Review of the Weighted Average Asset Life of State Water Corporation Assets

Final

Plan Design Enable

Strategic Management Overview and Operational and Capital Expenditure Review

Review of the Weighted Average Asset Life of State Water Corporation Assets

11th December 2009

Notice

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Contents

Glossary

Term	Definition
AASB	Australian Accounting Standards Board
IFRS	International Financial and Reporting Standards
RAB	Regulatory Asset Base
RUL	Remaining Useful Life
NSW	New South Wales
NZ	New Zealand
SCA	Sydney Catchment Authority
SWC	State Water Corporation
TAMP	Total Asset Management Plan
QLD	Queensland
WA	Western Australia

Executive Summary

This report presents our findings and opinion on the sufficiency of the State Water Corporation proposal to change the average asset life to derive the regulatory depreciation to be applied in the Determination of prices from 2011.

The 2006 Determination applied an average life of 160 years for assets existing in 2004 and 75 years for new assets. The Regulated Asset Base (RAB) in 2010 is equally apportioned to existing and new assets. SWC has proposed an average asset life for all assets of 83 years. The impact of the proposed change is to increase the average depreciation charge from $5.1M to $6.2M per annum over the future price path.

We have based our review on the Total Asset Management Plan (TAMP) document and supporting worksheets due to the lack of a specific report making the case for a change in asset life. Information on the Monte Carlo modelling was limited to input data and results and we were not able to follow trails back from the proposed 83 year average asset life to the base data. We sought further explanations from SWC on the methodology to assess average asset life. This helped us to understand the methodology and assumptions and highlighted the areas of uncertainty.

The asset base is predominantly dams and concrete structures. The greater part of the asset base has an average life at or greater than 150 years. The assets were mainly created over the period 1959 to 1984 with an average age of about 40 years.

The methodology applied by SWC has been to assess the service – condition and performance – and quantify the risk of failure. The condition assessment was carried out in a structured approach although good and reliable data is available for only just over half the asset base. Where there is a high consequence cost of failure for an asset below the benchmark condition grade for its age then the actual condition is downgraded resulting in a reduction in the remaining asset life. We found difficulty in understanding parts of the methodology as the process was not clearly documented.

We formed the view that the methodology of using a condition based asset life is appropriate and consistent with good practice. However, the analysis is not sufficiently mature and tested to provide robust assessments of asset life. There are difficulties in demonstrating a good calibration of the Weibull distribution for long life assets such as dams and structures. The difficulty of calibration is an issue common to other agencies with similar assets. The impact of a reduction in service potential due to consequence costs is uncertain but drives significant reductions in remaining asset life which on inspection appear inconsistent with the long life assets we have seen. The analysis does not apply two way adjustments to reflect the improvements in overall service potential from maintenance and enhancement expenditure.

Our comparison of asset lives used by other agencies in Australia shows that the current assumptions used by SWC are generally consistent. Some agencies are introducing condition based asset life using similar methodology.

Opinion

In our opinion, while there may well be a case to reduce the asset life from the current assumptions using condition based assessments, the current analysis and data provided to us are not sufficiently robust to justify a change in the asset life assumptions applied to the 2006 Determination. We advise that the current 160 years for existing assets and 75 years for new assets be retained for the 2010 Determination.

1. Introduction

In September 2009 the Independent Pricing Tribunal of New South Wales (IPART) appointed the Atkins/Cardno consortium to carry out a strategic management overview and review of operating and capital expenditure of State Water Corporation. The purpose of this review is to inform the Tribunal's Determination on prices for the upcoming price control period which applies to the period from 1 July 2010. IPART subsequently asked Atkins/Cardno to assess the sufficiency of State Water Corporation's proposed average asset life. This report presents our findings on this assessment and provides an opinion on the appropriate average asset life to be considered within the price review process.

We comment in Section 2 on the State Water Corporation's approach to the assessment of asset lives. Our findings are included in Section 4. We also compare the asset lives proposed by SWC with other agencies in Australia and current UK practice in Section 5. We summarise our findings in the Executive Summary at the front of this report.

1.1 Brief

The brief is to assess the sufficiency of State Water's proposed average asset life comprising:

(i) A review all relevant documents that detail and explain State Water's method and justifications for the selection of 83 years;

(ii) Further explanation from State Water where its methodology and/or justifications are not clear;

(iii) A report to IPART that outlines our assessment of the sufficiency of State Water's approach and calculation of its proposed asset life, and

(iv) An opinion of an appropriate average asset life for State Water.

This study addresses only the proposed average asset life assumptions and not the methodology for deriving depreciation.

1.2 IPART Methodology

IPART determines the revenue required for capital investment over the price control period using its Building Block approach. This comprises two elements, an allowance for a return on the assets used in providing the regulated services and an allowance for a return of these assets, termed regulatory depreciation.

This regulatory depreciation charge is to reflect the consumption of assets each year. The allowance for regulatory depreciation recognises that through the provision of services to customers, State Water's capital infrastructure will wear out and that an efficiently operating business will allow for the cost of maintaining its capital base.

The regulatory depreciation charge is calculated by dividing the Regulatory Asset Base (RAB) by the assumed average asset life. The RAB for 2010 is estimated at $510M[1]. The RAB is reduced by this annual depreciation charge but offset by increases from new investment and inflation in the year. This depreciation charge and revised RAB is used by IPART to model and derive water tariffs for the 2010 Determination.

[1] Review of prices for State Water Corporation, IPART July 2009

IPART has indicated[2] that it is reviewing the depreciation method to be applied to derive the annual charge. For the 2006 Determination a straight line method was used which assumes that the utility of the asset is consumed equally over the life of the asset.

