely offset by the subscription costs of the new system)
3. *Increased efficiency:* A 'single source of truth' from fully integrated systems will increase the efficiency of multiple functions within the organisation
4. *Customer benefits:* Single view of the customers through CRM to enable better customer service - however due to changes to the Microsoft product offering between tender and contract sign-up, the Microsoft "Customer Service" module was no longer within scope but rather, a more restricted customer management module "finops" was offered as part of the contracted product
5. *Consolidation* of disparate and unintegrated systems to a single instance of Microsoft Dynamics

The benefits plan will be formalised at Gate 6 which is due for completion by end of 2019 and ready for review by middle of 2020. However, this timing does not align with this IPART review so ultimately this will need to be revisited at the next review to confirm the benefits have been realised.

Procurement and Implementation Timeline

WaterNSW issued a Request for Tender to the market in October 2015 for the supply and implementation of a cloud-based ERP solution, based on either the Technology One or Microsoft Dynamics AX product set. The desktop evaluation phase considered three conforming responses, with [redacted] on the Microsoft Dynamics AX7 platform recommended to proceed to demonstrations, site visits, reference checks and proof of concept sessions, on the basis that they have provided the best overall proposal to WaterNSW, satisfying most functional requirements at a reasonable price. The results from demonstrations, site visits, reference checks and/or proof of concept sessions were:

- That the functionality of the Microsoft Dynamics AX7 product is a good fit with WaterNSW requirements and provides a significant improvement over the current systems environment
- It was generally felt that [redacted] could and would be motivated to do a good job on the implementation. There was a high level of confidence in [redacted] responsible for the actual application implementation

[redacted]

Upon completion of Phase 1, WaterNSW commenced with Phase 2 of the CIMS Project with the [redacted]. WaterNSW delivered the Project using internal subject matter experts, some of whom were backfilled, a dedicated Project Director, and external resourcing and advisory as was required. External Independent Assurance was also sought to ensure the project is successfully delivered and the Board received the assurance it requires during the project.

The project began in earnest in October 2016 with the original timeline set a Go Live date of September 2017. In hindsight, this was optimistic to assume such a short timeframe even without any major changes or challenges, but the business needs evolved and expanded so the revised scope was materially different from what was originally planned to be delivered.

A follow up review in February 2019 identified 22 critical or high priority defects and stated that some of these defects if not resolved may have a material impact to the business and its operation. We were able to confirm that the defects were closed either before or soon after Go Live in April 2019 and did not impact on the delivery of the project.

Challenges

WaterNSW discussed with the review team what they referred to as some of the “struggles” that emerged during the implementation of the project. [redacted] External independent assurance was also sought to provide the Board with comfort about how the project was being managed. [redacted]

We also asked WaterNSW to provide evidence how CIMS was performing since Go Live, i.e. to provide some visibility on the ability to carry out the BAU functions as well as the level of disruption to business operations

(it is not uncommon for there to be a dip in performance post implementation of new systems as users familiarise themselves with new systems and new processes bed down). The only evidence provided was that all the defects had been corrected which is not the same as demonstrating how CIMS has been performing since implementation.

Essentially a foundation system has been delivered but not the final optimal solution: data is being extracted but WaterNSW is not yet maximising the use of that data. There is a new roadmap which identifies future priorities which will be completed over the next price path:

- Deliver new CRM capability. The Water Licencing System and satellite systems will continue to be used in the meantime and we were informed this is not adversely affecting the smooth running of operations
- Water Market Systems program was deferred in order to minimise overall increase in ICT capital expenditure program

[redacted]

DamGuard – Current Price Path

DamGuard enables early detection and alarm notification that improves the way the dams are managed, significantly reducing risks of failure. While it was not the main driver, WNSW also described this project as their most successful business efficiency project in the current price path.

The previous state was very manual and time consuming involving multiple systems and processes which had to be pieced together to provide the necessary data. This could take up to six weeks to be analysed, which was described as “unacceptable” as it undermined the primary purpose of the dam safety surveillance which was to take action swiftly if abnormal behaviour occurs.

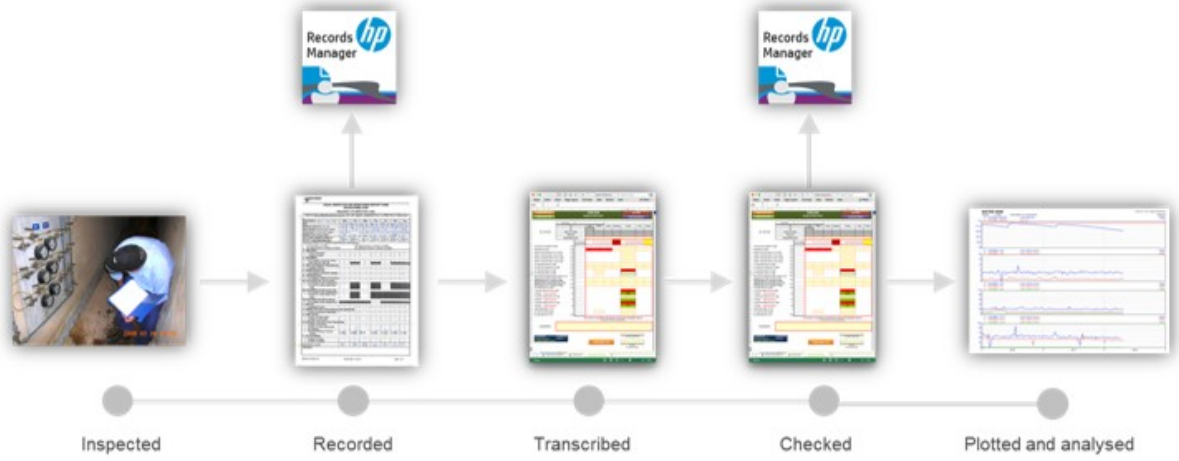


Figure 9-4 Schematic showing 6-week timeline for analysis of inspection data (Source: WaterNSW DamGuard Cost Benefit Analysis)

The rollout of the new solution was managed in an ‘agile’ way, based on a series of sprints in clusters whereby it was first rolled out to 2 dams, a further 5 dams and as of July 2019 it has been implemented in all 41 dams.

The result is that DamGuard has allowed WaterNSW to move to a streamlined digital solution with real time alerts and updates with consolidation of data in one place by adapting an off the shelf Microsoft solution. It has speeded up the alert/analysis process from 6 weeks to an almost real time solution.

The capital cost was $1.3m with annual operating costs of $274k. In terms of financial benefits, $1.5m per year of operational efficiencies were identified in the original business case based mainly on time savings. We were

however unclear if these savings were being realised or whether it simply "freed up time" to deploy personnel on other duties. WaterNSW responded that:

- *The opex efficiency identified by DamGuard is factored in the proposed opex budget requirements for the dam safety program in the upcoming IPART Determination (FY21-FY24) period.*
- *The estimated $1.5m operational efficiency identified by in the document supplied by ICT is a corporate wide and applies across the entire WaterNSW Portfolio of dams, i.e.; Greater Sydney and Rural.*
- *There is a greater efficiency gain from DamGuard implementation in the rural portfolio as compared to Greater Sydney portfolio due to the consequence category associated with the rural dam's portfolio (18 out of 20 dams in the Rural portfolio are assigned an extreme or High Sunny Day Consequence Category compared to only 9 out of 21 dams in the Greater Sydney portfolio).*
- *It is also worth noting that there has been a reallocation in dam monitoring accountabilities within the AE&DS team as a result of DamGuard implementation which is reflected in the new AE&DS team structure. As a result, two positions have been reallocated/redeployed to perform higher value-added activities to meet our new strategic structure.*

There is also considerable interest from other States in Australia in the product so there is potentially an opportunity to generate revenue by selling on the product to interested parties.

Overall, we concurred with WaterNSW that the project was not only a success in addressing the risks associated with managing dams and also appears to be an exemplar in terms of return on investment from an efficiency perspective (subject to confirmation that these benefits are actually being realised).

Data Centre – Current and Future Price Paths

The costs associated with the Data Centre refresh and Disaster Recovery are summarised in Table 9-5.

[redacted]

Table 9-5 Data Centre and Disaster Recovery expenditure (Source: WaterNSW SIR)

WaterNSW inherited a significant amount of legacy Data Centre infrastructure. Large elements of this infrastructure are duplicated and reaching both capacity limits and vendor support and thus in need of replacement. The program focuses on:

- Maintaining capability through asset renewal - replacing existing end-of-life assets in 2019/20 and again in 2024/25
- Augmenting disaster recovery capability which a 3rd party specialist commissioned to carry out a review identified as not fit for purpose
- Developing new capability through currency uplift on server operating systems, databases and consolidation of data centre services
- Augmenting capacity by procurement of increased storage, capability and processing growth (the headroom in the Data Centre is set at around 80% with 10% growth assumed per year, equivalent to $700k total investment

The utilisation of the NSW Government Data Centres (GovDCs)[29] is the preferred option pursued by WaterNSW to maintain core ICT infrastructure for both Production and Disaster Recovery environments. These environments are provided as a service which includes floor space, utility costs, physical security and environmental controls (temperature and humidity).

[29] See https://www.digital.nsw.gov.au/policy/buying-ict/government-data-centres and https://www.digital.nsw.gov.au/policy/buying-ict/government-data-centres for more information

[redacted]

WaterNSW, with assistance from Deloitte, approached the market in an open tender with a set of business requirements. Solutions provided in response to that tender informed the options. The recommended option was the Data Centre Refresh and development of new Disaster Recovery capability which had the lowest total cost of ownership as well as providing the strongest benefit case.

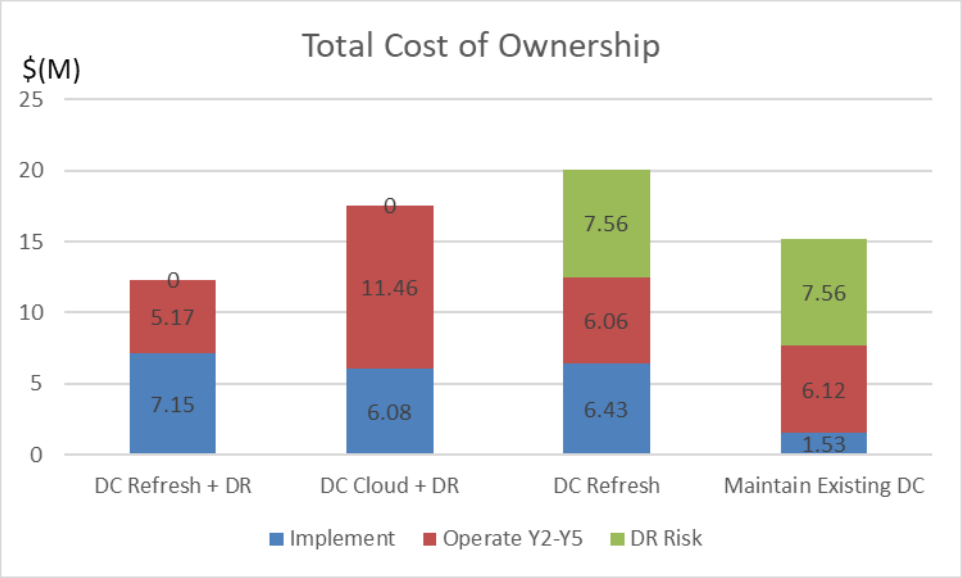


Figure 9-5 Financial summary of options

We also reviewed the delivery model[31] as well as the scope of work, procurement plan and tender evaluation and we were satisfied that the project has been developed and expenditure to date has been in a prudent and efficient way.

[30] For background information on tier certification and classification systems, see https://uptimeinstitute.com/tiers
[31] The key characteristics of the design of the delivery model is that (1) WaterNSW and the external vendor are jointly in-charge of the Project Management Office, Change Management and associated project management activities and (2)

We do not believe that there is sufficient justification for the 10% assumption for capacity growth each year on top of the headroom already being allowed for. This also does not set the right incentive to manage data in an efficient way; WaterNSW should be looking at opportunities to reduce its data. This is supported by the Water Services Association of Australia's report on the digital economy[32] which identified that:

New data is being produced at an extraordinary rate: 50% of the data existing worldwide was generated in the last 10 months. Most data remain under-analysed, presenting a real business risk and cost. The Veritas Databerg Report estimates that by 2020, worldwide $4.6 AUD trillion will be wasted due to gathering and storing too much data that is not being used…. only 10% of current data collected in Australia is tagged as 'business critical' while 62% of it remains 'dark' (of unidentified value) and 28% are ROT (redundant, obsolete or trivial).

