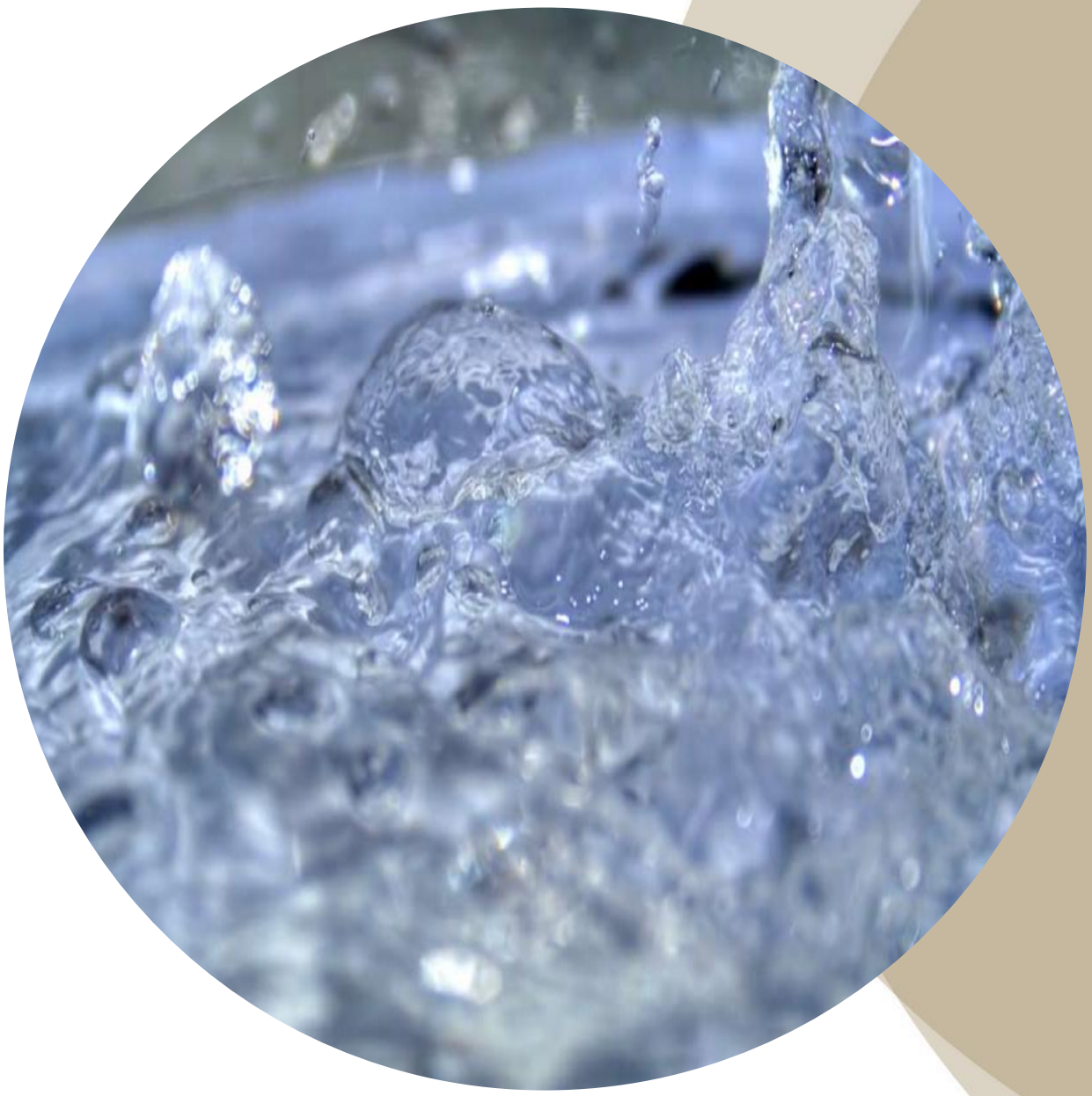

IPART Hunter Water Economic Life Report

IPART

12 June 2020

311001-00052

Advisian
Worley Group

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PROJECT 311001-00052 - WW-REP-0001: IPART Hunter Water Economic Life Report -

Rev	Description	Author	Review	Advisian approval	Revision date	Client approval	Approval date
0	First Issue	R.McLeod	S.Campbell	S.Settle	07.05.20		
1	Second Issue	R.McLeod	S.Campbell	S.Settle	18.05.20		
2	Final Draft Issue	R.McLeod	S.Campbell	S.Settle	02.06.20		
3	Final Issue	[redacted] R.McLeod	S.Campbell	S.Settle	12.06.20		

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Acronym	Definition
ATO	Australian Tax Office
DRC	Depreciated Replacement Cost
FAR	Fixed Asset Register
GRC	Gross Replacement Cost
HWC	Hunter Water Corporation
IPART	Independent Pricing and Regulatory Tribunal
PPI	Producer Price Index
RAB	Regulatory Asset Base
SCADA	Supervisory Control and Data Acquisition

1 Introduction

The Independent Pricing and Regulatory Tribunal (IPART) conducted a review of Hunter Water's maximum prices, to apply from 1 July 2020 for a period up to five years (the 2020 Determination). In September 2019, it released an Issues Paper in response to Hunter Water's Pricing Proposal for this review (received in July 2019). In March 2020 IPART released a draft report and draft determination setting out its draft decisions. Stakeholder submissions commenting on the draft report were received on 9 April 2020.