For the 2006 Determination, IPART established a RAB and drew a 'line in the sand' assuming assets prior to July 2004 were legacy assets and assumed an average asset life of 160 years[3]. Assets post-2004 had an assumed 75 year asset life. IPART commented that

"The significant difference in asset lives between existing and new assets reflects the impact that dams have on asset lives for existing assets".

In the 2006 Determination, State Water also had some short-lived assets that it has valued at historical cost and depreciated at the rates adopted for accounting purposes.

1.3 Atkins Methodology

We have reviewed the State Water Corporation's proposals for average asset life included within the Submission, examined supporting documents and working papers and sought to understand the data, assumptions and methodology used by SWC to derive its proposed asset life. We carried out some analysis but have not had full access to the SWC modelling to test the analysis and the sensitivity of assumptions. We have reviewed supporting information and discussed key issues with the agency. Our report is based on the extent of the data reliability, assumptions and robustness of the analysis.

SWC has presented its proposals for a change in Asset Life within its Submission to IPART[4] . Additional documentation was made available as part of our efficiency review and included:

1. Total Asset Management Plan Section 4, SWC September 2009.
2. Worksheet Asset Bank v21 which includes a full listing of assets and related analysis.

State Water agreed that there was no formal report which made the case for a change in asset life. We have therefore based our review on these documents. Information on the Monte Carlo modelling was limited to input data and results and we were not able to follow trails back from the proposed 83 year average asset life to the base data.

We sought further explanations from SWC through emails and a telephone conference call to gain a further understanding on the methodology to assess average asset life. This helped us to understand the methodology and assumptions and highlighted the areas of uncertainty.

We discuss the SWC methodology in Section 2.

1.4 Standards and Definitions

Australia has adopted the International Financial and Reporting Standards (IFRS) for all reporting periods commencing on or after 1 January 2005. For the valuation of infrastructure assets entities the appropriate standards are the documents: AASB 116 "Property Plant and Equipment" and AASB 136 "Impairment of Assets". These standards ask a utility to consider the estimated replacement cost of the economic benefits provided by the asset, the appropriate useful life for the asset in its environment, the estimated time until the next major renewal event or the asset is discarded (Remaining Useful Life (RUL)). The standards also ask whether the depreciation method used reflects the predicted pattern of consumption of the asset's future economic benefits.

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[2] State Water Corporation Determination Report, IPART September 2006
[3] State Water Corporation Determination Report, IPART September 2006
[4] Submission to IPART 2010 Determination, State Water Corporation September 2009

AASB116 defines depreciation as:

"the systematic allocation of the depreciable amount of an asset over its useful life".

and that each significant part of an item of property, plant and equipment be depreciated separately. This implies that infrastructure assets are to broken down into significant components with similar physical and operating characteristics. A separate useful life is to be applied to each component and they are to be depreciated separately.

The depreciable amount of an asset is allocated on a systematic basis over its useful life. The residual value and the useful life of an asset are to be reviewed at least at the end of each annual reporting period. If expectations differ from previous estimates and if impacts on the carrying amount are significant, appropriate adjustments to accounts are made.

2. Asset Life Methodology

2.1 Background

In Section 5 of its Submission[5], State Water Corporation proposed to change the regulatory average asset life from 160 years for existing assets, prior to 2004, and 75 years for new assets assumed in the 2006 Determination to 83 years for all assets. This was based on a detailed review of its water infrastructure, lands and building assets in 2009.

The regulatory asset base (RAB) is approximately $520M at the current 2010 price base. The initial RAB in 2004 was $241M nominal which when taking inflation into account shows that existing pre 2004 assets form about 50% of the current RAB.

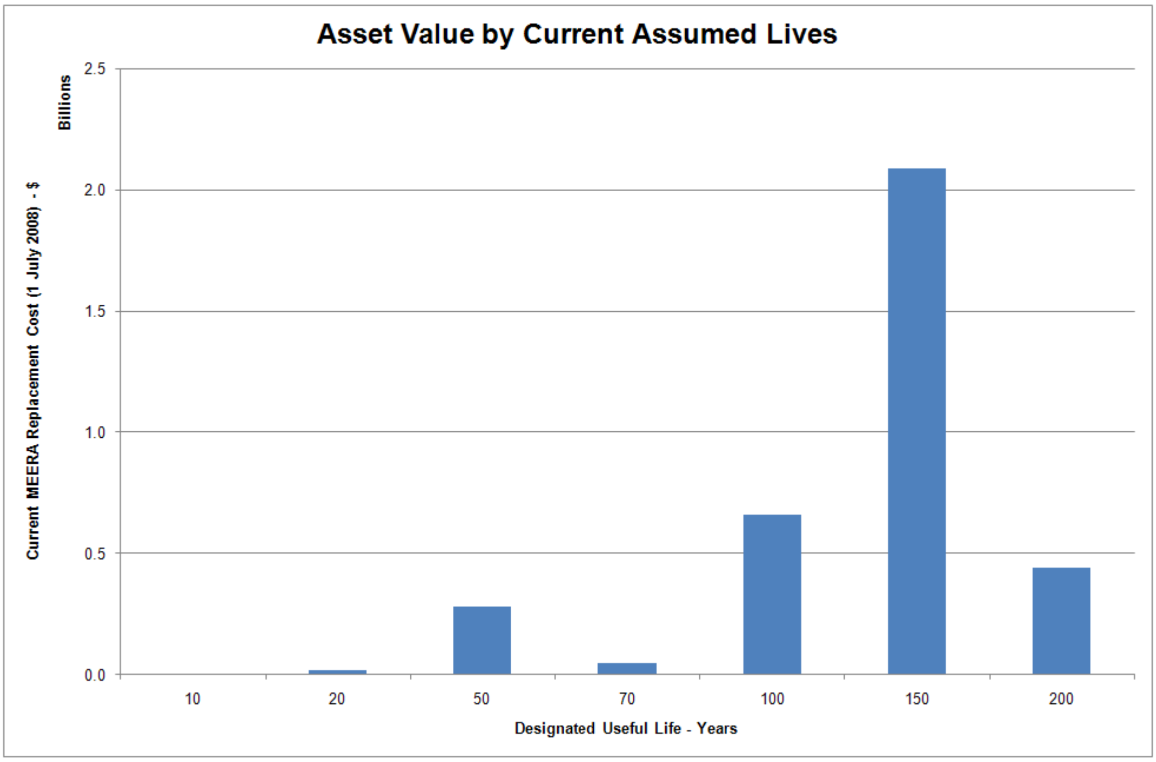
The impact of SWC's proposed change in asset life would be to increase regulatory depreciation from $5.1M to $6.2M per annum, offset by a reduction in the return on a slightly lower RAB. This includes short life assets which are depreciated at the rates adopted for accounting purposes.