We propose that there is a reduction of $300k per year to incentivise efficient behaviour which, when the 37% allocation for the Greater Sydney price control is applied, results in a reduction of $111k per year over the future price path.

ICT Renewals and Replacement Program – Current and Future Price Paths

The purpose of the ICT Renewals and Replacement Program is to provide WaterNSW with reliability such that their core business is not impaired by ensuring that employees have functioning and fit for purpose assets and applications to fulfil their functions and that adequate support is available where required. Expenditure relates for example to:

- Desktop PCs, laptops and monitors
- Toughbooks and tablets for use in the field
- Multi-functional devices for printing, scanning and photocopying
- Contractor support to build machines
- Mobile and satellite phones
- Software licences (under operational expenditure)

The program generally replaces assets once they reach their depreciation age, which for desktop PCs is four years, laptop computers three years, mobile telephones two years and for servers and network equipment (e.g. routers) it is five years.

The costs associated with the ICT renewals and replacement are summarised in Table 9-6Table 9-5. There is not a specific business case for this expenditure as the line item represents a provision for minor assets. The provision is a 'rolling' renewals provision where the renewal formulation is made on the basis of equipment purchased and the replacement dates based on asset life.

	Current Price Path					Future Price Path				
$2019/20 (millions)	2017	2018	2019	2020	Total	2021	2022	2023	2024	Total
Determination	$1,959	$2,141	$3,121	$1,606	$8,827					
Actual expenditure	$2,169	$1,355	$ 954	$ 728	$5,206	$ 1,130	$ 940	$1,027	$1,025	$4,122

Table 9-6 ICT Renewals and Replacement (Source: WaterNSW SIR and email of 6th September 2019)

Despite considerable effort, it proved challenging to conduct a deep dive into this area of expenditure. There had been a relatively recent change of personnel, access to some historic documentation was limited and there were potentially some inaccuracies in coding across the various financial systems used in the current price path. WaterNSW was unable to provide satisfactory responses to explain:

the external vendor delivers the technology components needed for refresh and transform. This is designed to both maximise WaterNSW oversight of the project and also reduce risks.

[32] WSAA (2018) Harnessing The Digital Economy, a discussion paper for the Australian and New Zealand water industry

- The reason(s) for the actuals being $3.6m lower than the allocation for the current price path – It was suggested that some of the expenditure was captured elsewhere although the only example provided was $273k assigned to Service Automation and Catalogue
- The reason why the forecast for the future price path is $1.1m lower than the current price path – We were informed that the reduction is due to some ICT renewals which would traditionally be funded from the ICT Renewals program being funded from other ICT projects. An example which was given related to telecommunications equipment which would normally be funded from this budget will be funded from the Telecommunications Program. This implies therefore that the funding requirement is not actually lower in the future price path, but we do not understand the logic of renewals and replacements being funded under another line item. It makes comparison and evaluation of investment much more challenging.
- How headcount had been considered - We sought to understand if the investment plans reflected the latest headcount for the future price path. The response we received stated that WaterNSW will purchase additional minor assets in cases where new personnel cannot be serviced by the existing ICT fleet. However, in our opinion, this is not confirmation that the renewals formulation was validated against headcount. It appears possibly to be a rollover of the assumptions made during the current price path.

In addition, there was no evidence presented to demonstrate if there had been consideration of the actual condition or performance of the assets during the current price path and thus whether the assumptions behind the age at which assets are replaced had been revisited to determine if they were still reasonable.

Notwithstanding the issues we have raised, we have no specific evidence to suggest that the expenditure undertaken in the past and that proposed is not prudent or efficient:

- The need is demonstrated
- The investment is consistent with WaterNSW's asset management strategy
- Procurement is managed in such a way as to promote best value

Appendix C. Project Summaries

C.1. Warragamba Dam Environmental Flows Construction

PROJECT DETAILS

Project Name	Warragamba Dam Environmental Flows (E-Flows) Construction	
Project Number	WGP008	Planning and design in 2016 price path, construction expenditure in 2020 price path
Work Program	Environmental compliance	
Key Investment Driver(s)	New mandatory standard	
Stage	Design	
Similar Projects	This project has been progressed alongside the raising of the Warragamba Dam wall as both impact the dam wall. However, the projects are functionally separate.	
Output Measure	WNSW has proposed that this project be included as an Output Measure for the future period	

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in 2019 Needs Assessment BC	$ 98.7million	**Initial Delivery Date**	December 2024
Outturn cost / Forecast outturn cost in Submission	$112 million (including $6.4 million capitalised overheads)	**Actual / Forecast Delivery Date**	

Year ending (price base $m 19/20)	2017	2018	2019	2020	Sub Total	2021	2022	2023	2024	Sub Total	Total
Planned (SIR)				5.264	**5.264**	11.633	39.052	29.189	20.283	**100.1**	105.3
Planned From review documents											

NEED FOR SCHEME

This project supports State Government policy as documented in the Metropolitan Water Plan. Outcome 4 of the Metropolitan Water Plan is that “Rivers downstream from dams are healthy”. The purpose of the project is to improve the health of the Hawkesbury-Nepean River be introducing a variable environmental flow regime through releases of water from Warragamba Dam.

WaterNSW anticipates that the requirement for the scheme will be formalised through a future works approval will include a requirement for environmental release in alignment with the preferred flow regime when finalised by the Metropolitan Water Directorate.

Note that implementation of environmental flows will decrease overall system yield for Greater Sydney.

SCOPE OF WORKS

The following new infrastructure and modifications to existing infrastructure are required to deliver the environmental lows:

- Modifications to pipe work within the disused Hydro Electric Power Station (HEPS) to allow for environmental flow releases and accommodate for a potential new turbine installation.
- Modification of the existing HEPS offtake on the upstream of the dam to include a multi- level offtake, with additional benefits from better management of cold-water pollution risks.

IMPACT ON OPERATING COSTS

The internal business case for the project does not identify any associated operating expenditure. An increase in operating expenditure is likely to result from this project to cover operation of the valve (power) and maintenance. The project may include energy recovery.

OPTIONS APPRAISAL

The design of the environmental flow regime is being led by WaterNSW. The flow regime has been determined by government and will be directed to WaterNSW as a policy position. The flow regime is expected to require flows in the range of 0 to 6750 ML/day with 95% of release being less than 500 ML/day.

In our discussions with Sydney Water, it was suggested that recycled water could meet some environmental flow requirements in the medium-long term as more recycled water becomes available in Western Sydney. This would need to State Government policy and is outside of the control of WaterNSW.

Design of the infrastructure is currently in progress. Design of the environmental flows project is being progressed alongside the design of the raising of the wall of Warragamba Dam to ensure that any constraints and synergies are identified and accounted for in the design.

The current design is for three outlet valves of varying sizes to meet the range of flows required. There is an existing penstock which will be used and further pipework and control valves will be required. The design is considering if there can be power recovery from the environmental flows, but this will depend on the quantities of water to be released. WaterNSW expects to have design 60% complete by early October 2019. The balance of the design to be completed will largely before power generation infrastructure.

COST ESTIMATING METHOD

The internal business case for this project includes the following cost estimates for planning and delivery:

- Base estimate - $89 million
- P50 estimate - $98.7 million
- P90 estimate - $118.1 million

The P50 estimates includes $8.6 million for planning and $90.1 million for delivery.

[redacted].

[redacted]

WaterNSW's SIR includes the following items relating to this project. There is $3.86 million in the three years from 2016/17 to 2018/19 presumably for planning works. In the current year expenditure in the SIR is forecast at $5.26 million. In response to a query, WaterNSW advised that expenditure in the current year is expected to be $7.5 million, $2.2 million higher than forecast.

[redacted]

The SIR reconciles with the breakdown of capitalised overheads provided by WaterNSW albeit there is one year less information in the capitalised overheads breakdown. Capitalised overheads are 6% of the total in the breakdown extrapolating this proportion over the total project costs in the SIR gives the following expected breakdown between direct costs and overheads.

Direct cost ($k)	105,643.79
Overheads ($k)	6,414.08
Total cost ($k)	112,057.88

The SIR does not reconcile to the supporting information, even after removing the capitalised overheads. The direct cost in the SIR is $105 million. The P50 estimate is $98.7 million. Without justification for this $7 million increase, we recommend that the efficient expenditure be aligned with the business case

PROCUREMENT METHOD

As noted, WaterNSW has progressed the raising of the Warragamba Dam wall in parallel with this project to date to ensure constraints and opportunities are identified. At our interviews, WaterNSW stated that it may be necessary to decouple delivery of the environmental flow project from the dam wall raising as they have different drivers and as there is significant uncertainty over the timing of the dam wall raising.

WaterNSW states with respect to procurement of these works that it will "*leverage off carefully customised procurement strategies. Dedicated teams have been established to oversee the planning (and subsequent delivery) of these projects. A core of WaterNSW personnel will be supported by contracted resources as needed to ensure time, cost and quality parameters are met for the procurement and ongoing contractor management of the delivery contractor/partner".*

This procurement approach (although very high level) is appropriate for a project of this scope and scale.

DELIVERY

Planning and design of the environmental flows project has been brought forward into the current period to align with the current period.

The internal business case has the following program for delivery:

- Detailed design, obtain environmental approvals and submission of final business case – Quarter one 2021;
- Award delivery contractor -Quarter 4 2021;
- Project completion – late 2026.

The completion date has also been nominated by WaterNSW as an Output Measure.

We queried whether there has been any direction from the State Government regarding the required timing for delivery of this project. However, WaterNSW has not yet responded to this query.

We also queried how any potential delays to the timing of the dam raising project would impact this project to which WaterNSW responded:

> *The implementation timing of Warragamba e flows is dependent on the Warragamba dam raising being approved by the Government, with no decision expected until quarter 1 2021. If the dam raising does not proceed, the e flows procurement of delivery contractor would start quarter 2 in 2021 and construction quarter 1 2022. As advised in the interviews, the timing is very fluid at the moment and current timings are subject to the NSW Government's approval for the dam raising.*

[redacted] We therefore consider it likely that the environmental flows project will need to be delivered separately to the dam wall raising. WaterNSW estimates that this will lead to a one-year delay in delivery. However, we think that this timing is also optimistic. We consider that the following factors make it more likely than not that this project will not commence until outside the current period:

- The amount of uncertainty and opposition to the raising of the dam wall will lead to more time being required to decouple the two projects. We understand that WaterNSW has progressed each as separable portions for design and approvals but there will be some planning, approval and design items that need to be separated. Also, there will be a need to engage with stakeholders (including the community) as to the different drivers for each project.
- WaterNSW's corporate focus in coming years will be primarily on the drought response. Its capacity to deliver the drought response will also extend its overall ability to deliver capital works. This project does not have the same urgency for delivery and therefore given its scale, deferral will better enable WaterNSW to respond to the drought.

The above represent our opinion of the most likely circumstances that will influence delivery of this project based on the information available to us. On this basis, we recommend that the capital expenditure for delivery of this project be deferred to commence in 2023/24 as a likely timing for commencement. We consider that the planning and design costs in the current period are justified.

Our recommended expenditure following adjustment to align with the SIR and deferral of expenditure is shown in the table below.