Price setting typically aims to set prices which generate revenue to meet a utility's efficient costs. This uses the building block approach to calculate those efficient costs, which includes allowances for:

- Operating costs
- Return on assets
- Return of assets (depreciation)
- Tax
- Return on working capital.

In calculating the depreciation building-block, the efficient stock of assets the utility holds (the 'regulatory asset base', or 'RAB') is divided by the economic life of those assets.

Hunter Water has proposed to further disaggregate its RAB from 4 to 20 sub-categories, and to significantly reduce the asset lives. This creates a large increase in the depreciation allowance in the short term.

2 Scope

The scope of this review is to assess Hunter Water's proposal, the available supporting evidence, any other relevant information, or experience and

1. make recommendations on the appropriate lives of both existing and new assets in each of the 20 RAB sub-categories, and
2. make recommendations, if any, on how the assessment or transparency of economic lives of assets could be improved.

3 Approach

Economic lives of Hunter Water subcategories should be consistent with design lives applied to the design and construction of assets. Weighted economic lives of new assets are sensitive the ratio of spending on assets with different lives within a category, the accuracy of information within the asset register and nominated asset lives. The weighted remaining economic lives are sensitive to changes in spending patterns, accuracy of asset register data and rates of escalation

The review consisted of:

Task 1 New Assets economic life review:

1. Examining the sub-category structure and groupings of assets within each subcategory to consider whether these groupings are logical and consistent. Checking for variance in economic life of assets within the subcategory and the associated cost weighting to test for any factors that may distort depreciation calculations.

2. Reviewing Hunter Water's and general engineering standards for new assets to ascertain, what design lives are nominated, or what might be reasonably inferred from review of the documents.

3. Compare Hunter Water nominated economic lives for new assets with industry standards for design lives, (using Advisian in house data of design lives applied to other similar projects, and benchmarks) and allowable asset live nominated by the Australian Tax Office. If available compare this to the Hunter Water specified design lives for specific assets or any engineering standards they may typically use.

Task 2 Existing assets economic life review Typically, best practice asset management would lead to the actual useful economic life of an asset being equal to or greater than the design life of an asset. There may be exceptions to this driven by factors such as:

1. obsolescence of the plant and equipment,

2. changes in law or regulations including safety and environment,

3. change in use not anticipated in design (e.g. more corrosive environment, frequency of use), and

4. possible change in the economic point at which the cost to maintain and repair exceed cost to replace

Approach to Remaining Average Weighted Life. The review of remaining average weighted life consisted of:

1. Reviewing by sample, the costs attributed to assets in the Hunter Water fixed asset register (FAR) that are used to calculate weighted average life to check for accuracy, consistency and appropriateness for use in calculating regulatory weighted remaining life of a category.

2. Reviewing the allocation of assets to categories for consistency and appropriateness.

3. Reviewing the indexation rates used in the FAR for consistency with the regulatory indexation of the RAB.

4. Reviewing Hunter Water's method of calculating the weighted average age of assets.

5. Reviewing the ratio of expenditure between asset classes and categories for consistency with the industry rules of thumb.

6. Preparing an independent model to calculate the remaining average weighted of assets.

4 Primary Document References

https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-water-services-metro-water-prices-for-hunter-water-corporation-from-1-july-2020/publications-prices-for-hunter-water-corporation-from-1-july-2019/technical-paper-06-revenue-requirement-and-financial-metrics.pdf

https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-water-services-metro-water-prices-for-hunter-water-corporation-from-1-july-2020/publications-prices-for-hunter-water-corporation-from-1-july-2019/consultant-report-aither-hunter-water-expenditure-review-14-december-2019.pdf

https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-water-services-metro-water-prices-for-hunter-water-corporation-from-1-july-2020/publications-prices-for-hunter-water-corporation-from-1-july-2019/draft-report-review-of-prices-for-hunter-water-corporation-from-1-july-2020-10-march-2020.pdf

Excel file "FAR – RAB disaggregation – HWC Proposal" Created 23/5/2018 by Sean Cox.

5 Recommendations

5.1 Recommended economic lives of Hunter Water's proposed new assets in each of the 20 RAB sub-categories.

In our review of the economic ages off new assets, we found that they were generally within acceptable bounds of economic asset lives expected within the water and wastewater industry. We did note some anomalies that we believe are not consistent with expected economic lives, however whilst they require addressing, we do not believe the adjustments will have a material impact on the determination of a reasonable depreciation rate. We do note however that future incorrect allocation of assets to categories could potentially materially distort the regulatory depreciation allowance.

In our review of the FAR we did not consider the formulae for weighting the age of new asset was consistent with calculation of regulatory depreciation. The Hunter Water weighting method was based on weighting by rate of depreciation per asset, we consider that weighting should be based on the gross replacement cost (excluding non-depreciable components). This view is based on the premise that depreciation is calculated on a straight-line basis applied to an inflation indexed RAB.

The Hunter Water original opening RAB was determined in June 30, 2000. This RAB included existing assets, "pre-line in the sand" assets. The original opening RAB and was not valued using the discounted replacement cost method used in the FAR. Consequently the the FAR discounted replacement asset values required scaling to reconcile with the RAB at 30 June 2018 pre-line in the sand and post-line in the sand assets. The FAR excel file was adjusted to weight life by value of assets and scale the gross replacement costs such that depreciated replacement costs + non-depreciable items were more closely reconciled with the RAB at 2018. We note that whilst the total reconciled to within 3% of the RAB the ratio of the major categories did not reconcile to the RAB categories. This misalignment was not material for the purposes of this task and is discussed later. Results are summarised in table 1 below.