2.2 Asset Data

The SWC assets are predominantly dams and associated structures, pipework and valving, weirs and associated works and smaller miscellaneous and short life assets associated with the monitoring and control of the assets. The existing asset base has a gross replacement cost of $3,400M. The depreciated optimised replacement cost is of the order of $2,300M. This is based on the assumed asset lives used in the 2006 Determination. Figure 2.1 shows the disaggregation of assets by assumed life and modern replacement value.

[5] Submission to IPART 2010 Determination, State Water Corporation September 2009

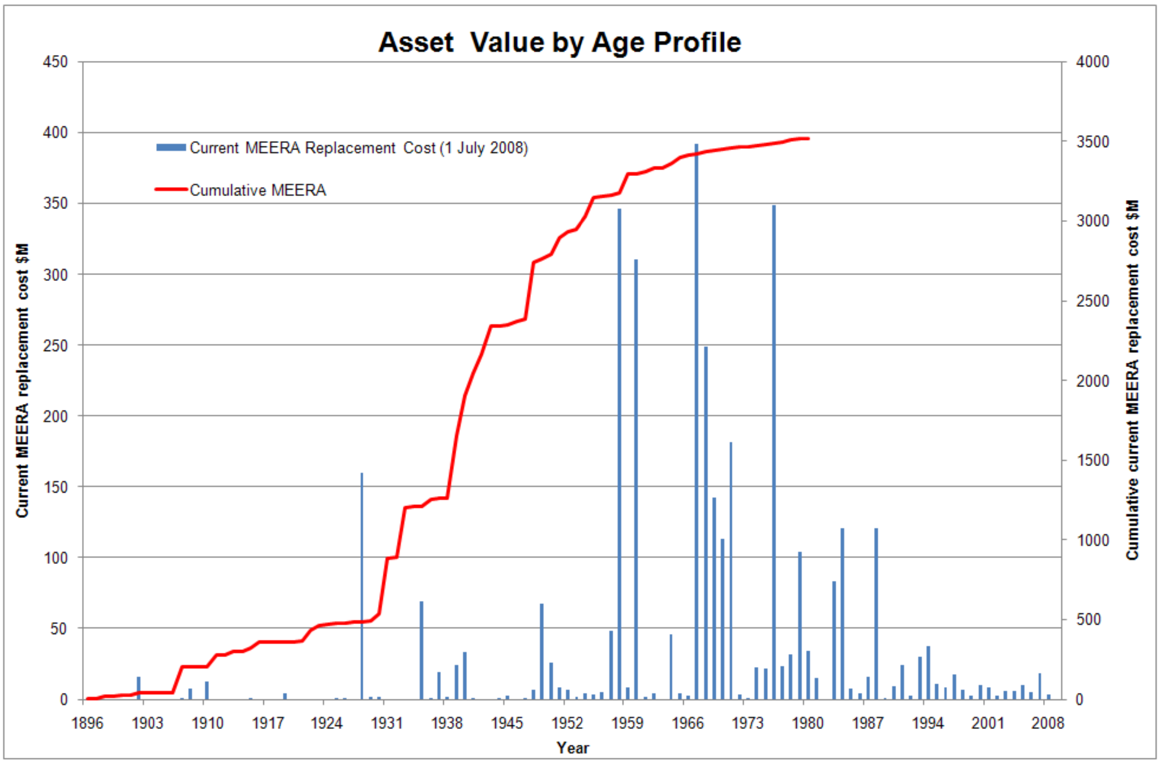
Figure 2.1 – Asset value by current assumed lives



Dams, embankments and concrete structures form the greater part of the asset base with assumed lives of 150 years forming 80% of the asset base. Assets with 75 years or less comprise only 4% of replacement value.

This asset base has been built up over time as the provision of bulk water services has developed by the previous organisation. The growth in the asset base is shown in Figure 2.2.

Figure 2.2 – Asset value by age profile



The figure shows that about 70% of the asset base was created over the period 1959 to 1984 with corresponding age range from 25 to 50 years.

The asset listing provided in the spreadsheet 'Asset Bank 21' includes over 13,000 entries of which nearly 4,500 report a gross replacement cost. About 80% of the total replacement cost relate to 350 assets of which the top 12 assets represent 33% of total value. The analysis of average asset life is therefore sensitive to assumptions on a small number of high value assets.

2.3 Methodology

SWC's methodology comprises five main stages

(i) Condition data survey and collation

(ii) Assessment of the consequence of failure

(iii) Comparison of asset service potential against the benchmark asset

(iv) Adjustment of service potential score to reflect condition and risk of failure

(v) Analysis of remaining asset life through a Monte-Carlo analysis

The analysis and discussion below uses the gross optimised replacement cost for comparative analysis.