WARRAGAMBA E-FLOWS (WGP008)											
2019/20 $ 000k	2020	2021	2022	2023	2024	2025	2026	2027	2021-2024	2021-2025	Total Project
Proposed June 2019 SIR	5,264	11,633	39,052	29,189	20,283	6,638	0	0	100,156	112,058	112,058
Reduction in line with business case	0	0	0	-756	-2,539	-1,898	-1,319	-432	-3,295	-5,193	-6,944
Defferal adjustment	0	-11,633	-39,052	-17,556	18,770	22,551	20,283	6,638	-49,471	-26,920	0
Total Atkins reccommended adjustment	0	-11,633	-39,052	-18,312	16,231	20,653	18,964	6,206	-52,766	-32,113	-6,944
Atkins proposed expenditure	5,264	0	0	10,877	36,513	27,291	18,964	6,206	47,390	79,944	105,114

POST PROJECT REVIEW

N/a

KEY DOCUMENTS REVIEWED

- Warragamba Dam Environmental Flows - Preliminary Business Case
- Metropolitan Water Plan 2017
- Response to RFI #142
- WaterNSW – 2019-20 AIRSIR.xlsm

C.2. Greater Sydney Renewal Provision

PROJECT DETAILS

Project Name	Greater Sydney Renewal Provision	
Project Number	WEM086	2020 price path
Work Program	Asset renewal	
Key Investment Driver(s)	Asset renewal for existing mandatory standards	
Stage	Planning	
Similar Projects	There are a number of other renewals programs in the SIR: 	
Link to asset plans	[delete if N/A]	
Output Measure	[delete if N/A]	

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in 2019 Needs Assessment BC	N/a	**Initial Delivery Date**	N/a
Outturn cost / Forecast outturn cost in Submission	N/a	**Actual / Forecast Delivery Date**	N/a

Year ending (price base $m 19/20)	**2017**	**2018**	**2019**	**2020**	**Sub Total**	**2021**	**2022**	**2023**	**2024**	**Sub Total**	**Total**
Planned (SIR)	**0**	**0.0411**	**0.0013**	**0.0423**		8.759	15.373	12.693	8.865	**54.657**	**54.6997**
Planned From review documents											

NEED FOR SCHEME

The Greater Sydney Water Infrastructure Renewals program is a portfolio of needs assessed to maintain capability of existing water infrastructure assets in Greater Sydney. These renewals activities are required

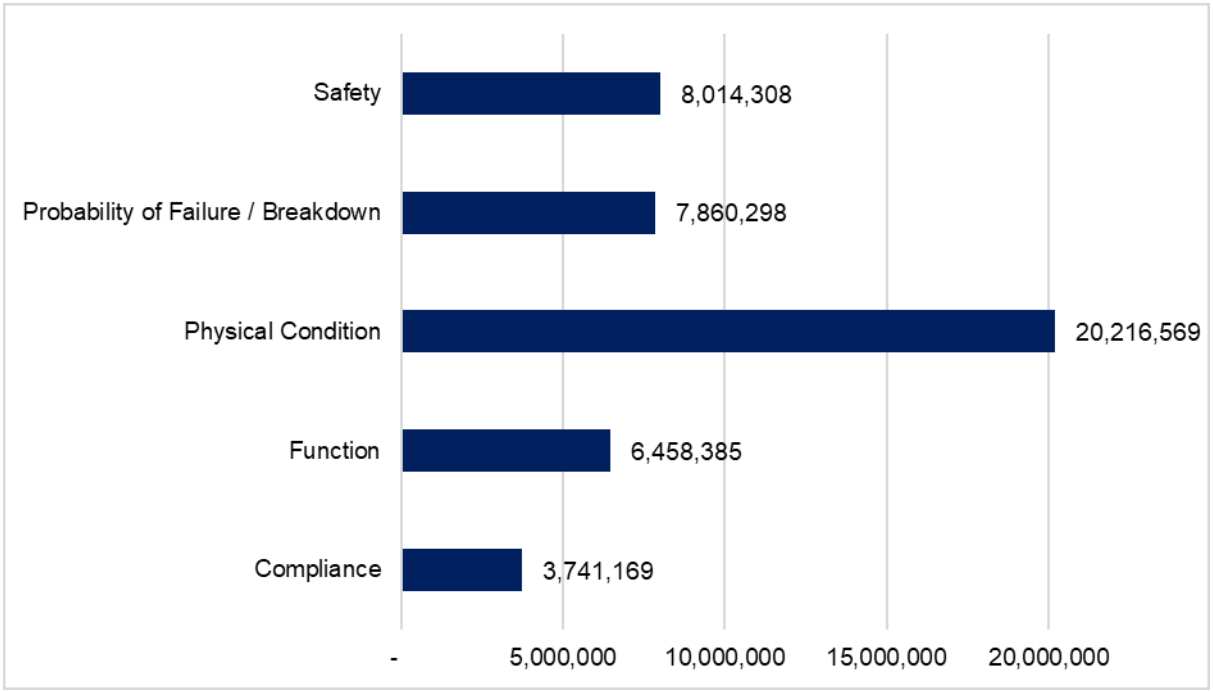
to maintain service obligations in delivering water to its customers reliably, consistent with the WaterNSW Operating License Design Criteria.

SCOPE OF WORKS

The scope of this works is a portfolio of needs assessed for renewal to maintain the capability of existing water infrastructure in the Greater Sydney area. Approximately half the budget is categorised as civil works.

Investments in Water Infrastructure are driven by risks of failure as evidenced by assets in deteriorating conditions (poor or worse), in consideration of asset criticality and cost of remediation. In some instances, assets are refurbished whilst in fair condition (for example, valve refurbishments) to protect against more costly replacements later in their lives. In order to identify potential needs, WaterNSW held workshops in late 2018 with its key internal stakeholders to identify needs for future investments in all regions of Sydney. Following these workshops, WaterNSW planning team reviewed the needs, and engaged independent consultant (SMEC and GHD) to review the proposed needs and identify preferred refurbishment or replacement options and cost estimates where the need is valid.

A breakdown of expenditure by driver is shown below.



IMPACT ON OPERATING COSTS

No explicit impacts on operating costs have been identified. However, generally, renewal of assets tends to lead some reduction in operating expenditure due to technological advancements and improved efficiency standards (all else being equal).

OPTIONS APPRAISAL

In considering the preferred option, the options were against need (asset condition, criticality and asset life) for prudency. Works in scope include renewals of access and safety assets, boat ramps, electrical, cranes, outlets and pipelines, valves and gates, peat barriers, structural and other various items including two

aeration compressors. The scope of works for the projects are per the assessment reports by SMEC for Greater Sydney Water Infrastructure Renewals.

In the assessment of each project for needs-based renewal, each component of a project is considered. Each component of an asset or project has calculated intervention and attached lifecycle event as identified in PowerPlan. The triggers for renewal include when the cost of replacement is greater than the weighted cost of the capital, annualised risk control and the decay in condition of the asset combined with asset criticality. In the options 'do nothing' is not an option so intervention and action must be taken.

In late 2018, WaterNSW held workshops with key internal stakeholders to identify needs for future investments for water infrastructure in the Greater Sydney area. Following from these workshops, WaterNSW planning teamed reviewed the needs and engaged independent consultants (SMEC and GHD) to review the proposed needs and complete cost estimates where the need for replacement or refurbishment was valid.

Condition assessment is initially captured in Dynaway against all criteria before being transferred to PowerPlan. As a part of the condition assessment program, annual visual assessments are undertaken as a part of maintenance. Specialised and specific condition inspections are also conducted.

The consultants undertook site assessments with the asset managers and operators and captured the preferred option and costed these options. In considering the preferred option, the options were assessed for prudency against the need, with the cost of individual options and their effectiveness in meeting the need efficiently being an integral part of the assessment process.

The renewals budget under this project is exclusive of projects covered under other programs in the Greater Sydney IPART submission (e.g. SCADA, roads and bridges), irrespective of whether they were initially assessed by SMEC.

COST ESTIMATING METHOD

Cost estimates were prepared by SMEC as part of its assessment of options. The cost estimates have been challenged by WNSW and we saw evidence of these in our interviews with WNSW. The program includes capitalised overheads of 16% in the total costs in the SIR.

PROCUREMENT METHOD

WaterNSW is determining its procurement arrangements for renewal works. It currently expects the procurement approach to involve a single or multiple delivery partner(s) by geographical region. Where delivery partners are engaged, it is anticipated that they will have program and project management capabilities to enable them to self-perform works. This delivery partner approach is expected to realise efficiencies through appropriate risk sharing.

Delivery will also be supported by a panel of concept designer(s) and a panel of specialist contractors to provide specialist technical services such as SCADA and coatings.

DELIVERY

The program is an ongoing program-built bottom up from assessed needs. The program averages $10.9million per annum in the forward period but starts at $8.8million in 20/21 before increasing to $15.4 million then declining. WNSW intends this to be an ongoing renewal program for the water infrastructure assets not specific to the forward price period.

POST PROJECT REVIEW

N/a

KEY DOCUMENTS REVIEWED

- Water Infrastructure Renewals Project Summary
- 159 capitalised overheads to GS
- 128 - Greater Sydney Regulatory Submission - Support - Renewals Program
- 217 – SMEC program map and deferred works list
- WaterNSW – 2019-20 AIRSIR.xlsm

C.3. Greater Sydney Resilience Provision

PROJECT DETAILS

Project Name	Greater Sydney Resilience Provision	
Project Number	WEM169	2020 Period
Key Investment Driver(s)	Existing mandatory standards	
Stage	Planning	

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in 2019 Needs Assessment BC	$ 20.5m	**Initial Delivery Date**	2025
Outturn cost / Forecast outturn cost in Submission	$20.5m	**Actual / Forecast Delivery Date**	2025

Year ending (price base $m 19/20)	2021	2022	2023	2024	2025	Sub Total 21-24	Project Total
Planned (SIR)	0.2	2.1	6.1	8.6	3.5	17	20.5
Planned From review documents	0.2	2.1	6.1	8.6	3.5	17	20.5

NEED FOR SCHEME

WaterNSW state the need for the scheme is to improve the flexibility and resilience of WaterNSW water supply network in the Greater Sydney Region. A resilience study was undertaken to identify potential risks within the water supply network. The study identified that address a high-risk failure scenario where both Warragamba pipelines fail upstream of the Orchard Hills offtake due to terror attack or unforeseen rupture.

Although listed as existing mandatory standards we consider this to be a discretionary spend project.

SCOPE OF WORKS

Works would include a new pipeline and infrastructure from Prospect reservoir to Orchard Hills offtake.

IMPACT ON OPERATING COSTS

N/A

OPTIONS APPRAISAL

Options appraisal was limited, to either undertake the project or not.

COST ESTIMATING METHOD

Cost estimates are preliminary and based on general industry knowledge of past projects. These include capitalised overheads and the management reserve:

P50 - $20.5m

P90 - $24.3m

PROCUREMENT METHOD

A limited procurement plan is included within the business case which explains the overall WNSW procurement process. There is no mention of how WNSW may drive efficiencies through the procurement process.

DELIVERY

WaterNSW have not demonstrated any link to any particular performance measures which would identify a need for the project. Although this project is identified as an 'existing mandatory standard' it more readily appears to be a discretionary spend project i.e. it is not linked to any deterioration in asset performance.

We consider this to be imprudent on the basis that there are two existing pipelines with interconnectors already in existence and this would appear to be a gold-plating project. We were not provided with significantly robust evidence on the need for this project to justify its expenditure. We recommend not including any expenditure for this particular project as per our recommended adjustment in below.

GREATER SYDNEY RESILIENCE PROVISION (WEM169)						
2019/20 $ 000k	**2021**	**2022**	**2023**	**2024**	**Total Project**	**2021-2024**
Proposed June 2019 SIR	1,920	5,687	5,531	3,861	17,000	17,000
Atkins recommended adjustment	(1,920)	(5,687)	(5,531)	(3,861)	(17,000)	(17,000)
Atkins proposed expenditure	0	0	0	0	0	0

POST PROJECT REVIEW

N/A

KEY DOCUMENTS REVIEWED

60 Greater Sydney Resiliency Program – Project Summary
60 Prospect to Orchard Hills Transfer Regulatory Business Case
60 Annexure A NSW00017_RP_Greater Sydney System Resilience Options Study_Report_Ver04a
60 Annexures B - 19-61 Estimate @Risk GW Resilience Program - Prospect to Orchard Hills Transfer

C.4. Greater Sydney Supply Augmentation

PROJECT DETAILS

Project Name	Greater Sydney Supply Augmentation	
Project Number	The submission includes two project lines with this title. One, WNM003, incorporates $7.3M between 2017 and 2019. The other, WGO002, incorporates $13.9M shared between 2020 and 2021.	Mainly in 2016 Price Path
Work Program	Growth	
Key Investment Driver(s)	New assets for growth	
Stage	Planning	
Output Measure	Project: "Future augmentation of Sydney's water supply" Measure: "Substantial progress required in identifying and planning the next augmentation for Sydney's water supply" Expected completion: end of the next regulatory period	

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in Preliminary BC	[redacted]	**Initial Delivery Date**	2020
Outturn cost / Forecast outturn cost in Submission		**Actual / Forecast Delivery Date**	2021

Year ending (price base $000s 19/20)	**2017**	**2018**	**2019**	**2020**	**Sub Total**	**2021**	**2022**	**2023**	**2024**	**Sub Total**	**Total**
Planned (SIR)	[redacted]										
Planned From review documents											

NEED FOR SCHEME

The scheme is driven by the need to meet anticipated increases in water demand.

SCOPE OF WORKS

This project line refers to identification and planning work for options to augment the water supply for Greater Sydney. The studies undertaken in the current Determination period has identified the Burrawang to Avon Tunnel (BAT) project as the preferred option.

The costs in the submission relate to planning and business case preparation. WaterNSW is currently drafting the Infrastructure NSW Strategic Business Case for which it is aiming to have internal approval by

the end of 2019, to submit to the NSW Expenditure Review Committee (ERC) in early 2020. The aim is to finalise the business case in 2021.

It is expected that the NSW Government Greater Sydney Water Strategy 2020 will determine whether the scheme should proceed to construction.