Table 1 FAR New Asset lives years (Advisian adjustments)

	Corporate	Water	Wastewater	Stormwater
Civil	45	96	96	122
Electrical/Mechanical	26	32	25	10
Equipment	12	17	13	12
Intangibles	4	N/A	N/A	N/A

We note that the values for electrical mechanical and equipment for stormwater are low, expenditure is sporadic and that there insufficient data upon which to base a decision of what represents typical average weighted life of new assets in these categories. We recommend that stormwater is collapsed to one category including civil, electrical/mechanical, equipment and intangible assets. This change will not have a material impact on regulated depreciation and will simplify calculations. We note the equipment category average weighted life for water is higher than other categories because a significant proportion of the assets by gross replacement value have a life of more than 20 years. Consideration should be given to reallocating these assets to the electrical/ mechanical or civil categories to bring the mix of assets ages in line with other equipment categories.

Recommendation 1 Our recommended weighted average new asset lives for this determination are summarised in table 2 below.

Table 2 Recommended New Asset lives years

	Corporate	Water	Wastewater	Stormwater
Civil	**45**	**96**	**96**	**121**
Electrical/Mechanical	**26**	**32**	**25**	
Equipment	**12**	**17**	**13**	
Intangibles	**4**	N/A	N/A	

5.2 Recommended remaining economic lives of Hunter Water's existing assets in each of the 20 RAB sub-categories.

In our review of the weighting formulae for remaining asset life, we noted it was based on weighting by rate of depreciation per asset, similarly to the reasoning for new asset lives we consider that weighting should be on depreciated replacement cost (excluding non-depreciable components).

The FAR excel file was adjusted to weight asset lives by value and scale the gross replacement costs such that the depreciated replacement costs + non-depreciable items reconciled with the RAB at 2018. Results are summarised in table 3 below.

Table 3 FAR Weighted Average remaining lives years (Advisian adjustments)

	Corporate	Water	Wastewater	Stormwater
Civil	30	70	77	65
Electrical/Mechanical	19	26	20	
Equipment	10	7	9	
Intangibles	3	not used	not used	

In our review of the calculation of remaining weighted lives by Hunter Water we noted that the FAR is a tool that has been developed for accounting purposes and there are some differences between the methodology for calculating regulatory and financial depreciation.

The features of the Hunter Water FAR methodology that we consider are not consistent with the regulatory calculation of depreciation and may distort remaining weighted average ages are:

1. Regulatory depreciation is linked to original actual expenditure and is not subject to revaluation. Assets in the FAR older than 5 year are revalued to replacement cost at five-year intervals. Whilst we did not detect any material anomalies in our review, this type of revaluation process can be subject to systemic error and unintended bias. In optimum conditions the Regulatory depreciation should be based on actual cost, reconcilable to the RAB.

2. Assets values are then escalated from the last revaluation date to the date of calculation of weighted average life. The escalation rates used are the Annual PPI building construction NSW which are materially different from regulatory indexation applied to the RAB. This exacerbates the challenge of reconciling the FAR to the RAB.

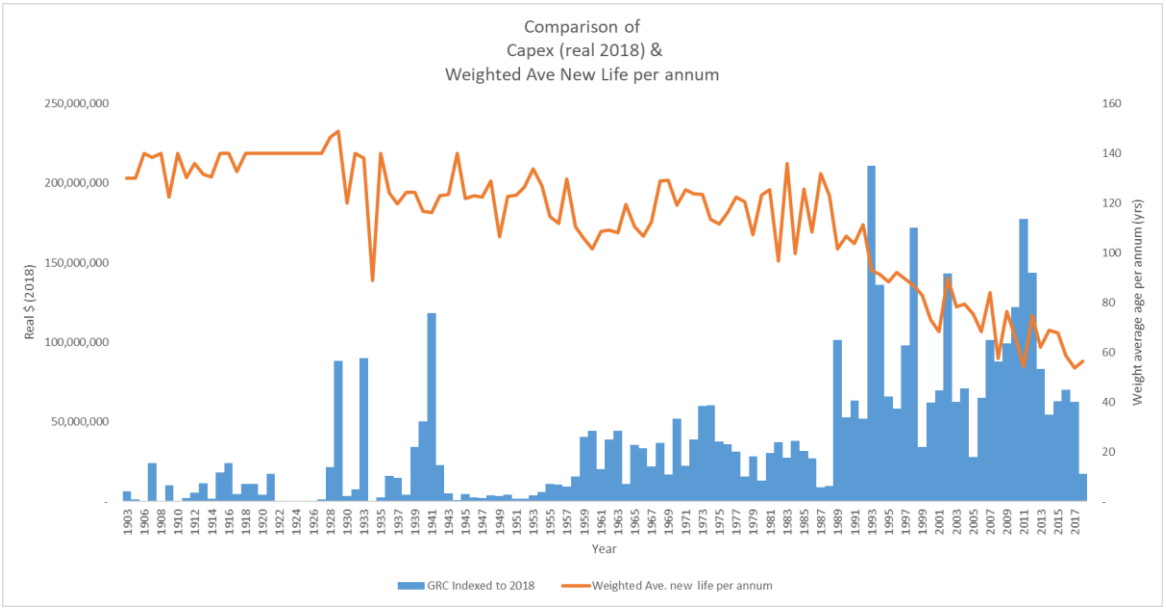
3. The opening RAB set in 2000 was not calculated using the DRC methodology. The Hunter Water methodology uses DRC for pre-line in the sand assets. The DRC assets in the FAR that predate the Line in the Sand require scaling to ensure their contribution is appropriately weighted in the RAB remaining average weighted life. We understand the Hunter Water and IPART agreed on this matter and Hunter Water have a model that makes this adjustment.