Condition Based Surveys

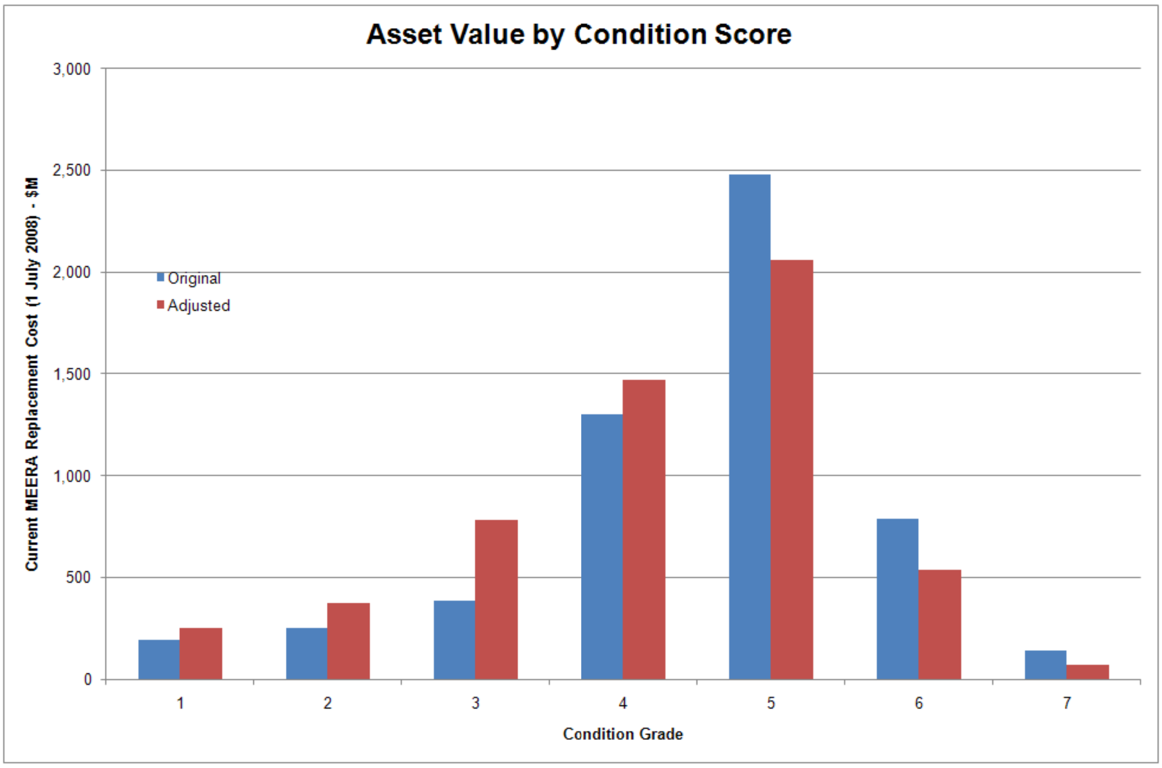
The service potential of each asset was determined from four factors: expected usage, expected physical wear and tear, the technical and commercial obsolescence of assets and any legal or similar limits on the life of assets. These assessments were carried out through site inspections, interviews with operations staff and desk top analysis. The work was managed by the Asset Management team using a standardised and documented approach. SWC commented that consistency of approach was an issue and this was managed through checking of data and visits by two of the Asset Management team.

The expected usage of the asset was assessed by each asset's capacity or physical output.

Expected wear and tear is dependent on the utilisation of each asset and the repair and maintenance programme. For short and medium life assets we would expect to see a trade-off between maintenance and replacement.

The assessments graded each asset on a 7 (excellent – new condition and acceptable risks) to 1 (poor – failed condition and unacceptable risks) for each of the four criteria defined above. The analysis takes the minimum score from the four derived from data collection. We found that the lowest score for most assets related to condition, that is expected wear and tear. Some assets reported the lowest score against technical or commercial obsolescence. This latter includes compliance against current dam safety requirements hence low scores were reported for assets impacted by these standards, for example spillways. In practice where spillway capacity is inadequate the spillway is not replaced but may be supplemented by an additional spillway in a different location. The resulting overall asset condition score is shown in Figure 2.3.

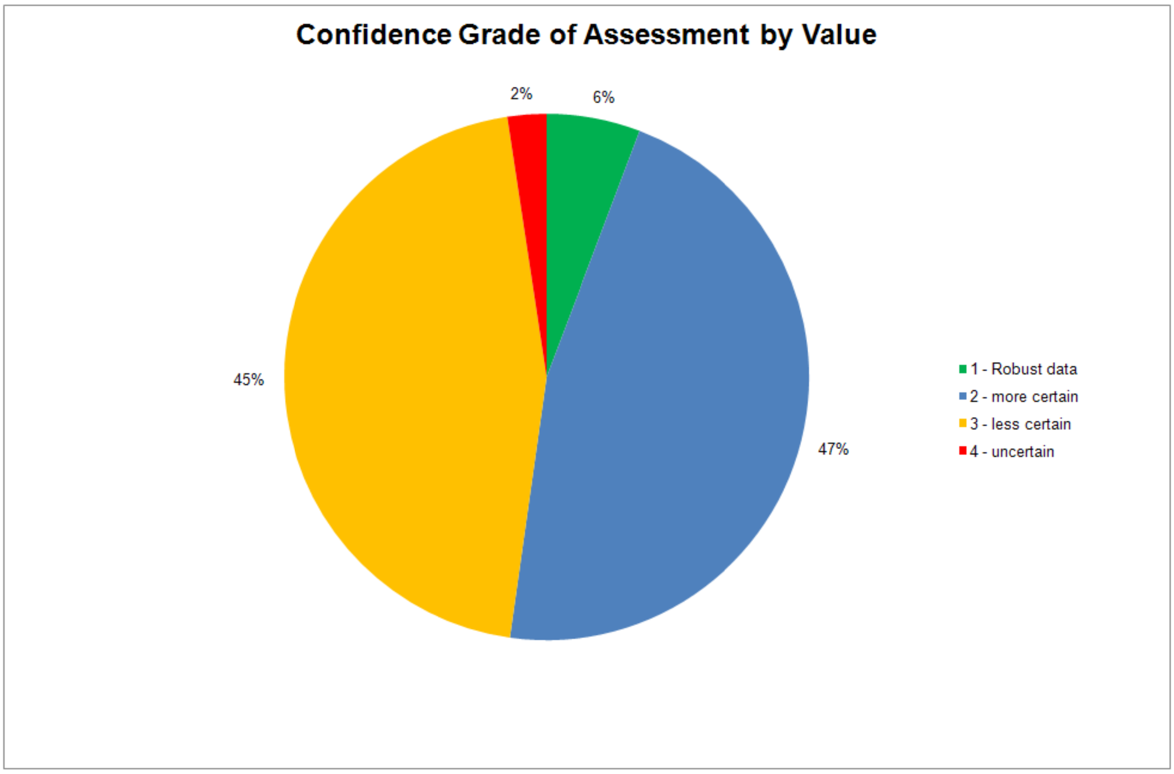
Figure 2.3 – Asset value by original and adjusted condition scores