WaterNSW considers that there is significant uncertainty around this decision, especially as it interacts heavily with decisions around the implementation of drought schemes and Warragamba raising for example. WaterNSW has therefore proposed that it be treated as a contingent project and has not included construction costs in the submission.

IMPACT ON OPERATING COSTS

There will only be an opex impact if the project is taken forward (not included in the submission). This is estimated to be ~$4M p.a.

OPTIONS APPRAISAL

WaterNSW commissioned a consultant to develop the Greater Sydney Augmentation Plan 2100. This identified a number of water supply "portfolios" which were subjected to economic optimisation and prioritisation using Multi-Criteria Analysis (MCA).

The chosen portfolio has the lowest Net Present Cost although we note that it does not score highly against operability, safety and greenhouse gas production.

As there are no construction costs included in the proposal and the business case is still being developed, we have not interrogated the options appraisal and background modelling in detail. [redacted]

COST ESTIMATING METHOD

[redacted]

Greater Sydney Supply Augmentation - recommended capital expenditure

GREATER SYDNEY SUPPLY AUGMENTATION								
2019/20 $ 000k	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**Total Project**	**2021-2024**
Proposed June 2019 SIR	[redacted]							

[33] The document is not dated but appears to have been prepared in 2017 based on the document reference.

[redacted]

The Greater Sydney Augmentation Plan 2100 included an estimate of $795M capex and $4M opex.

PROCUREMENT METHOD

Procurement for delivery will only be initiated if the scheme is approved by the ERC.

DELIVERY

N/A

POST PROJECT REVIEW

N/A

KEY DOCUMENTS REVIEWED

49 62 Burrawang to Avon BAT Tunnel Preliminary Business Case
62. Burrawang to Avon BAT Tunnel - Project Summary
190 194 Greater Sydney Supply Augmentation Final Report May 2018 CONFIDENTIAL

C.5. Metro Dams Electrical Upgrade

PROJECT DETAILS

Project Name	Metro Dams Electrical Upgrade		
Project Number	WEM036	In progress	Mainly in 2016
Work Program			
Key Driver(s)	Asset renewals		
Stage	Implementation		

Year ending (price base $m 19/20)	2017	2018	2019	2020	Sub Total
Planned (2015 SIR)	4.1	13.3	13.0	3.6	**30.4**
Project Execution Business case	0.05	10.2	7.3	3.3	**21.4**
Actual	0.06	7.9	7.0	6.1	**21.2**

NEED FOR SCHEME

This project was initiated to replace the electrical equipment at the six metropolitan dams. It has been identified that some electrical overhead wires have been the root cause of some bush fires. Renewal of the electrical infrastructure achieves compliance, renews aged electrical supply and distribution systems, lowers operational risk in the event of bushfire and preserves option value of future communication/SCADA upgrades.

SCOPE OF WORKS

The upgrades cover the following electrical systems and backbone services for future
SCADA, control, security, instrumentation and communications at the proposed works sites
HV & LV distribution systems including;

- Kiosk substations (33kV/11kV, 11kV/415V and 33kV/415V)
- Air break switches (33kV and 11kV)
- LV main switchboards
- Distribution boards
- Power cablings and reticulation systems
- Cable containment systems
- Lighting system
- Power outlets
- Lightning protection system
- Earthing systems
- 240VAC UPS systems

Backbone facilities for systems and equipment including:

- Fibre optic cabling
- Data cabling
- Control cabling
- Cable containment systems
- Cable termination onto appropriate equipment (e.g. FOBOT, patch panels)
- Equipment cabinets

IMPACT ON OPERATING COSTS

There was no explicit link made to any opex savings throughout our review

OPTIONS APPRAISAL

The business case considered options to upgrade and/or install electrical supply and distribution infrastructure, SCADA, security and communications upgrades. Consistent with a risk-based approach, the recommended solution (option 1) was to leverage off the concept design work already completed, but restrict the scope of works to the electrical supply and distribution system and lighting with construction works to proceed in two stages, starting with facilities with higher operational criticality. Additional works, considered in the preliminary business case, were deferred for delivery under other strategies/projects within future Determination periods

COST ESTIMATING METHOD

There was a bottom up cost estimate developed within the business case. As this was primarily electrical infrastructure replacement costs were well understood and easy to obtain cost benchmarks. The overall costs estimate appeared in line with the Determination, however this masks recent scope adjustments to align with current business drivers.

Planning expenditure to March 2017	$0.22 million
Execution - internal resource cost	$2.28 million
Execution - external contract base costs	$13.60 million
Risk based contingency (P50 equivalent)	$2.15 million
Management reserve (~5% of Execution base costs)	$0.83 million
Budget Allocation for Capitalisation of BU and Corporate Overhead (*actual capitalisation may vary*)	$2.39 million
Total Estimated Project Costs (ex GST)	**$ 21.47 million**

PROCUREMENT METHOD

Procurement was based on tenderers selected through and EOI process. Tenderer was selected on 60%price 40% technical.

DELIVERY

This project was initiated to replace the electrical equipment at the six metropolitan dams the project appears to have been delivered as planned within the final business case. Within the previous 2016 IPART Determination $29.4M (real 19/20$) was allowed, this compares to a forecast outturn of $21.2m or a 38% overestimate at the last Determination. This indicates that the efficient level of expenditure set at the last Determination was too high. The project had significant amounts of scope rationalised including dam safety instrumentation, security and facility upgrades and automation renewals, through a strategic review in line with WaterNSW asset management system. This represented the primary driver for underspend. We consider this scope reduction in making our overall catch-up efficiency assessment for the future Determination period.

POST PROJECT REVIEW

N/A still in progress

KEY DOCUMENTS REVIEWED

0115C3 Metropolitan Dam Electrical Upgra_frastructure and Operations - 19 April 2017 (Item 6.4) - Final _ Item 7.1b ATT (2)

C.6. Warragamba Corridor & Pipeline and Internal Lining Restoration

PROJECT DETAILS

Project Name	Warragamba Pipeline and Corridor comprising: • Warragamba Corridor & Pipeline - Tranche 1-WEM107 • Warragamba Internal Lining Restoration Project- WEM109 • Warragamba Embankment Upgrade- WEM126 • Warragamba Pipeline Corridor Restoration Planning- WEM127	
Project Number	WEM107; WEM109; WEM126; WEM127	2020 Determination Period
Work Program	Warragamba Pipeline Renewals Program	
Key Investment Driver(s)	Asset Renewals	
Stage	Design	

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in 2019 Needs Assessment BC	$ 105.5m	**Initial Delivery Date**	[month/ year]
Outturn cost / Forecast outturn cost in Submission	$ 105.5m	**Actual / Forecast Delivery Date**	30/6/2024

Year ending (price base $m 19/20)	SIR ID	2018	2019	2020	Sub Total 17 to 20	2021	2022	2023	2024	2025	Sub Total 20-24	Sub Total 20-25	Total Project
Planned (SIR)													
[redacted]													
Total Capex			**0.71**	14.25	**14.97**	24.05	17.39	19.58	29.50	19.22	**90.52**	**109.74**	**124.71**

NEED FOR SCHEME

The Warragamba Supply Scheme is the largest and most important of Sydney's water supply systems, providing a secure water supply to satisfy the demands of industrial, commercial and residential development of metropolitan Sydney. The Warragamba water supply pipelines are essential for delivering water from Warragamba Dam to water filtration plants at Prospect, Orchard Hills and Warragamba.

Two large diameter concrete lined welded steel pipelines run from the dam to the Prospect Water Filtration Plant (WFP) within a dedicated corridor. Prospect WFP supplies 80% of Sydney's water demand, serving around 3.5 million people (expected to increase to 3.9 million by 2023) with reliable drinking water. The Warragamba Pipelines are potentially the sole source of water supply for around 3.3 million people in Sydney when the Desalination Plant is not in operation, or around 2 million people when it is.

The condition of most of Pipeline 1 and the corridor assets, and some sections of Pipeline 2, have been identified as being in poor condition and continuing to deteriorate. Several assessments and studies have been conducted over recent years which have identified a number of issues and defects which have the potential to cause adverse impact to service delivery, health, safety, environment, finances, and reputation. These include:

- Sediment built up against the pipelines and pipe supports
- Rock falls and earth slippages in cutting batters
- Damaged, deteriorated or blocked concrete and earth drains, kerbs, culverts and aprons
- Water ponding around the pipeline anchor blocks and supports
- Vegetation growth near the pipeline and in drainage systems
- Erosion of cutting batters from stormwater run-off leading to slipping, slumping and instability of
- cutting batters and collapse of retaining walls
- Erosion around pipe supports at a number of creek crossings
- Non-functioning, corroded, or damaged rocker bearings
- Non-functioning, missing, corroded, or damaged stabiliser rods
- Failure of the pipeline coating, leading to advancement of corrosion of the steel pipe
- Limited access to the pipeline, impairing the ability to inspect and repair the pipe or other deficiencies
- Misaligned, hardened and leaking pipe expansion joints
- Non-compliant, corroded or damaged walkways and access platforms

The objectives of the Restoration Program are to maintain ongoing reliable supply of water through the two Warragamba Pipelines and to achieve a further operating life of at least 50 years for the pipelines by improving the condition of pipeline and corridor assets and undertaking upgrades to address root causes of asset failure.

SCOPE OF WORKS

The following works have been proposed as part of the Warragamba Pipelines and Restoration Program:

1. Non-outage works - restoration of anchor blocks, stabiliser rods, stiffener rings, cuttings, drainage, pipeline coating, ladders and platforms, customer offtakes, access manholes, scour valves and adits.
2. Outage works - restoration of concrete sills, rocker bearing assemblies, expansion joints, internal cement lining, and scour pipework

IMPACT ON OPERATING COSTS

The full restoration program estimates and net opex saving of $45m over the next 30 years comprising of a $69m reduction in reactive maintenance costs and an additional maintenance of $24m on the replaced assets.

OPTIONS APPRAISAL

Four Options were considered:

- Base Case: Continue with current reactive repair approach.
- Option 1: Remove vegetation and silt, full restoration and upgrade of cuttings and drainage, restoration of pipeline coating, internal cement mortar lining, sills, pipeline rocker bearings, expansion joints, stabiliser rods, scour pipework, river crossings, ladders and platforms, customer offtakes and access manholes. (i.e. the “Full Restoration Program”)
- Option 2: Remove vegetation and silt, full restoration and upgrade of cuttings and drainage, and restoration of pipeline coating and internal cement mortar lining
- Option 3: Remove vegetation, desilt and reinstate drains, remove failed retaining walls, and restoration of pipeline coating and internal cement mortar linin

NPV was undertaken on a totex basis and over a 30-year period. This considered avoided costs, and risk costs of system failure.

A Multi-criteria analysis was then undertaken on all options, benefits, risks and consequences was considered with Option 1 being considered as the preferred option.

COST ESTIMATING METHOD

High level cost estimation for the preferred option underwent some sensitivity analysis within the business case.

Whilst the basis for the selection of the preferred option seems sound, we have not seen any evidence of the internal challenge of the cost estimates within the business cases so consider there to be scope to achieve efficiencies within the delivery of the program.

The nominal project business case estimate was as follows:

Total direct costs		[redacted]
Total indirect costs and WNSW costs		[redacted]
Total Project Costs excluding Contingency		[redacted]
Risk Contingency		[redacted]
Total Project Costs		$118,654,653

PROCUREMENT METHOD

Consultants undertook a multi-criteria analysis to decide on the most appropriate procurement method.

Cost plus contract using multiple contracts was the preferred procurement methodology for the non-outage works, and

A lump sum contract using a single contractor for the outage works. Prequalification of contractors and early contractor involvement (ECI) for each package of work was also recommended.

DELIVERY

N/A – in planning stage

The move WaterNSW have made towards a more vertical project management and project delivery organisation should help to realise savings within this program. We have not made any specific adjustments for this program of works but consider this within our overall catch-up efficiency challenge to WaterNSW within the capital delivery assessment.