To assess the materiality of these differences on the derivation of an weighted average remaining life and to provide another data point for comparison we prepared a check model. The independent model generated average weight ages consistent with the results from the Advisian adjusted FAR model. The Independent model did highlight that the ratios of spend between categories was not consistent with the RAB, however testing by adjusting ratios to achieve reconciliation with the RAB did not have a material impact on weighted average ages.

Regulatory (inflation-indexed) straight-line depreciation assumes that the average age of new assets when added to the RAB remains constant (on average) and consistent with nominated regulatory weighted average ages. If assets are getting older on average, then the utility will over-recover and if they are getting younger the utility with undercover.

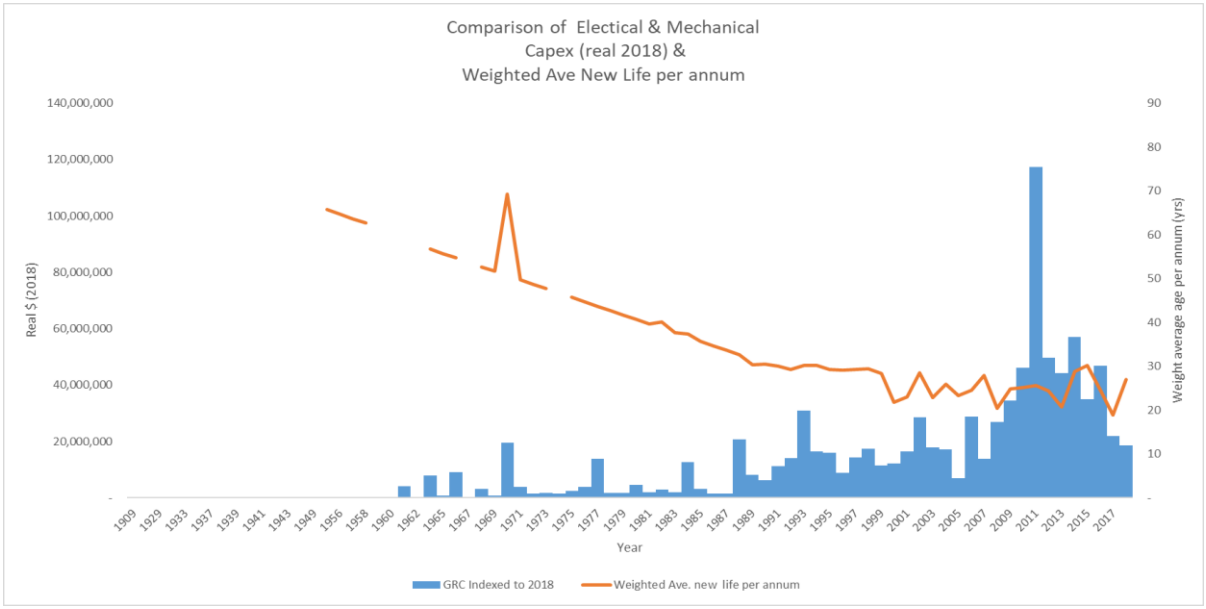
On reviewing the average life of assets over time using the data from the FAR we note that average weighted age of new asset has been steadily declining.

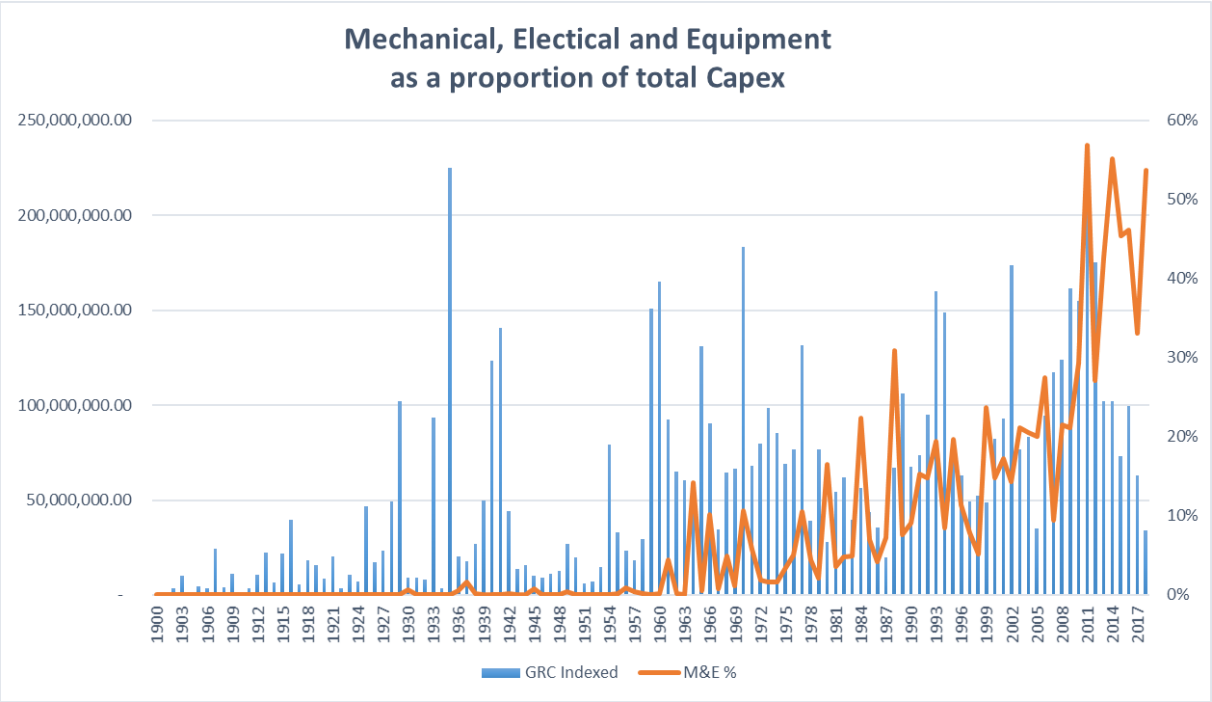
Figure 1 Average age of new assets over time