The analysis shows that 60% of assets by value has a score greater than 4.

SWC has applied a confidence rating for each asset on a 1 to 4 scale, 1 representing uncertain data and 4 being robust data. We show the reliability of the overall data through the confidence rating by percentage asset value in Figure 2.4.

Figure 2.4 – Confidence grade of assessment by value



The analysis shows that reliable data was used for just over 50% of the assets by value.

Consequence of Failure

State Water has assessed the consequence of failure from nine categories which capture the full range of tangible and intangible consequences, including health and safety, societal safety, and economic and compliance impacts. Each asset component was assessed against each category and assigned a score on a 1 (catastrophic) to 7 (minor) impact corresponding to the order of magnitude of the consequence.

SWC comments that the consequence scale is used to assess the consequence cost in dollar terms and summated to derive a total consequence of failure for each asset.

Comparison of asset service potential against the benchmark asset

The cumulative probability of failure over time is estimated using a Weibull distribution. SWC has defined parameters for the Weibull distribution based on order of magnitude estimates on the probability of failure of old valve components and from dam operations staff on the observed fail rate of valves in new and satisfactory condition. The probability estimates were checked against dam wall structure assets for comparability with the dam failure probabilities derived from the portfolio risk analysis process.

Our view is that the Weibull distribution can be used and calibrated for short and medium life assets such as valves and gates, but there is not sufficient operating experience to calibrate and apply to longer life assets such as dams, embankments and concrete structures. The difficulty of calibration is an issue common to other agencies with similar assets.

Where the service potential rating for an asset was lower than the benchmark asset of the same age and following the typical pattern of service potential use then three factors were considered in determining the remaining useful life of each asset. These were the probability of failure, the consequence of failure and the risk costs. SWC subsequently commented that:

"We do not have benchmarks assets, per se. What we did do was compare each asset's observed decay against that of the mode and mean decay curves (using a Monte Carlo analysis) for all assets. When an asset's decay varied from this mode/mean by a margin greater than a given threshold, we elected to use a formula to determine a new asset life, otherwise we retained the original life and depreciation date. These formulae are explained in the attached spreadsheet."

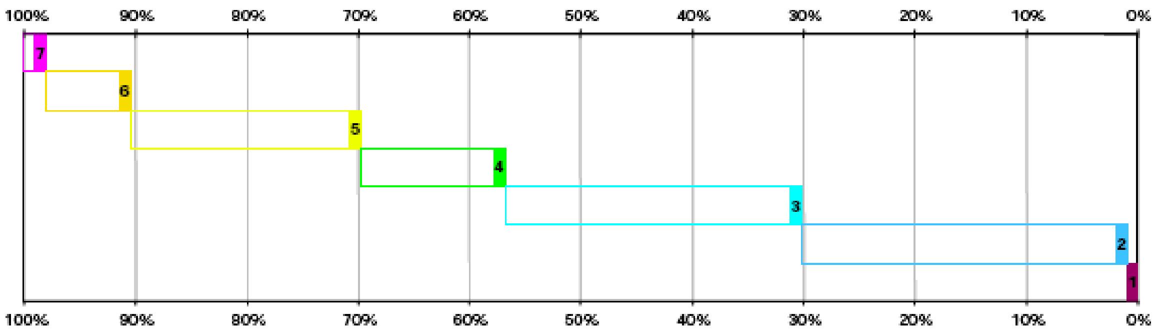
For those assets with a lower service potential than the benchmark assets, SWC has adjusted the service rating based on the risk cost generated from the analysis above. Where the risk cost exceeds a 1:1000 chance of severe loss a reduction of one point is applied. If the risk cost exceeds a 1:100 chance of severe loss then a two point reduction is applied. Similarly if the risk cost exceeds the annualised weighted cost of replacement then a two point reduction is similarly applied.

This analysis results in a revised current asset service potential profile. We noted that 35% of the asset base by optimised replacement cost had been shifted by one condition grade and a further 23% by two condition grades.

Analysis of Remaining Asset Life

The remaining life associated with each service potential score has been derived using a Monte-Carlo analysis. This is based on a relationship between the adjusted service potential rating, mainly driven by condition shown in Figure 2.5 below, taken from the SWC methodology and reproduced below for ease of reference.