POST PROJECT REVIEW

N/A – in planning stage

KEY DOCUMENTS REVIEWED

155 Warragamba Pipeline and Corridor Business – SEG955-MD-PC- REP -00001
155 Warragamba Pipelines FMEA 2019 ver 1_1
155 Warragamba Pipelines Master Plan 2019 ver 1_3
53. Warragamba Pipeline and Corridor - Project Summary
156 Warragamba Pipeline Restoration Project of Development of Costing IPART 190916

C.7. Warragamba Pipeline ancillary valves upgrade

PROJECT DETAILS

Project Name	'Warragamba Pipeline ancillary valves upgrade		
Project Number	WEM032	In Progress	mainly 2020 Price Path
Work Program	Warragamba pipeline		
Key Driver(s)	asset renewal		
Similar Projects	Warragamba pipeline restoration		
Stage	Implementation		

Year ending (price base $000k 19/20)	2017	2018	2019	2020	Sub Total	2021	2022	2023	2024	Sub Total	Project Total
Proposed June 2019 SIR	136	2,608	5,409	7,483	**15,635**	[redacted]					
Proposed June 2015 SIR	2,375	3,379	2,461	2,290	**10,505**	428	-	-			**12,208***

***including $1,275k expenditure before 2017**

NEED FOR SCHEME

The Warragamba Pipelines consist of two 27Km long parallel pipelines that deliver raw water by gravity from Warragamba Dam to Sydney Water's Prospect Water Filtration Plant.
• Pipeline No 1 pipeline consists of a 2650 mm diameter pipe from the Dam to Cross Connection 1 and thereafter to a 2100 mm diameter pipe to the Ferrers Rd outlet.
• Pipeline No 2 pipeline consists of a 2650 mm diameter pipe from the Dam to Cross Connection 1 and a 3000 mm diameter pipe from then on to the Ferrers Rd outlet.

There are three major cross connections (Cross Connections 1, 2 & 3) and two minor cross connections at Mamre Road & Old Wallgrove Road Cross Connections enable various configurations of the Pipelines to be operated for maintenance or in the event of a failure.

The Warragamba pipeline has had no major upgrades since its construction over 50 years ago and the major hydraulic valves are now reaching the end of their design life. Many valves are supported on props and slings due to corrosion. There is a need to upgrade the valves to have remote control capability and introduce pipe break detection technology.

SCOPE OF WORKS

Core Works

- Removal and replacement of 21 Hydraulic or Electric Actuated Valves (noting 6 of these Valves were procured ahead of installation)
- Major refurbishment of 2 existing Valves V10 and V16

Other works include:

- Detailed Design including workshop and installation drawings, functional description specifications
- Factory Acceptance Testing (including overseas at the manufacturers facilities), Pre-commissioning, Site Acceptance Testing and Commissioning

- Provision of non-build deliverables including Manufacturer Data Records, Operations & Maintenance Manuals, Training Materials, WAE Drawings, Asset Data, Warranties
- Training for WaterNSW's Staff

IMPACT ON OPERATING COSTS

There is no explicit impact on opex indicated within the business case. [redacted].

OPTIONS APPRAISAL

The four options considered in the preliminary business case were for the design and documentation of valves only (excluding construction). [redacted]

Option	Description
1. Refurbishment of Valves and Replacement of Actuators	Undertake the concept design and documentation relating to refurbishment only of 24 critical valves on the Pipelines and the replacement of their existing electric or hydraulic actuators with new actuators of the same mode of operation.
2. Replacement of Valves and Replacement of Actuators	Undertake the concept design and documentation relating to the replacement of 24 critical valves on the Pipelines together with the replacement of the existing actuators with new actuators.
*3. Combination of Replacement/Refurbishment of Valves and Replacement of Actuators (**Preferred Option**)*	Undertake the concept design relating to the replacement of all the hydraulically operated valves and some of the minor cross connection valves with new valves and refurbishment of the electrically operated valves This option also recommends decommissioning and removal of four valves at the minor cross connections.
4. Base Case (Refurbishment of Valves)	Continue maintaining existing valves until replacement or refurbishment absolutely necessary. This option is not acceptable as the risk of system interruptions would be significantly increased due unplanned outages of the pipeline

COST ESTIMATING METHOD

WaterNSW Business Case (stage 2) states the total project cost of [redacted] (nominal prices), this compares to [redacted] (nominal in the June 2019 SIR submission) or [redacted] real prices.

We have not made any specific adjustment for this but consider this within our recommended cost estimation catch-up efficiency. We consider that the expenditure remains prudent despite the significant scope and expenditure increases noted since the 2015 pricing submission to IPART.

PROCUREMENT METHOD

Three tenders were received and assessed based on a 60% price and 40% non-price criteria.

Original Approach (2018)
• MCP panel members invited to tender for work as D&C package, except for
• 6 major valves for early stage works procured by WaterNSW
• Originally awarded to a contractor who since went into receivership

Interim for (2019)
• Selective tender for install of 2 valves and removal of two valves for refurbishment

Revised Approach (remainder of program)
• Open Tender D&C including sourcing of remaining valves

DELIVERY

The scope of project 2019-2023 was originally planned from 2018-2022 but failure of the contractor for the work into receivership after done for the first 2 valves. WNSW have let single package of work for the next 2. WNSW have purchased 6 valves in advance. WNSW do not have long term storage options for this type of equipment and condition can deteriorate if not stored appropriately.

There is the consideration of accessibility of the sites as a number of the bridges required to be crossed may not necessarily support the weight of a modern crane required to move the valve into position. These issues are expected to be experienced further east towards the top end of the pipeline. Management reserve and contingency have been included within the cost estimate.

WNSW are constrained by the timing of outages in number of work fronts due to the critical nature of the infrastructure and water required by Sydney Water at Prospect WFP which need to be planned and coordinated a year or more in advance.

POST PROJECT REVIEW

N/A

KEY DOCUMENTS REVIEWED

157 Warragamba Pipeline Valves & Controls Upgrade - Procurement and Contracting Plan Redacted
224 Warragamba Pipeline Valves and Controls Upgrade Presentation
Summary Warragamba pipeline main valve and controls renewal
Warragamba Pipeline Valves Controls FBC (Part 2) - Approved

C.8. Upper Canal Interim Works Stage 2

PROJECT DETAILS

Project Name	Upper Canal Interim Works Stage 2		
Project Number	WEM038	Status	2016 Determination period
Work Program	Upper Canal		
Key Driver(s)	[asset renewal/ new assets for growth/ new assets for quality/may be multiple]		
Similar/Related Projects	• Upper Canal Works Stage 1 • Warragamba Pipeline Valves and Ancillaries controls upgrade • Greater Sydney Bridges		
Stage	Completed		

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in 2019 Needs Assessment BC	$ 53m +$3m (for planning)	**Initial Delivery Date**	2019
Outturn cost / Forecast outturn cost in Submission	$43.1m	**Actual / Forecast Delivery Date**	2019

Year ending (price base $m 19/20)	**2017**	**2018**	**2019**	**2020**	**Total**
Planned (SIR)	1.0	15.3	24.3	2.3	**43.1**
Planned From review documents		13.9	21.4	20.4	**55.7**

NEED FOR SCHEME

The Upper Canal is a critical water supply infrastructure asset and the primary method of transferring water from the four Upper Nepean dams to the Prospect Water Filtration Plant, supplying on average approximately 20% of Greater Sydney's water. The Upper Canal and an essential component of the water supply system for Sydney. The Upper Canal will continue to provide the only system redundancy to the Prospect supply node (including Warragamba Dam and Pipelines), which is the single largest supply node for Sydney, supplying about 80% of Greater Sydney demand now and in the future.

The Upper Canal is susceptible to stormwater and groundwater contamination from: agricultural activities; septic systems from unsewered residential dwellings; increased urbanisation along part of the corridor (contaminated run-off and security).

In some locations, drainage systems are inadequate, resulting in surface run-off inflows or groundwater infiltration into the canal. In addition, several sections of canal have been temporarily propped to prevent

walls from collapsing inwards, resulting in an increased likelihood of pathogens entering the canal from weather-related incidents and groundwater ingress through the deteriorated canal walls.

SCOPE OF WORKS

The Business Case for Upper Canal Works Stage 1 was approved in 2013 to undertake immediate rehabilitation work. The Stage 1 work formed the initial works, augmented with Stage 2 works to improve the canal's reliability in the short to medium term, until a long-term strategy for the canal is implemented.

The scope of the works focused on repair of highly critical sections of the canal to be utilised for up to flows of 680ML/d, including:

- repair of any urgent works and high-risk section of the canal wall to extend the life of the asset;
- repair drainage requirements, reducing the raw water quality contaminants from entering the canal;
- provision for security fencing to limit public access to the canal;
- automation of canal gates, allowing for remote monitoring and operation as required;
- raise sections of the canal to improve freeboard; and
- provide safe access and operation of the canal.

IMPACT ON OPERATING COSTS

There was no impact on operating costs identified in the business case we reviewed.

OPTIONS APPRAISAL

A number of options were considered with the shortlist below:

Option	Capital Cost Estimate
1. Rehabilitation – 'No Regret' Scope of Works	$53m
2. 25 Year Refurbishment	$304*
3. 50 Year Refurbishment	$593m*
4. Replacement with Single 53km Long 2100mm Diameter Pipeline	$1.7b**
5. Replacement – 48km Long Tunnel	$2.1b**

The strategy overall recommended proceeding with the 'Interim Rehabilitation Works' extending the life of the asset up to 2035 with the longer-term view to replace Upper Canal with either a tunnel or pipeline. The first stage of the interim rehabilitation works i.e. Option 1 – No Regret scope of works, prioritised only the poorest section of the canal providing an acceptable level of risk mitigation and reliability that will maintain and improve the canal's reliability for the safe transfer of water quality and quantity to Sydney Water's Prospect WFP in the short to medium term.

COST ESTIMATING METHOD

Total project expenditure proposed at the 2015 IPART submission by WaterNSW was $70.8M in real prices with a post Determination adjusted expenditure forecast of $65.6M total and $62.2M over the current period. According to the 2015 submission works were due to commence in 2016 however only minor works occurred in 2017 with a significant ramp up in activity 2018. With the project due for completion in December 2019 outturn expenditure is forecast to be $43.1M.

WaterNSW approved an internal budget of $56M at the last Determination period. WaterNSW sought $78m from IPART in real terms for the whole project including planning costs (although it was coded differently at the last submission).

We note that in the business case produced in December 2017 there was a management reserve allocated of $4.5M, this was allocated on top of a project contingency of $2.4M. WaterNSW inform us that the majority of projects are costed at a P50 including some risk components (latent conditions, weather delays etc.) the latter forming the risk based contingent amount. The reasons for the variation are attributed to the cost estimate of original scope being far higher than budgeted and scope reductions.

PROCUREMENT METHOD

Three contractors were invited to tender with submissions were assessed based on a 60% price and 40% non-price criteria. The contract was awarded on a lump-sum basis

DELIVERY

Cost reductions have been achieved throughout the project lifecycle through the main contract partner including mobile relining across the canal as well as some scope adjustments. WaterNSW have out-turned for this particular project at $21.8M less than the 2016 IPART Determination in real terms in the current period. This indicates that at the time of project inception that efficiencies were not factored into the project planning phase and that the cost estimating process was not challenged effectively.

POST PROJECT REVIEW

WaterNSW have not undertaken a formal post project review as the project is not yet closed out.

KEY DOCUMENTS REVIEWED

184 Upper Canal Stage 2
15 December 2017 - Final Business Case Upper Stage 2 (1)

C.9. Burrawang Pumping Stations Electrical System Stage 3

PROJECT DETAILS

Project Name	Burrawang Pumping Stations Electrical System Stage 3		
Project Number	WEM046	Completed	Mainly in 2016
Key Driver(s)	Asset renewals		
Stage	Completed		

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in 2019 Needs Assessment BC	$ 14.3m	**Initial Delivery Date**	2019
Outturn cost / Forecast outturn cost in Submission	$16.2m	**Actual / Forecast Delivery Date**	2019

Year ending (price base $m 19/20)	2017	2018	2019	2020	Sub Total
Planned June 2019 SIR	9.5	2.3	4.3		**16.2**
Planned From review documents	9.8	3.1	.3		**13.3**

NEED FOR SCHEME

The Burrawang Pumping Station is a component of the Shoalhaven Transfer Scheme, a dual-purpose water supply and hydro-electric power generation scheme. Water is pumped from Tallowa Dam storage (Lake Yarrunga) by Origin Energy to Fitzroy Falls reservoir via Bendeela Pondage. Burrawang Pumping Station transfers water from Fitzroy Falls Reservoir to Wingecarribee Reservoir for water supply purposes. Wingecarribee Reservoir supplies water to Wingecarribee and Goulburn-Mulwaree Councils, and releases water by run-of-river to Warragamba and Nepean dams. The Burrawang Pumping Station is thus a critical piece of infrastructure supporting the role of WaterNSW in ensuring the supply of raw water to Sydney Water Corporation and other customers.

The Pumping Station is equipped with various electrical, electronic, instrumentation and control assets which are integral to the reliable operation of the station. The bulk of the electrical equipment is original infrastructure installed over 35 years ago. A formal condition assessment completed in 2011 found the electrical, electronic, instrumentation and control equipment at the Pumping Station to be operational, but only in fair condition. The following deficiencies were identified in the current systems:

- A number of items of electrical equipment are aged and do not conform with current statutory requirements;
- Spare parts are no longer available for critical items of electrical equipment;
- There are Work Health and Safety (WHS) issues for operation and maintenance personnel relating to the arrangement and configuration of the electrical equipment;
- The switchgear mechanisms and springs are beyond their expected life and may not operate when required.