This trend started around the 1980s and appears to be influence by two factors. The first is increasing ratio of mechanical, electrical and equipment assets in the FAR over time. This has gradually increased the ratio of assets with younger lives as illustrated in the graph below.

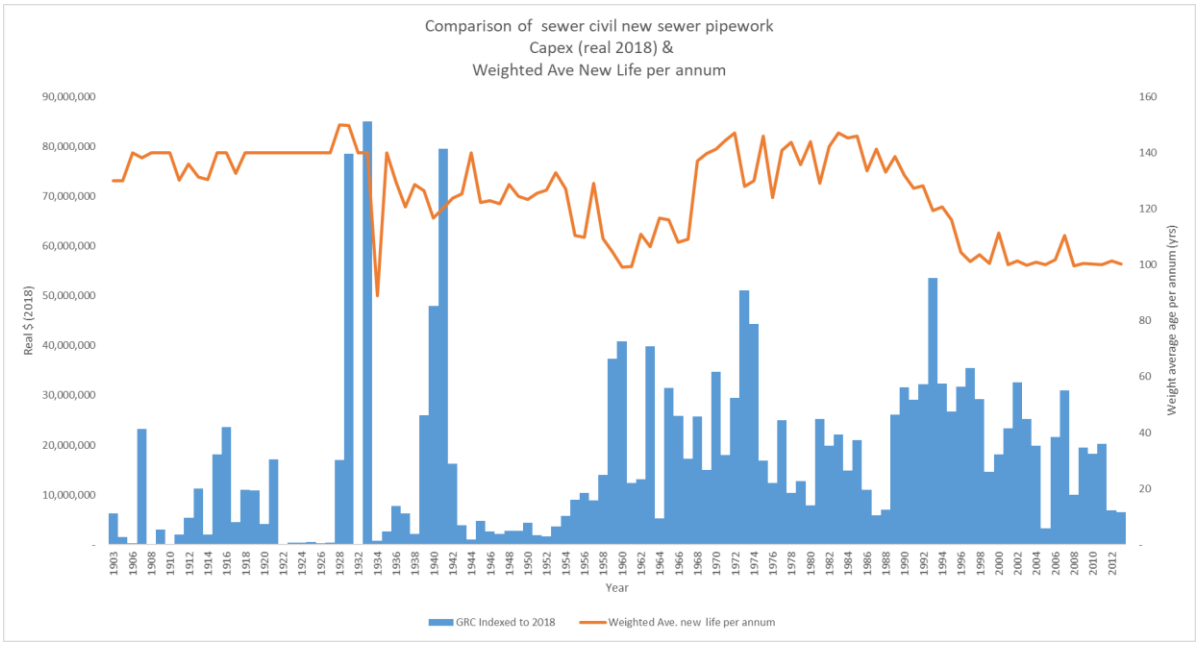
Figure 2 Average age of new mech/elect assets over time