Figure 2.5 – Remaining life of an asset



The relationship between the condition rating and assumed residual life shown in the figure makes some broad assumptions on the range of each condition grade. In addition, the subjective shift of one or two grades for some assets below a benchmark asset has a material reduction on remaining asset life. Our view is that the service potential grades are an indicator of condition and performance and, because of the sensitivity of assumptions, do not lend themselves directly to numerical calculations.

SWC has derived the remaining life associated with each rating from a Monte Carlo analysis of outcomes and expert judgement of in-house staff. The result is a profile of probable weighted average asset life which has two peaks, one at year 61 and a further peak at year 83. SWC has assumed the 83 year weighted average life in its Submission.

3. Results

Results of the analysis

We reviewed the analysis for the top 12 assets, all dam structures, in terms of gross replacement cost. These assets represent 33% of the asset base. The results are shown in Table 3.1 below.

Table 3.1 – Results for the top 12 assets by value

Asset	Element	Gross replacement cost $M	Service Potential Overall condition grade	Adjustments to condition grade
Copeton	Structure	151	4	Condition grade 6 (wear and tear)– 2 to reflect risk cost
GLND	Structure	141	4	Condition grade 5 (wear and tear)– 1 to reflect risk cost
Burrendong	Structure	127	3	Condition grade 5 (wear and tear)– 2 to reflect risk cost
Blowering	Structure	120	2	Condition grade 4 (wear and tear)– 2 to reflect risk cost
Burrendong	Concrete	116	5	Condition grade 5 (wear and tear)
Burrinjack	Concrete	93	3	Condition grade 5 (wear and tear)– 2 to reflect risk cost
GLND	Concrete	82	5	Condition grade 5 (wear and tear)
Windamere	Structure	73	3	Condition grade 5 (wear and tear)– 2 to reflect risk cost
Blowering	Concrete	68	3	Technical and commercial obsolescence and -1 to reflect risk cost
Keepit	Concrete Dam	62	5	Technical and commercial obsolescence
Wyangala	Old Dam Wall	60	3	Condition grade 4 (wear and tear)– 1 to reflect risk cost
Copeton	Concrete	57	4	Condition grade 5 (wear and tear)– 1 to reflect risk cost

We noted that:

1. The minimum condition score was related to 'expected wear and tear' for ten of the 12 assets.
2. The condition grade is reduced in nine of the twelve assets, by one point for three assets and by two points for the remaining six assets.
3. Technical obsolescence is driving minimum condition score for two assets.

4. The impact of moving an asset by one point has a material impact on remaining asset life. For example a shift from a grade 6 to 4 reduces asset life by on average 27% or just over 50 years for a 200 year currently assumed asset life. A movement from grade 5 to 3 would show a 37% reduction or nearly 75 years for a 200 year asset life.
5. The technical obsolescence score relates to shortcomings in asset performance against new standards. These are being addressed in capital expenditure projects to improve performance and extend the life of the assets.

As an example, we looked at the results for the Blowering Dam which we visited as part of the efficiency study. The dam was constructed in 1968 with a 200 year assumed asset life. We noted that the structure had been assessed as a condition grade 4 with a note to say cracks in the upstream face. The grade had been reduced to 2 to reflect the consequence cost of an asset failure. From Figure 2.5 this adjustment represents a shift from an average 63% to 15% of remaining asset life, or nearly half its asset life.

The Blowering dam concrete structure was ranked a 3 because of technical and commercial obsolescence, before the condition grade was downgraded one point because of the consequence cost. We assume the 3 ranking is because of the lack of capacity of the spillway as we are not aware of any other factors which would impact on this. In practice this obsolescence is resolved by additional works to the assets but not writing off the original assets which are still serviceable.

We found from long-lived assets of this type, the approach to asset serviceability differs from shorter life assets. For example pumps and valves are generally replaced due to condition and/or obsolescence. The approach is different for earth and concrete structures where these assets are modified and upgraded to extend its service capability and asset life, with the additional assets depreciated at the new asset life assumption. The life of the original asset is extended.

Overall the results of the analysis show that 42% of the asset base has a condition based assessment but is not impacted from the consequence cost adjustment. A one point reduction was applied to 35% of the asset base and a 2 point reduction to a further 23%.

Sensitivity tests

We were not able to undertake sensitivity tests of changing assumptions on the resulting average remaining asset life. This did not however impact on the findings of our review. We are not aware of any sensitivity tests carried out by SWC.

We also carried out a high level analysis assuming that 50% of the RAB related to existing assets and that 42% of assets had no adjustment to assumed lives. We assume that new assets have no adjustment. Our analysis suggests that the impact of the condition based asset life is to reduce the life of existing assets by about half the current assumed 160 years.

4. Findings

Our findings are based on the review of State Water's approach and examination of supporting documents and worksheets. We have discussed key issues with SWC. We have carried out some analysis but have not had full access to the SWC modelling to trail data and test the sensitivity of assumptions. Our main findings are shown below.

Methodology

SWC has taken a detailed approach to the estimation of weighted asset life based on asset surveys, expert opinion on service potential and consequence of failure and the application of Weibull deterioration curves. This approach is consistent with good practice. However the methodology is in places unclear and we had difficulty in understanding how the spreadsheets were used. It would be helpful to document the process more clearly.

Data Reliability

Data on condition has been collected from the field interviewing local staff and inspecting some assets. The confidence of the data is also reported with some 50% of value good or reliable but the remaining half as less reliable or uncertain. We noted from inspection of the spreadsheet data that there are inconsistencies with some asset data although we are unsighted as to whether these are material. There is further work to improve the quality of the data.