SCOPE OF WORKS

The scope of the works included electrical replacement of:

- low voltage distribution boards
- indoor and outdoor lighting
- 11 kV electrical cables
- main transformer yard fencing
- the main switchboard with a new 11 kV main switchboard
- pump motor starters with new VSD type motor starters
- existing 11 kV wound rotor main pump motors with new asynchronous induction motors
- valve control panels for the main pumps
- the low voltage switchboard for the Common Services Room
- provision of a local SCADA system in the Pumping Station's Control Room.

Scope increases and variations have been included to undertake mechanical refurbishment of 2 main pumps and commissioning costs that were not foreseen.

IMPACT ON OPERATING COSTS

WaterNSW had to pay Origin Energy $3.6M in energy costs to pump the water and are unable to recover these costs as opex as it was not an operational requirement, these costs have not yet been fully capitalised and we expect the expenditure numbers to change when outturn 2018/19 expenditure is reconciled.

OPTIONS APPRAISAL

Three options were considered and taken forward for a multi criteria analysis

Base Case

- The Base Case is to continue to maintain the existing electrical, electronic and instrumentation assets in accordance with the current maintenance strategy and delaying expenditure on replacement of the assets until absolutely necessary or when components fail. Upgrade works would be carried out piecemeal over the next 8 years.

Option 1

- undertake a suite of high priority works
  - safety and reliability objectives
  - retrofitting power factor correction to ensure compliance with the current Burrawang Pumping Station electricity supply agreement.
  - Pump motors would be replaced with similar motors at the end of expected life in 2018/19.

Option 2 (Preferred Option)

- undertake a complete works package addressing:
- safety and reliability,

- replacing VSD drives and asynchronous motors. To achieve compliance with the electricity network supply authorities' requirements for improved power factor correction.

COST ESTIMATING METHOD

The original cost estimate was market costed with scope variations added later on

PROCUREMENT METHOD

A single Design and Construct main contract was procured for the whole of the works with a joint selection process for the motors and VSD drives, and a division of risk associated with the supply, installation and performance of the motors and VSD drives

Tenders sought via open expressions of interest including Early Tenderer Involvement, short-listing of up to three (3) tenderers (plus a reserve), and invited priced tenders

DELIVERY

Total capex for the scheme to date has been $16.2M according to the SIR submitted in June 2019. According to the variation business case (November 2017) the total expenditure forecast is $19.8M. The original business case was for $12M with a subsequent variation of $6.4M; $2.8M for pump refurbishment and $3.6M for commissioning costs including water and energy costs through operations outside standard pumping protocols. We consider the expenditure to be prudent and we have not made any specific adjustments for this project.

POST PROJECT REVIEW

It is estimated that 8% efficiencies were achieved throughout the contract based on cost reductions for pumping

KEY DOCUMENTS REVIEWED

184 Burrawang Pumping Station

A. 0132P6 - Burrawang Pumping Station- Stage 3 - ATS- Approved Version
B. WaterNSW Board meeting - 14 December 2016 - Final Business Case - Burrawang Pump Station Variation
C. Burrawang V05 -Business case signed off by CEO on 28 November 2017

C.10. GS Post-PRA Dam Safety Upgrade Program

PROJECT DETAILS

Project Name	GS Post-PRA Dam Safety Upgrade Program	
Project Number	WNM007	2020 Determination period
Work Program	Dam Safety	
Key Driver(s)	Asset renewals	
Stage	Planning	

FINANCIALS AND PROGRAM (costs to 2019/20)

Budget in 2019 Needs Assessment BC	$ 36.2m	**Initial Delivery Date**	[month/ year]
Outturn cost / Forecast outturn cost in Submission	$ 36.2m	**Actual / Forecast Delivery Date**	[month/ year]

Year ending (price base $m 19/20)	**2020**	**Sub Total**	**2021**	**2022**	**2023**	**2024**	**Sub Total**	**Total**
Planned (SIR)	1.8	**1.8**	5.4	9.0	14.4	5.5	**34.4**	**36.2**
Planned From review documents								

NEED FOR SCHEME

The NSW Dams Safety Committee (DSC), as the dam safety regulator, sets the framework and principles for dam safety requirements, and sets the risk tolerance criteria for public safety. Contemporary practice within Australia and overseas has moved towards a risk-based approach for the management of dam safety risks, rather than purely on a deterministic standard.

The outcome of the Greater Sydney PRA identified 4 dams (Cataract, Cordeaux, Fitzroy Falls and Woronora Dams) above Limit of Tolerability; i.e.; plotting within the intolerable risk zone on the DSC's societal risk chart for existing dams. As a result, dam safety upgrade has been recommended to reduce overall risk below the line of tolerability, thus meeting regulatory conditions set by the DSC.

SCOPE OF WORKS

The DSMS dictates the staged approach based on the regulatory requirements. These stages are. –

- Short term - to maximise safety whilst planning for the later stages of improvements a structural fix must start within 2 years and a non-structural fix (warning and evacuation plans or operating limits) must be complete within 1 year. –

- Medium term - to reach risk levels below the limit of tolerability but not ultimate low level of risk, improvement must be complete within 10 years. –
- Long term - to satisfy ALARP, work must be completed within 20 years

Investigations and interventions have been planned across the four dams (Cataract, Cordeaux, Fitzroy Falls and Woronora Dams) to reduce the risks within each dam. These include sinkhole and geotechnical investigations, embankment reinforcements and drainage improvements.

IMPACT ON OPERATING COSTS

This was not considered in the documentation provided by WaterNSW.

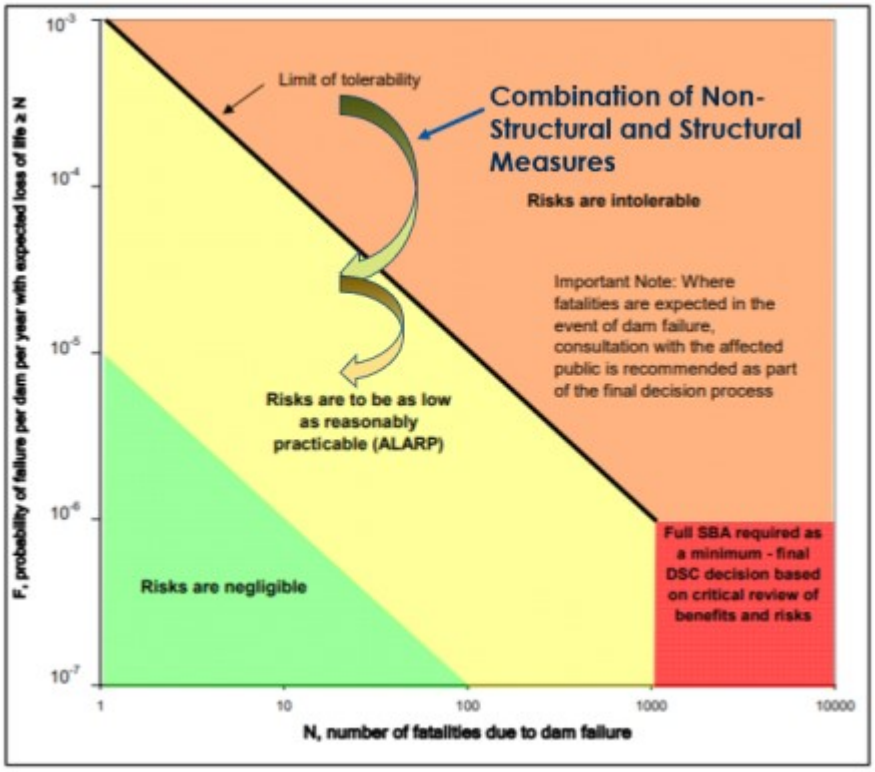
OPTIONS APPRAISAL

The overall options assessment is based on either:

(a) 'Do nothing, accept current risk profile' or;

(b) Reduction in risk uncertainty via studies and investigations for dams in the intolerable and ALARP risk positions. Risk reduction capital works for intolerable dams via dam safety upgrades.

This is driven by the limit of tolerability framework outlined below



COST ESTIMATING METHOD

The fully loaded (including capitalised overheads) expenditure proposed for the program is $36.18 of which $34.3M is in the future Determination period. WaterNSW has undertaken a comparative cost estimate for

the program utilising the historic standards-based decision-making framework which would have required nine dams not meeting the criteria and a total expenditure of some $185M.

The overall risk-based approach compares favourably with the standard approach.

PROCUREMENT METHOD

WaterNSW has established supply chain partners have frameworks in place including in-house capability with significant experience in delivering comparable projects in the rural dam's space.

DELIVERY

The dam safety program appears to deliver value for money we have not made any program specific adjustments to this.

POST PROJECT REVIEW

To align the risk-based approach to dam safety management, WaterNSW commenced a PRA project for the Greater Sydney dams in 2017 and is currently in the process of finalising and closing out this project.

KEY DOCUMENTS REVIEWED

65 Dam Safety - Post-PRA Risk Evaluation and Reduction Program - Project Summary
65. Chapter 6 - Dam Safety Management System Manual
193 IPART RFI - Greater Sydney Post-PRA Upgrade Works (reissued)
DSC1B (
DSC2D

Appendix C. Terms of Reference

SCOPE OF WORK

PROJECT NAME: Sydney Water and WaterNSW Expenditure and Demand Forecasts Reviews

BACKGROUND

IPART seeks the services of suitably qualified consultants to undertake separate **expenditure and demand reviews** for the following:

A. Sydney Water Corporation's water, sewerage, stormwater and other services

B. WaterNSW's bulk water services in the Greater Sydney area, including to its main customer Sydney Water.

More information about these previous reviews is available on our website https://www.ipart.nsw.gov.au/Home/Industries/Water.

We note that the **expenditure reviews** for projects A and B include review items that may require specialist expertise (see appendices). We also require a suitably qualified consultants to undertake the **demand reviews**, particularly for project A. The consultant must clearly identify in a single proposal the projects it is bidding for (see Section 9 – Pricing).

IPART is also requesting quotes, as a separate piece of work, to undertake a similar expenditure and demand forecast review for Hunter Water. The consultant may also bid for this piece of work in its itemised proposal.

EXPENDITURE REVIEW - OBJECTIVES

IPART's role is to set prices which reflect the efficient costs of delivering a utility's monopoly services. Our price reviews seek to protect customers from paying for inefficient or unnecessary expenditure, while ensuring each utility raises adequate revenue to cover the efficient costs required to deliver its monopoly services.

The objective of this consultancy is to review each utility's operating and capital expenditure from two perspectives – actual expenditure incurred since the 2016 price Determination and forecast expenditure for the 2020 Determination period.

The time period definitions for the purposes of this consultancy are:

2016 Determination period = the period from 1 July 2015 to 30 June 2020.[34]

2020 Determination period = Determination period from 1 July 2020 up to 30 June 2025.

The consultant's recommendations on efficient levels of expenditure will be used to determine maximum prices to apply from 1 July 2020 for each public water utility. Box 1 provides an explanation of the efficiency test that the consultant is required to undertake.

[34] The consultant will also need to assess the efficiency of actual expenditure incurred in 2015-16, the last year of the 2012 Determination period. We also note that 2019-20, the last year of the 2016 Determination period, is forecast expenditure.

Box 1: Efficiency test

The efficiency test examines whether a utility's capital and operating expenditure represents the best and most cost-effective way of delivering monopoly services to customers.

Broadly, the efficiency test considers both *how the investment decision is made*, and *how the investment is executed*, having regard to, amongst other matters, the following:

customer needs, subject to the utility's regulatory requirements

customer preferences for service levels, including customers' willingness to pay

trade-offs between operating and capital expenditure, where relevant

the utility's capacity to deliver planned expenditure

the utility's expenditure planning and decision-making processes.

The efficiency test is applied to:

historical capital expenditure, and

forecast capital and operating expenditure

that is included in the utility's revenue requirement, for the purposes of setting regulated prices.

The efficiency test is based on the information available to the utility at the relevant point in time. That is:

for forecast operating and capital expenditure, we assess whether the proposed expenditure is efficient given currently available information

for historical capital expenditure, we assess whether the actual expenditure was efficient based on the information available to the utility at the time it incurred the expenditure (i.e., whether the utility acted prudently in the circumstances prevailing at the time it incurred the expenditure).