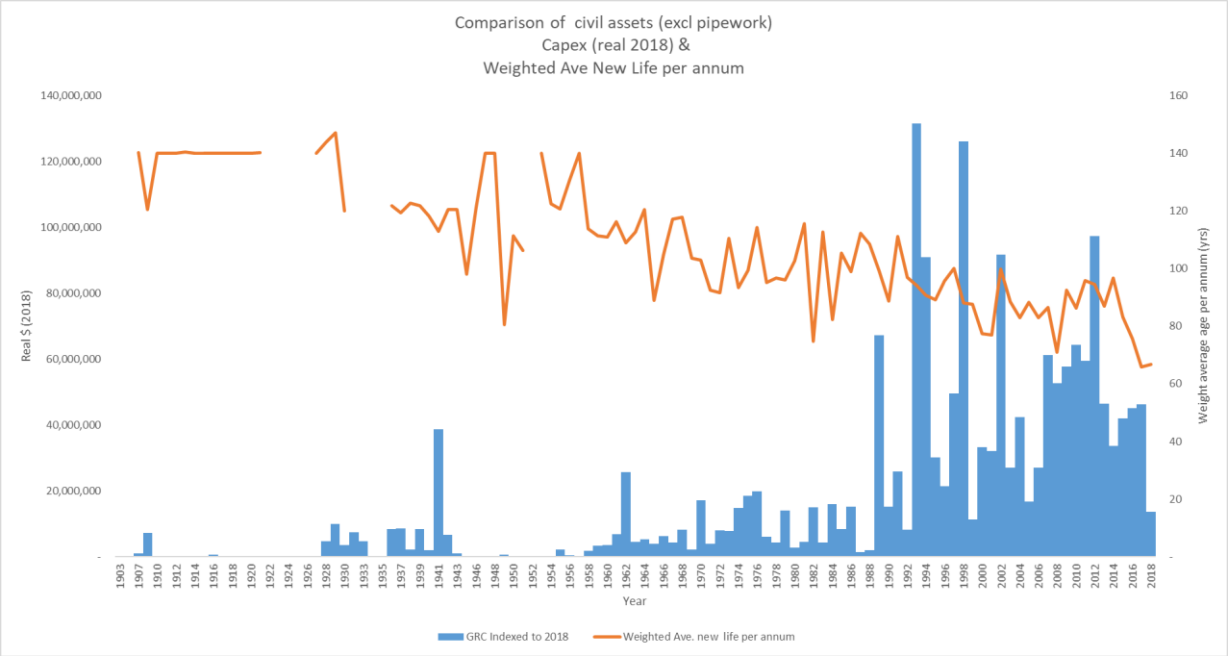




Another related factor is the decreasing ratio (longer life) new sewer pipelines compared to an increasing ratio of other shorter life civil assets such as pipe relining, and civil infrastructure as part of new mechanical and electrical asset for sewerage collection and sewage treatment.

Figure 3 Average age of sewer civil assets over time





This trend was also observed within the water assets.

The cause of this trend could be related to an incomplete FAR data set of retired assets, particularly of older assets. Other factors that could be contributing to this trend are increasing levels of mechanisation and automation associated in increasing adoption of SCADA and telemetry systems since the 1970s, increased levels of complexity of waste water treatment processes driven by increasing environmental standards most noticeable in the late 1990 early 2000s, increasing ratio of pipework renewals as the pipework fleet ages and increased levels of reliability of sewer collection systems (particularly prevention of dry weather spills).

In summary whilst the use of the FAR to calculate depreciation for the current determination is appropriate it is recommended (refer recommendation 3 below) that the trend of reducing asset ages indicated by analysis of the FAR be tested and validated and its likely future trajectory and impact on pricing be examined.

Recommendation 2 Advisian recommends that the average weighted remaining lives of assets in table 4 be use for the purposes of this determination.

Table 4 Recommended weighted average remaining lives (years)

	Corporate	Water	Wastewater	Stormwater
Civil	**30**	**70**	**77**	**65**
Electrical/Mechanical	**19**	**26**	**20**	
Equipment	**10**	**7**	**9**	
Intangibles	**3**	not used	not used	

5.3 Other recommendations.

In addition to observations of possible reducing average age of assets over time there are some administrative matters to consider when adopting the Hunter Water proposed categorization methodology including:

- risks associated with potential incorrect allocation of asset to categories in future determinations, and
- opportunities to standardise and organize categories to assist in monitoring trends, benchmarking, and identification of efficient asset mixes within and across industries

To ensure that future determinations are efficient, that the calculation of regulatory depreciation appropriately achieves return of assets and to identify opportunities to ensure the depreciation framework is promoting efficient mixes of asset ages we recommend further work be undertaken as follows.

Recommendation 3 We recommend that further work be undertaken to:

1. Test the validity for the observed trends in the FAR of reducing average weight age of new assets over time,
2. Gain understanding of potential future trends in average weighted life of new assets and how pricing regulation can support utilities moving to efficient asset mixes,
3. Investigate standardising depreciation categories for regulated entities to assist in monitoring trends and benchmarking performance within and across industries. Including testing the benefits and efficiency of using 20 categories to calculate depreciation.
4. Establish guidelines for asset allocation to categories to reduce the variance of asset lives within categories. This will reduce the anomalies such as occurred in the water mechanical equipment life and facilitate closer reflection of actual depreciation.
5. Investigate and test for bias in underestimating economic life of assets anchored around engineering, accounting and ATO standards.
6. Explore the potential to improve the link between condition monitoring and updating remaining useful economic life of assets in the FAR and test for risk bias in these reviews. In other words, as a general industry observation, condition-based assessment are more problem focused and tend not to look on, or report opportunities to, extended asset lives.

6 Discussion and Observations

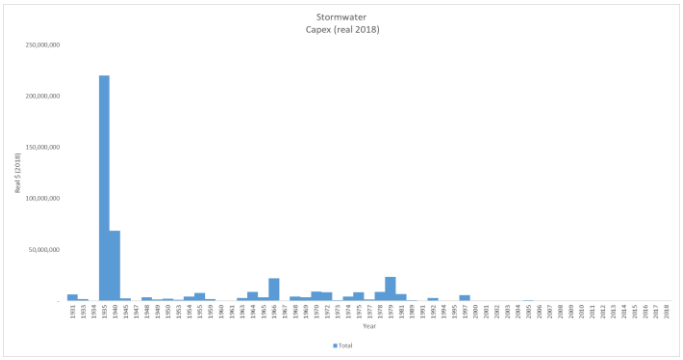
6.1 Asset lives

Generally, asset lives nominated by Hunter Water are consistent with other reference standards and our expectations. There are a few exceptions worth noting in particular:

1. The useful life of dams may be longer that nominated whilst typical standards for dam life are in the order 100 – 150-year economic life expectancy can be in order of 200 years.