Robustness of Analysis

(i) The service potential includes an element for technical obsolescence which is a driver for some assets where new standards are being applied. For example dam spillways are being upgraded to new standards. When this work is complete, the capital expenditure will be rolled into the RAB. The second benefit is that the life of the asset being modified is extended. This could be represented in the asset model by an increase in service potential but we have not seen this. All the adjustments are one-way, that is a deterioration in condition, rather than a two-way adjustment, either a deterioration or improvement in condition, that these enhancements would provide.

(ii) The asset base is predominantly long-lived assets such as dams, weirs and concrete structures where interventions to address deterioration in service potential is to renovate assets or parts of assets. Again, a two-way adjustment of the service potential score would be appropriate. Short and medium life assets tend to be replaced at the end of their service potential where the modelling is valid.

(iii) The cumulative probability of failure is modelled through a Weibull distribution. While this is an accepted method of analysis, the calibration of the curves depends on evidence of good quality data over the life of assets. This may be possible with short or medium life assets; the calibration of curves for dams and concrete structures is not demonstrated. The difficulty of calibration is an issue common to other agencies with similar assets.

(iv) We challenge the relationship between the service potential score and remaining asset lives shown in Figure 2.5 as the steps between condition grades appear inconsistent. For example a step from grade 6 to 4 is an average reduction of 27% in asset life whereas a step from 4 to 2 is 48%. Using a more even grading curve, a step change in grade would be equivalent to about 15%.

Audit Trails

We were not able to follow clear trails from the 83 year average life proposed through the workings to base data. As such we were not able to test the sensitivity of the assumptions on the outturn asset life. Our findings are therefore based on the data and tests we have been able to do.

We formed the view that the methodology of using a condition based asset life is generally appropriate and consistent with good practice. There is scope to improve the quality of the data. However the analysis is not sufficiently mature and tested to provide robust assessments of asset life particularly with the use of the Weibull distribution and the impact of the step changes in service potential applied.

Our opinion is that while there may well be a case to reduce the asset life from the current assumptions using condition based assessments, the analysis and data provided to us are not sufficiently robust to justify a change in the asset life assumptions applied to the 2006 Determination. The current 160 years for existing assets and 75 years for new assets are consistent with other agencies with similar assets and should be retained for the 2010 Determination. The 160 year asset life is consistent with other agencies with predominantly long life assets such as dams and structures. .

5. Comparison with Other Agencies

In determining appropriate useful lives to be adopted by SWC, Atkins/Cardno reviewed the following information:

(i) Useful lives adopted by Cardno in previous valuations in Australia;

(ii) Useful lives included in the following guidance material:

a. Total Management Planning Guidelines (1994 and 2001 editions) Dept of Environment & Resources Management, Qld;

b. International Infrastructure Manual (2002 Edition) - it should be noted that no guidance has been provided in the 2006 Edition;

c. Asset Management Guidelines for Water Supply and Sewerage Schemes, NSW Public Works Department 1992;

(iii) Financial statements prepared by the larger Australian water utilities. A number of financial statements were reviewed, but most provided very broad ranges for a very limited range of asset classes. However, the asset useful lives provided in the financial statements for the Sydney Water and Water Corporation, Western Australia were quite comprehensive; and

(iv) Previous reports prepared for IPART for Sydney Catchment Authority (Worley Parsons, June 09).

The useful lives have been summarised in Table 5.1 and presented in detail in Appendix A. A typical range of useful lives is shown together with useful lives accessed from other sources.

Table 5.1 - Extracts from Financial Statements for Useful Lives

Asset General definitions (asset life in years)	Typical Range	State Water	Water Corporation WA	Seq Water QLD	SCA	Sydney Water	Goulburn Murray Water	Water Care NZ
Dams and associated works	100 - 200	30-200	3-200	15-150	100-200	200	Up to 200	189
Buildings and structures	60-100	2-92	3-150	40-80	10-100	50-100		68
Plant and equipment	10-40	3-30	1-85	3-10	20-100	25-40	2-10	
Pipelines and fittings	40-100		2-151		50-150	65-140		79
Drains and channels	80-150	5-15	10-150		100	150	40-120	

Source: Atkins Cardno analysis of public data

Plant and equipment for some agencies would include mobile plant which would therefore have low useful lives

A review of Table 5.1, Appendix A and State Water's asset register indicates that State Water's useful life estimates are reasonably consistent with that used by other Australian water authorities.

The analysis shows that in general average asset lives for dams and associated structures is in the range 100 to 200 years. The one exception is the Sydney Catchment Authority where the average regulatory asset life is 60 years although the reported asset life for dams, embankments and civil works is in the range 100 to 200 years.

Other approaches

The National Water Initiative[6] identifies two approaches to address the loss of service delivery capacity or depreciation with the annuity approach or RAB Building Block approach. IPART has historically applied the latter approach. The annuity approach may be an option to consider in the medium term given the uncertainties of the life of dams and structures and the approach to maintain to a good condition and performance in the long term.

Regulatory asset lives in the UK

The regulatory approach to assets with long lives such as dams and associated works, water mains and sewers is to assume that they will remain in perpetuity and that, in the medium term, the expenditure to maintain assets in good condition is equivalent to depreciation. This expenditure is termed an infrastructure renewal charge and represents the average capital maintenance costs normally over a 20 year period based on the agency's asset management plan. The one annual charge is made to reflect both capital maintenance and asset consumption or depreciation. This approach was applied to reflect the uncertainties of asset age in determining a realistic depreciation charge. This is a regulatory approach only and is not consistent with international accounting standards. The approach is akin to the annuity method, setting maintenance costs over a medium term period, but within the overall building block regulatory approach.