EXPENDITURE REVIEW - DESCRIPTION OF SERVICES

For the expenditure review, IPART requires the consultant to provide the following three tasks:

- **TASK 1** - a strategic review of the utility's long-term investment plans (10 to 20 years) and asset management systems and practices.
- **TASK 2** - a detailed review of the utility's historical and forecast operating and capital expenditures for efficiency.
- **TASK 3** - a review of the utility's performance against past output measures and to propose new output measures for the next Determination period if appropriate.

Task 1: Review of long-term investment planning and asset management practices and processes

For each utility, the consultant must undertake a strategic review of the utility's long-term investment planning and its asset management systems and practices as specified below. In undertaking this task, the consultant must provide advice on:

a) Whether the longer-term capital investment strategy is the most efficient, and whether processes supporting this including options analysis, procurement processes, customer engagement practices, whole of life cycle planning and assessment of capital and operating expenditure trade-offs are best-practice and therefore likely to result in efficient investment decisions.

b) The key assumptions that are driving expenditure (e.g., asset replacements, demand forecasts and growth assessments (**please see links with the demand review below**), environmental regulatory requirements, licensing standards, customer service standards and preferences), including comments on whether these assumptions are reasonable and how they have been considered and tested by the utility.

c) The robustness of systems for linking asset management decisions with current and future levels of service and performance requirements, including customer preferences, service standards and environmental outcomes.

d) The way in which the utility manages the risks associated with asset failure or underperformance.

e) Any particular concerns or issues relating to the utility's strategic processes for determining and prioritising future infrastructure expenditure and asset management decisions.

Task 2: Detailed review of operating and capital expenditure

For each utility, the consultant must undertake a detailed review of its operating and capital expenditure for efficiency. The consultant must use findings from Task 1 to inform this task.

T2.1 Detailed review of operating expenditure

T2.1.1 Actual operating expenditure

The consultant must review actual operating expenditure incurred over the 2016 Determination period. In undertaking this task, the consultant must:

Report and comment on the variations in operating expenditure from what was allowed in the 2016 Determination, including the extent to which these variations are justified or not.

Identify and comment on the nature and size of operational savings realised (e.g., whether they are permanent or temporary in nature).

T2.1.2 Efficiency of forecast operating expenditure

The consultant must review the efficiency of forecast operating expenditure for the 2020 Determination period. In undertaking this task, the consultant must:

a) Provide recommendations as to the efficiency of the utility's forecast level of operating expenditure and provide annual estimates of the level of operating expenditure that is required to efficiently supply the regulated monopoly services.

b) Identify the potential for and recommend efficiency savings to be achieved within the operating expenditure budget, and provide evidence and reasoning to support the recommended savings.

c) Advise on the appropriateness of and recommend how shared operating costs (including overheads) are allocated to monopoly services, and the rationale for this allocation.

d) Identify any consequential impacts on capital expenditure (i.e. increased or reduced costs) based on the assessment of operating expenditure.

e) Where appropriate, have regard to productivity benchmarking analysis when identifying potential efficiency savings.

T2.2 Detailed review of capital expenditure

T2.2.1 Capital program

The consultant must review the utility's capital program to inform recommendations as to the efficiency of the utility's level of capital expenditure. In undertaking this task, the consultant must:

a) Assess the reasonableness of the utility's capital expenditure program as a whole, within the context of its long-term plans and the assumptions underlying them, including the scale, scope and planning of the entire capital expenditure program. That is, the consistency of the utility's proposed 5-year capital expenditure program with its longer term program of capital expenditure, and the implications of and risks associated with the 5-year program for the longer term program.

b) Undertake a detailed investigation into the outcomes and project planning for a sample of the utility's capital projects above an agreed materiality threshold (to be agreed with IPART, but generally at least 10% of capital projects above a $10 million materiality threshold).

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

d) Review the appropriateness of the asset lives used to calculate regulatory depreciation (or 'return of capital') in the utility's pricing proposal, and recommend adjustments where appropriate.

e) Review the allocation of any common capital costs between monopoly services and other parts of the business and assess whether there has been any inappropriate allocation of common capital costs.

f) Advise on the robustness and effectiveness of the utility's ring fencing of capital costs where relevant[35] from its other operations, and identify opportunities for improvement (IPART will advise the consultant upon appointment where ring-fencing applies).

T2.2.2 Efficiency of actual and forecast capital expenditure

The consultant must review the efficiency of actual and forecast capital expenditure for the 2016 and 2020 Determination periods. In undertaking this task, the consultant must:

a) Report and comment on actual and forecast capital expenditure for each year, including the variations in actual capital expenditure from what was allowed in the 2016 Determination.

b) Provide recommendations as to the efficiency of the utility's level of capital expenditure and provide annual estimates of the level of capital expenditure that is required to efficiently supply the regulated monopoly services.

c) Identify any consequential impacts on operating expenditure (i.e., increased or reduced costs) based on the assessment of capital expenditure.

d) Identify the potential for and recommend efficiency savings to be achieved within the capital expenditure budget, and provide evidence and reasoning to support the recommended savings.

a) Where appropriate, have regard to productivity benchmarking analysis when identifying potential efficiency savings.

b) Audit and assess the accuracy with which the utility has classified its historical and planned capital expenditure into asset classification classes [for example, Sydney Water's assets are categorised as Civil, Electrical, Mechanical, Electronic and Non-depreciating (or 'CEMELND'), each with different asset lives] and make recommendations regarding:

the efficient capital expenditure on new assets in each classification class by business area

[35] For example, ring-fencing applies to a recycled water scheme where it represents a higher-cost means of servicing customers than a 'traditional' network based servicing strategy.

the average remaining life of existing assets by classification class and business area

the expected life of new assets by classification class and business area.

T2.3 Special review items

Attachments A and B provide further details on potential key issues related to each expenditure review. These attachments are included to give an indication of important expenditure items the consultant may need to focus on. IPART may revise areas of focus once each utility has provided its pricing proposal to IPART. The weight given to each the special review items will be finalised prior to the expenditure interviews (see timetable below).

Task 3: Review of output measures and propose new output measures

The consultant should use any findings from Task 2 to inform this task. In undertaking this task, the consultant must:

a) Review the utility's performance against its output measures over the 2016 Determination period. Where output measures have not been achieved, provide comment on the reasons for this.

b) Recommend a set of new output measures for the utility's proposed operating and capital expenditure program, for the 2020 Determination period.

DEMAND REVIEW - OBJECTIVES

The objective of this consultancy is to review the utility's forecast sales and customer connections used to support its proposed expenditure and prices.

Once IPART has determined the revenue requirement for the 2020 Determination period, the next step is to decide on the utility's forecasts for sales and customer connections. These forecasts are used in calculating the price levels to recover the required revenue.

It is important that the demand forecasts are as accurate as possible. If they differ markedly from actual sales volumes and connections over the Determination period, prices will result in significant over-recovery or under-recovery of the required revenue.

It is also important that short-term and long-term forecast sales and connections align with and support the utility's expenditure proposals. In particular, the utility's long-term growth projections that underpin strategic capital investment plans must be robust and based on reasonable assumptions and best available information.

DEMAND REVIEW - DESCRIPTION OF SERVICES

For the demand review, IPART requires the consultant to provide the following two tasks:

- **TASK 1** - a review of the reasonableness of the utility's long-term growth projections
- **TASK 2** - a review of the reasonableness of the utility's demand and customer connection forecasts over the 2020 Determination period

The consultant should note that, in preparing its bid, the size and complexity of these tasks differ markedly for Sydney Water and WaterNSW.

- **For Sydney Water -** both tasks are relatively large pieces of work.
- **For WaterNSW –** only Task 2 applies. Further, about 99% of WaterNSW's total water sales will be determined through the Sydney Water demand review. This is because WaterNSW relies on water sales estimates supplied by Sydney Water to set its prices.

Task 1: Review of long-term growth projections (Sydney Water only)

The consultant must review the reasonableness of Sydney Water's long-term growth projections that underpin its strategic capital investment plan. In undertaking this task, the consultant must:

a) Report and comment on the growth projections, including the forecasting method, inputs and data used, and *ex-post* adjustments used.

b) Advise on the profile of growth projections.

c) Advise on the sensitivity and certainty of growth projections.

d) Review the consistency of assumptions against other publicly available data, having regard to Government forecasts of population, household and dwelling growth, development approvals and development completions.

e) Identify any consequential impacts on operating and capital expenditure proposed over the 2020 Determination period and beyond, with particular focus on how changes in growth projections affect the timing and nature of capital investment decisions/pathways and the ensuing NPV of different growth servicing options (i.e., **links with expenditure review**).

Task 2: Review sales and customer connection forecasts

T2.1 Sydney Water

The consultant must review the approach and reasonableness of forecast sales and connections for the 2020 Determination period by:

Service - water, wastewater, and stormwater, and

Customer type – residential and non-residential.

When assessing the reasonableness of forecasts, the consultant must give consideration to population growth, weather conditions, implied average use per property/connection, and assumed changes in use per property/connection due to conservation measures and/or price changes.

The consultant should not duplicate reviews that have already been undertaken. In particular, we note that Sydney Water's econometric model to forecast water demand has been subject to external peer review in the past. The consultant's review should, therefore, focus on the inputs into models and any outstanding items from previous reviews that have not been incorporated.

In undertaking this task, the consultant must:

a) Report and comment on the variations in actual sales and customer connections from what was allowed in the 2016 Determination.

b) Report and comment on the reasonableness of forecast sales and customer connections for the 2020 Determination period.

c) Recommend annual estimates for forecast sales and customer connections for each year of the 2020 Determination period.

d) Advise on forecasting models/methods employed (benchmark against other relevant regulated businesses).

e) Advise on input assumptions used to form forecasts (e.g., consistency of assumptions against other publicly available data).

f) Advise on statistical significance and sensitivity of forecasts.

g) Advise on price elasticity of demand assumptions and other *ex-post* adjustments used to estimate residential and non-residential water sales.

h) Advise on non-revenue water, which includes real system losses (i.e., leakage), unauthorised consumption, and unbilled unmetered consumption (e.g., for firefighting).

i) Identify any consequential impacts on incremental operating and capital expenditure of adjustments made to sales and connection forecasts (i.e., **link with expenditure review**).

T2.1 WaterNSW

WaterNSW's customer numbers are stable and Sydney Water accounts for about 99% of WaterNSW's total water sales, so the effect of customer numbers is not as important in setting prices as forecast bulk water sales.

Further, as noted above, WaterNSW relies on water sales estimates supplied by Sydney Water to set its prices. The scope of this task is therefore much smaller in size, limited to bulk water sales to WaterNSW's remaining customers.

In undertaking this task, the consultant must:

a) Report and comment on the variations in actual sales and customer connections from what was allowed in the 2016 Determination.

b) Report and comment on the reasonableness of forecast sales and customer connections for the 2020 Determination period.

c) Recommend annual estimates for forecast sales and customer numbers for each year of the 2020 Determination period.

d) Advise on forecasting models/methods employed.

e) Advise on input assumptions used to form forecasts.

f) Advise on statistical significance and sensitivity of forecasts.

REQUIRED OUTPUT

The primary output items from expenditure and demand forecast reviews are set out below.

6.1 Reports (all in MS Word format)

6.1.1 Inception Report

The consultant is required to produce an Inception Report (no more than 5 pages), to be provided shortly after the inception meeting (exact date to be agreed to by IPART and the consultant at the inception meeting) that outlines agreed:

review protocols, including communication contacts and channels

methodologies and terminology, including any common approaches across concurrent expenditure reviews

identification of any interdependencies in the expenditure reviews for the utilities

key issues and/or areas of focus

protocols for interaction with utilities and stakeholders

details of proposed resourcing by task.

6.1.2 Draft and Final Reports

The consultant will be required to produce a Draft and Final Report for the expenditure and demand reviews. The reports must include:

- a clear explanation of the consultant's reasons or rationale for each of its findings/outcomes, including its information sources, approach and any key assumptions used
- report actual values in $nominal and forecast values in $2019-20, applying CPI indexes to be provided by IPART.

Furthermore:

- all tables and calculations in the reports must also be provided in Excel format to facilitate the transfer of the consultant's outputs to IPART's pricing models (to avoid rounding errors introduced through text-only formats), and
- the consultant must conduct a thorough Quality Assurance check of all outputs to eliminate errors and inconsistencies.

The Appendix of the Draft and Final Report for the expenditure reviews should contain a one-page summary for each capital project examined in detail (as per section 2.2.1 (b)). The one-page summaries should include the following:

- the planned project budget, program and outputs
- the actual or forecast project costs, program and outputs (appropriate to the stage in the project)
- reasons for variations between actual and forecast expenditures
- additional information that identifies any proactive planning by the utility for change of project scope or process development as a result of the project
- assessment of the project procurement approach, outcomes and contribution to the utility's capital program drivers, and
- an assessment of the project's efficiency.