2. Base on the information presented to Advisian, available publicly and documented in Appendix B of this report, it can be argued that Grahamstown Dam was fully refurbished with the completion of the works in 2005, albeit over an extended period, and that the date adopted as the expenditure date should be recalibrated from 1961 to 1996 for the original embankment works. Dams depreciation characteristics have similarities to sewer pipe work in that once constructed significant proportions of dam assets (e.g. earthen embankments) do not deteriorate if maintained correctly. It could be argued that part of these assets should treated as non-depreciable.

Figure 4 Stormwater Capital expenditure over time



3. It is also noted that the stormwater assets have characteristics more like a single asset than a portfolio of assets with most of the expenditure occurring around 1935-1940. We also note that, like dams, a significant proportion of the asset does not deteriorate and it could be argued that part of these asset should be treated as non-depreciable however, noting that the impact is unlikely to be material given the low contribution to overall depreciation.

4. Base on the information presented to Advisian, available publicly and documented in Appendix B of this report, The Chichester Dam is understood to have had major remedial works for stability rectification in 1985 and these works could not be identified in the asset register. The impact of this remediation could have improved the economic life of the dam. We do not have sufficient information to establish if this is the case.

5. The useful life of SCADA, communications and associated IT system is potentially overstated when considering obsolescence.

6. Software systems have mostly been allocated a life of four years (the ATO recommend five years post 2018). Generic nomination of the economic life may not be appropriate as the life expectancy will vary materially depending on the size and complexity of the system being installed and the associated licensing arrangements.

7. Whilst design life for sewer systems are typically 100 years, their performance can vary significantly and including requiring remediation at a much earlier age arising from

displaced joints, tree roots and increased ingress and infiltration. Remaining economic life should be informed and updated by asset condition monitoring linked to the FAR process.

8. The design life of some water asset reservoirs can exceed nominate design lives and their remaining economic life should be informed and updated by asset condition assessments linked to FAR process.

Recommendation 4 The useful live of Grahamstown Dam and Chichester dam should be reviewed considering the potential useful economic life that could be greater than design standards. The capitalization date for both dams should also be review considering refurbishment work that has been undertaken.

Recommendation 5 Consider whether part of the dams and civil stormwater asset value (parts of earthen embankments, culverts, channels, and pipes) should be treated as non-depreciable item similarly to the way sewer pipework is treated.

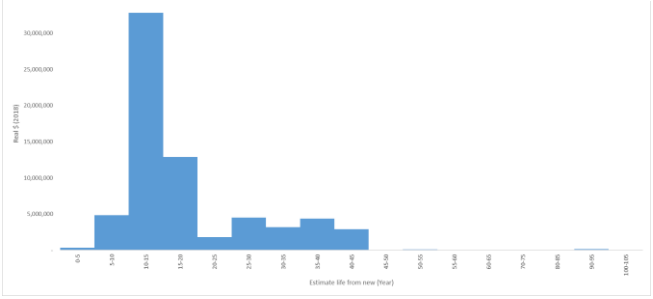
6.2 Classification and grouping of assets

Advisian reviewed the grouping of asset into categories. The grouping is logical and generally consistent with the objective of establishing appropriate regulatory depreciation for this determination. However, we note that this level of complexity may not be needed to achieve the objectives of regulatory depreciation, particularly with respect to the number of subcategories (civil, mech/elect, equipment, intangible).

We also reviewed the allocation of assets to categories and detailed finding are provided in Appendix A. We noted some incorrect allocation of assets to categories within the FAR (refer appendix A) however do not consider this material for the purposes of this exercise. For future calculation of regulatory depreciation, it is important that assets are properly allocated to categories, particularly to electrical/mechanical, equipment and intangible categories where this is significant risk of material errors when longer life assets are allocated to shorter life categories or vice versa. The emphasis should be on allocating assets to asset categories with similar asset lives.

We also noted that while the allocation of the assets to categories may be correct, that the ages variance in some categories created outcomes inconsistent with the purpose of grouping assets into subcategories (i.e grouping asset by age). This is illustrated in the case graph of water equipment category below where the are a significant number of assets that should be allocate to Mechanical/ Electrical (25yr) or Civil (95 yr) asset categories.

Figure 5 Variance of age of Water Equipment



Tighter grouping of assets ages in categories provides a more accurate reflection of depreciation when weighting asset life by value. Guidance of allocation of asset to categories should be adjusted to reflect this principal.

6.3 Gross Replacement Cost (GRC) review

Hunter Water has a robust process in place for valuing assets on its FAR and the level of accuracy is that expected for financial accounting purpose. The are some aspects of the process that are not consistent with calculation of the regulatory calculation of weighted asset life for return of assets.

Whilst we have not detected any matter that would cause concern about the integrity of the FAR it is a method that relies of judgement and can thus be subject to unintended bias.

Appendix A
Review of Asset Lives by Category

Review of Asset Lives by Category

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Acronym	Definition
AS	Australian Standards
ATO	Australian Tax Office
CCTV	Closed Circuit Television
CIPP	Cure in Place Pipe
FAR	Fixed Asset Register
GRC	Gross Replacement Cost
HWC	Hunter Water Corporation
ICT	Information and Communications Technology
IPART	Independent Pricing and Regulatory Tribunal
IQMS	Integrated Quality Management System
PE	Polyethylene
PLC	Programmable Logic Controller
RAB	Regulatory Asset Base
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition

1 Civil

1.1 General Overview of Category

The items identified in the FAR with a depreciation classification of 'Civil' were captured, providing 3,613 entries after entries associated with retired and non-HWC Capital funded assets were removed.