[6] Draft National Water Initiative Pricing Principles

Appendix A – Comparison of Designated Asset Lives

Asset Type	Component	Recommended Useful Life Range	Recommended Typical Useful Life	TMP Guidelines**	International Infrastructure Management Manual***	Sydney Water Corporation	Sydney Catchment Authority	Sydney Catchment Authority (Worley Parsons Review)	NSW Public Works Department	State Water Corporation	Comment
Bores	Bore	20-60	50	50-80					20-30		
	Flowmeter	10-20	10			25-40			10-15		
	Instrumentation	10-20	10	10							
	Pipe work	50-80	50	50-80					60-80		
	Pump & Motor	20-40	20	15-25		25-30			25-30		
	Switchboard	20-25	20								
	Valves	30-50	30	25-50					20-25		
Dams	Access Road	30-50	30								
	Buildings	40-60	60		50-100	50-100	10-100	10-100	50-70		
	Dam Civil Works	100-200	200			200	200/100			100-200	Watercare dams have an average useful life of 189 years (as per the 2007 Annual Report)
	Dam Embankment	150-200	200	150-200	50-100	200	200/100		70-100	200	
	Electrical	20-25	20	15-25	15-25	25-30	20-50	25	20-25		
	Destratification System	25-30	30								
	Fences (Security) and Gates	15-30	30	25	25				20-25		
	Instrumentation	10-20	10	10							
	Intake Tower	80-100	100								
	Mechanical	10-40	25	15-25	15-25	25-40	20-100	25			Typically 25, but could be as high as 40 for large well maintained assets
	Pipe work	50-80	80	50-80	65-95	140			60-80		
	Recreation facilities	20-40	30								
	SCADA	Oct-15	10	10					10-15		
	Spillway Civil Works	100-150	100								
	Spillway Gates	60-100	100								
	Telemetry	10-20	10	10	15-25	10-15			10-15		
	Valves	30-50	40	25-50		25-40			20-25		
Channels	Channel	80-150	100	150		150	100		70-100	5-15	
Lagoons	Pump & Motor	20-40	20	15-25		25-30			20-25		
	Structure	50-100	60	60					70-100		
Repeater Towers	Civil - structure	60-80	80		60-70	100			70-100		
	Control & Monitor	10-20	10		15-25						
	Mechanical & Electrical	10-20	20		15-25	25-40			15-45		
Reservoirs	Access Ladders & Handrail	20-40	25	25					20-25		
	Disinfection Dosing	10-20	20								
	Level Indicator	10-20	20			3-12			15-25		
	Mechanical (Pumps)	10-40	20	15-25	25	25-40			25-30		Typically 20, but could be as high as 40 for large well maintained assets
	Metalwork	20-40	25								
	Meters	10-20	15	15	15-25	8-14					
	Pipe work	50-80	50	50-80	65-95	65-140			60-80		
	Roads & Drainage	30-50	30		50-80	100					
	Roof - Steel	25-60	40						Min 40		Steel roof
	Signage, Fencing & Landscape	15-30	15	25	25				20-25		
	Structure (concrete)	60-100	80	60	50-80	150	75-100		70-100		
	Structure (steel)	25-60	60	60	50-80				70-100		Thin walled steel reservoirs may have significantly lower lives
	Switchboard	20-25	20		15-25						
	Telemetry	10-20	10	10	15-25	10-15			10-15		
	Valves	30-50	30	25-50					20-25		

River Intakes	Electrical	20-25	20	15-25	15-25	25-30			20-25		
	Lifting Gear	20-40	20						30-40		
	Mechanical (pumps)	10-40	20	15-25	25	25-40			25-30		Typically 20, but could be as high as 40 for large well maintained pumps
	Metalwork	20-40	25						10-15		
	Pipe work	50-80	50	50-80	65-95	65-140			60-80		
	Structure (concrete)	60-100	80	60	50	100			40-50		
Water Mains & Fittings	Asbestos cement (AC)	40-60	60	60*							
	Cast iron cement lined (CICL)	70-80	80	80*							
	Ductile iron cement lined (DICL)	80-100	80	80*							
	Mild steel cement lined (MSCL)	70-80	80	50*							Where a well maintained Cathodic protection is installed useful life could be incresed by 30 years
	Polyethylene	60-80	60	50*							
	uPVC	60-80	60	50*							
	Water mains				65-95	65-140	50		60-80		
	Water mains (above ground)						150				
	Valves (isolating)	25-35	30	25-50					20-25		
	Valves (control))	10-15	15	15					8-12		
	Water Meters	10-15	15	15	15-25	8-14					
	Tunnels & conduits	100-150	100			150	100				
Water Pump Stations	Building	40-60	60	60	50-100	50-100			40-50		
	Disinfection Equipment	10-20	20								
	Electrical	20-25	20	15-25	15-25	25-30			20-25		
	Lifting Gear	20-40	20						30-40		
	Mechanical (generator)	10-30	20	15-25	15-25	25-40					
	Mechanical (pumps)	10-40	20	15-25	25	25-40			25-30		Typically 20, but could be as high as 40 for large well maintained pumps
	Metalwork	20-40	25								Ancillaries - eg ladders, platforms, covers etc
	Meters	10-20	15		15-25	8-14			10-15		
	Pipe work	50-80	50	50-80	65-95	65-140			60-80		
	Roads & Drainage	30-50	30		50-80	100					
	Signage, Fencing & Landscape	15-30	15	25	25				20-25		
	Structure (concrete)	60-100	80	60	50	100			40-50		
	Surge Protection Vessel	20-40	40								
	Switchboard	20-25	20		15-25						
	Telemetry	10-20	10	10	15-25	10-15			10-15		
	Valves	30-50	30	25-50					20-30		
Weirs	Weir	75-150	100	50-125		100	100		70-100	50-100	

* Total Management Planning Gguidelines 1994, DERM Qld
** Total Management Planning Guidelines 2001, DERM Qld
*** International Infrastructure Management Manual 2002 - section 3.10

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