The Draft and Final Reports should be clearly and logically set out and written in plain English, avoiding the unnecessary use of technical terms. The reports should incorporate appendices for supporting information and evidence where necessary.

The Draft and Final Reports must also be provided in PDF format suitable for web publication (i.e., on IPART's website for stakeholder comment).

Versions of the Draft Report

The Draft Report is required to be a complete document that addresses all tasks, as outlined in this scope of works, with supporting justification. Its purpose is to provide IPART and each utility with the opportunity to comment on the consultant's recommendations. Therefore, it should not be a 'working draft' document.

The consultant will produce two versions of the Draft Report

The first version will be based on financial data in the utility's pricing proposal (received on 1 July 2019) and due mid-September. A second version will be updated to incorporate end year actual financial data for 2018-

19 when it becomes available (received in mid-September). This Draft Report will be due end-October, and released to the utility for comment.

Versions of the Final Report

Each utility and IPART will provide comments on the Draft Report directly to the consultant. The consultant must consider and respond to these comments in the Final Report.

The consultant should note that the Final Report will be released as a public document on IPART's website (i.e., alongside IPART's Draft report early March 2020).

The utility may identify expenditure projects or other detail that is commercial-in-confidence. The consultant must provide a version of the Final Report suitable for publication without commercial-in-confidence information, subject to IPART's instructions as to whether it agrees that the identified information is commercial-in-confidence. Therefore, the consultant must provide two versions of the Final Report:

one confidential version

one public version suitable for publication without confidential information.

6.1.3 Supplementary Report

The consultant will be asked to prepare a Supplementary Report that responds to the utility's submission to IPART's Draft Report released in March 2020. This Supplementary Report will be due end-April 2020.

The consultant should note that the Supplementary Report will also be released as a public document on IPART's website. Therefore, the consultant must provide two versions of the Supplementary Report:

one confidential version

one public version suitable for publication without confidential information.

6.2 Additional outputs

Additional required outputs of the consultancy include:

Regular discussions and meetings with the utility and any issues arising so that there are 'no surprises'.

Written fortnightly work in progress report to IPART covering key issues, actionable items, communication with utilities, resourcing, and time and expenses – email format.

Written summary of key issues in utility's pricing proposal which will be incorporated in a Tribunal briefing and IPART's Issues Paper– MS word format and no more than 15 pages.

Information requests to the utility setting out the information required (in addition to currently available information) to be provided to the consultant to perform the required services, as set out in this scope of works. This is to be provided at least one week in advance of interviews with utility staff – either MS Word or Excel format

Written response to stakeholder submissions to IPART's Issues Paper and Draft Report which will be incorporated in Tribunal briefings - MS word format and no more than 15 pages.

Presentations to IPART, which outline the major issues and findings of the Draft Report and the Final Report –presenting to the Tribunal

SOURCES OF INFORMATION

For each review, IPART has provided (in each Attachment below) a list of documents as a guide only, it should not be considered exhaustive.

In addition to its own analysis of available information provided, the consultant is required to source and report analysis of other inputs through:

- interviews with utility staff
- comparisons with relevant organisations, and
- the consultant's experience in the water and sewerage industry and in other comparable sectors, and in undertaking other similar tasks.

In the event that the consultant identifies gaps in the information, it is the responsibility of the consultant to take the necessary steps to acquire the required information and to liaise promptly with IPART to ensure that the consultancy outputs are delivered on time. Should the reliability of the information be in doubt, the consultant is expected to source 'second best information', apply sound judgement and provide detail and justification for assumptions made.

SELECTION CRITERIA

IPART will evaluate each quote based on the following criteria:

- the proposed methodology to perform the required Services (this includes demonstrating an understanding of the Services required)
- demonstrated capability to perform the required Services (including the proposed team, the team's experience and the allocated hours to complete the required Services) [The consultant should note that this is a mandatory requirement]
- total cost to IPART of the delivery of the required Services
- experience in providing Services of a similar nature including any prior work undertaken for IPART
- proposed quality assurance procedures and risk management procedures

PRICING

With regard to **projects A and B**, consultants can either: submit a bid for a single project; submit a bid for both projects; or submit a bid with another specialist consultant as a subcontractor for either or both projects. IPART will only enter into a contractual arrangement with a single consultant; if a bid is submitted with a subcontractor. The consultants must clearly identify which of the parties would enter into this arrangement with IPART.

The consultant should clearly identify in its proposal the projects it is bidding for and provide:

- a total price for its proposal
- individual pricing breakdowns of the expenditure and demand forecast reviews for each project (i.e., Sydney Water and WaterNSW) it is bidding for.

That is, please itemise bids if your proposal is for both projects so that your proposal can be considered on a joint and standalone basis

The consultant must include in its proposal any estimated associated expenses, e.g. travel, accommodation.

The consultant must clearly identify if their proposed pricing is in line with the NSW Government's Standard Commercial Framework capped resource rates for Financial Services. All proposals that do not comply with these rates must be clearly identified.

LIAISON/CONSULTATION

The consultant may be required to attend and participate in meetings, have involvement in consultation, and attend and present at workshops or Tribunal meetings as circumstances dictate.

TIMETABLE

While the dates are indicative, the consultant must meet the work schedule outlined below for each utility. Dates in bold represent key review milestones.

Indicative date	Activity
1 July 2019	**Utility pricing proposal due**
8 July 2019	Inception meeting with IPART
12 July 2019	Inception Report
15 July 2019	Key issues meeting with IPART
22 July 2019	Key issues paper to IPART (key issues from utility's pricing submission)
29 July 2019	Progress/feedback meeting with IPART
5 August 2019	Commence interviews with utility staff (first round)
10 September 2019	**IPART release Issues Paper (commenting on utility pricing proposal)**
16 September 2019	**Updated AIR/SIR from utilities due (actuals for final quarter of 2018-19)**
16 September 2019	Provide initial Draft Report to IPART
27 September 2019	IPART comments on the initial Draft Report due to consultant
14 October 2019	**Stakeholder submissions due on IPART Issues Paper**
18 October 2019	Submissions paper to IPART (views on stakeholder submissions to IPART's Issues Paper)
21 October 2019	Continue interviews with utility staff (second round)
28 October 2019	Provide finalised Draft Report to IPART
6 November 2019	Present findings of Draft Report to IPART (Tribunal)
8 November 2019	Provide finalised Draft Report to utilities
22 November 2019	Utilities' comments on Draft Report due to consultant
26 November 2019	**Public hearing - Sydney Water and WaterNSW**
9 December 2019	Provide Final Report to IPART
10 March 2020	**IPART releases Draft Report**
6 April 2020	**Stakeholder submissions due on IPART Draft Report**
End-April 2020	Provide Supplementary Report in response to submissions to IPART's Draft Report – revising expenditure and demand recommendations
16 June 2020	**IPART release Final Report**

RESOURCING

The consultant is expected to commit to and maintain a single project manager for the duration of this review. The consultant will ensure that the persons assisting the consultant in providing the services includes persons

with appropriate expertise including in the water industry (and/or a comparable industry, such as energy), engineering and/or regulatory economics, and in the special review items outlined in Appendices A and B.

In drafting its proposal, the consultant should attach the resume for each of the personnel nominated for this expenditure review. In addition, the consultant should provide a breakdown of the proposed hours and hourly rates for each of the above tasks, by personnel.

CONFIDENTIALITY AND CONFLICT OF INTEREST

The quote should explicitly address any conflicts of interest (actual or perceived), and the consultant's capacity to comprehensively and effectively manage it. Please contact us once you identify any potential conflict of interest, before lodging your response.

B. WaterNSW's prices in Greater Sydney

WaterNSW's forecast water sales to Sydney Water (99% of its water sales) are based on Sydney Water's own forecasts of water sales to its customers. Therefore, the key cost drivers of Sydney Water's forward looking expenditure (i.e., growth and drought response measures), which are described in Appendix A, will also be highly relevant considerations when assessing WaterNSW Greater Sydney's forward looking expenditure.

As part of the core tasks described in this scope of works, IPART is seeking specialist consultant expertise to investigate and advise on the following special review items.

1. Investigating the causes and effects of historical under-spending

Capital expenditure

The consultant should investigate the reasons for any underspending of WaterNSW - Greater Sydney's capital expenditure allowance. Consistent underspending could indicate that we have included a higher capital expenditure allowance than required, that there has been a decrease in the level and/or quality of service delivery, or that expenditure has been efficiently deferred.

In the 2016 WaterNSW Greater Sydney price review, our expenditure consultants Aither noted that WaterNSW had a tendency to over-forecast capital expenditure and include large non-specific contingencies within estimates for its projects. This issue is discussed in more detail in our Final Report and Aither's expenditure review Final Report which are available on IPART's 2016 WaterNSW Greater Sydney price review page: https://www.ipart.nsw.gov.au/Home/Industries/Water/Reviews/Metro-Pricing/Prices-for-WaterNSW-%E2%80%93-Greater-Sydney-area-from-1-July-2016-Sydney-Catchment-Authority

This investigation will help inform consideration of forward looking expenditure (see special review item 2 below).

Operating expenditure

The consultant should investigate the reasons for any underspending of WaterNSW – Greater Sydney's operating expenditure allowance. WaterNSW may apply for an efficiency carryover (under IPART's Efficiency Carryover Mechanism) in its upcoming pricing proposal. The consultant will be required to scrutinise any application for an efficiency carryover, along with identifying and analysing reasons for any opex underspend, as part of our expenditure review. A relevant consideration will be recognising that WaterNSW – Greater Sydney is part of a larger WaterNSW business (which also includes rural bulk storage, delivery and management services – covered by IPART's rural water price Determinations) and ensuring that underspends are not the result of inefficient cost shifting between business units.

2. Review of forward looking capital works programs

WaterNSW has identified three potential capital works programs, which are at various stages of development, but have the potential to significantly increase WaterNSW - Greater Sydney's RAB.

a) Raising the Warragamba Dam wall

https://www.waternsw.com.au/projects/greater-sydney/warragamba-dam-raising

b) Shoalhaven Transfers project

https://www.waternsw.com.au/projects/greater-sydney/burrawang-to-avon-tunnel

c) Drought Response measures

There is limited information currently available about this program.

The consultant will be required to draw on information made available by WaterNSW both in its pricing proposal and the consultant's follow up interviews and information requests (which may be limited) and other information sources that the consultant identifies and collects (e.g., other similar capital works programs that have been undertaken in other jurisdictions) to inform its assessment of the efficiency of these capital works programs.

Sources of Information

WaterNSW's pricing proposal (due early July 2019) will outline the full financial details of its actual and forecast operating and capital expenditure. Along with the written pricing proposal, WaterNSW will submit:

an Annual Information Return (AIR) in Excel format, and

a Special Information Return (SIR) in Excel format and supporting documentation for capital expenditure projects. This will be a business case or other documentation relevant to the approval for each project.

Other relevant sources include:

WaterNSW's expenditure was reviewed by Aither for IPART as part of the 2016 price review. A copy of this report is available on IPART's website.

WaterNSW's operating licence 2017-2022 (available on our website).

Appendix D. Recommendations for future reviews

D.1. Corporate Expenditure

We have found the way that Corporate expenditure is presented in the WaterNSW submission a challenge to analyse and validate. Corporate expenditure by its very nature is split across the various price controls and the submission and corresponding SIR states the allocated expenditure for the Greater Sydney area. Business cases, interviews with key staff and presentations made to us focus on the total expenditure for any given item as the budget holders are familiar with these costs, not how they are allocated. It has therefore been difficult to follow the line of sight between the total costs for fleet, property and ICT expenditure and the allocations to the Greater Sydney price control. For Corporate expenditure, our recommendation for future submissions (not just the Greater Sydney price control) is that WaterNSW should report the total amount in its submission and should also include a section which maps these total amounts to the amounts allocated to the specific price control in the SIR. It will also provide IPART with more comfort that there is consistency between different price controls for Corporate expenditure.

D.2. Capitalised overheads

Throughout our project reviews we were unable to immediately reconcile the June 2019 IPART SIR submission with the expenditure numbers we were presented at the capex project reviews. As WaterNSW is a project focused business, capital expenditure numbers presented at the project reviews by the capital program teams were direct capital costs only and did not account for any capitalised overheads which are added on at a business unit level depending on where in the business the project sits. On aggregate 9% ($61M) of the proposed total capital expenditure in the future period is attributed to capitalised overhead costs.

We recommend that for the next expenditure review a breakdown is made available at the outset so that direct costs are not conflated with indirect or capitalised overhead costs within the submission. These could be treated as separate line items.

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