The Civil Category was found to contain a range of assets, predominantly

- Water Assets
- Sewer Assets
- Drainage Assets
- General Supporting Infrastructure
- Buildings and Non-Commercial
- Recycled Water

The total GRC for these items is $1,876M

On review of the descriptions against these items the civil assets included

- Treatment works
- Dams, Storages and Tanks
- Stormwater Drainage Channels & Pipes
- Pump Stations
- Depots/Stores and Workshops
- Manholes & Sewer Vents
- Sewer Mains
- Fencing
- Offices and General

Other items noted included

- Condition Assessments
- Office Equipment
- Chlorinators
- Tools and Working Plant

These items contribute $4.7M to the total GRC for the Civil items,

1.2 Referred Standards

Advisian consulted a number of standards and practices adopted by water supply authorities in Australia, these included

- Water Services Association of Australia

- AustRoads design guidelines
- Australian Standards (AS 4058)
- Specifications from Water Corporation, Unitywater and Water Supply Authorities and Councils

From review, the applied design life for Civil assets is generally dependant on its purpose e.g. Water Services Association of Australia provides a standard design life of 100 years for civil components on water and sewer network infrastructure. Treatment plants often will have lower standard design lives with 60 years often applied to sewage treatment plants and 80 years to water treatment plants.

Service reservoirs which typically comprise of a concrete or steel tank often have design lives of 80 years with 40-50 years for roofs and steel components.

Stormdrain assets have a design life of 100 years with access roads and not exceeding 20 years.

1.3 Calculated Useful Life v's FAR Useful Life

On review of the supplied data a comparison of the FAR Useful life was initially undertaken against the Calculated Useful life. It was found that the calculated useful life was predominantly the same as the FAR Useful life. In those instances where there was an identified difference, this generally consisted of reduction in Useful Life applied to ageing assets constructed prior to June 2000 and the majority prior to 1980. The reductions that were applied look, on first impression, to generally correct FAR useful life which may be inappropriately high e.g. 100yr life on hand rails, 100yr life on access roads and brings the life into alignment with the aforementioned standards, however there are a number of anomalies remaining e.g. access ladders, metal work and fall arrests.

Asset Number	Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Dat	FAR Useful Li	LIFE YRS	Calculated Life Yrs	Difference
WPS057001001	COORANBONG WPS-KAHIBAH ST MORISSET-CIVIL	242,829	0	30/06/1966	1200	100	60	40
WPS058001001	DUDLEY WPS-DUDLEY RD WH'BRIDGE_CIVIL	133,505	0	30/06/1966	1200	100	60	40
WPS059001001	ELEEBANA WPS-CHERRY RD-CIVIL	473,898	0	30/06/1984	1200	100	60	40
WPS063001001	MORISSET 1 WPS-COORUMBUNG ST-CIVIL	183,054	0	30/06/1964	1200	100	60	40
WPS064001001	SWANSEA STH WPS-PACIFIC HWY-CIVIL	245,255	0	30/06/1960	1200	100	60.66666667	39.33333333
WPS065001001	TERALBA WPS-CNR YORK & NORTH-CIVIL	454,375	0	30/06/1956	1200	100	64.66666667	35.33333333
WPS066001001	TORONTO WPS-MT WARING RD-CIVIL	667,106	0	30/06/1976	1200	100	60	40
WPS067001001	VALENTINE WPS-LURNEA CR-CIVIL	275,057	0	30/06/1962	1200	100	60	40
WPS068001001	WEST WALLSEND WPS-GEORGE BOOTH DR-CIVIL	133,960	0	30/06/1981	1200	100	60	40
WPS070001001	WYEE BOOSTER WPS-WYEE RD-CIVIL	132,273	0	30/06/1992	1200	100	60	40
WPS071001001	WYEE WPS-GOVERNMENT RD-CIVIL	125,349	0	30/06/1973	1200	100	60	40
WPS072001001	WARATAH-BRAYE PARK EDITH ST-CIVIL	130,168	0	30/06/1969	1200	100	60	40
WPS078001001	SPEERS POINT - BOOSTER WPS - CIVIL	65,564	0	1/01/1999	1200	100	60	40
WRT026001001	WARATAH 4 RES. CONCRETE-CIVIL(N.I.S.)	9,827,478	0	30/06/1916	1140	95	104.75	-9.75
WRT019001002	NEW LAMBTON RES ROOF ST JAMES RD-AL SHT	177,416	0	30/06/1929	1116	93	100	-7
WRT011001001	MEREWETHER SUCTION TK M'WTHR ST CONC-NIS	281,368	0	30/06/1924	1020	85	100	-15
WRT027001001	WARATAH 5 RES. CONCRETE-CIVIL(N.I.S.)	12,041,001	0	30/06/1928	1020	85	100	-15
WRT049001002	PELTON RESERVOIR ROOF-Z/L SHEET-CIVIL	118,715	0	30/06/1927	1020	85	100	-15
WRT057001001	RAYMOND TCE RES.-N.I.S. CIVIL	118,715	0	30/06/1928	1020	85	100	-15
WPS020001001	BELLBIRD WPS-CIVIL	106,581	0	30/06/1950	984	82	70.75	11.25
WPRV00041001	CHISHOLM 2 PRV - CIVIL	60,500	0	9/10/2015	960	80	60	20
WPRV00101001	ANNA BAY PRV 1 - CIVIL STRUCTURE	77,000	0	1/11/2009	960	80	60	20
WPS009002009	THE HILL 2 WPS - PITT ST - ACCESS LADDER	14,507	0	1/09/2013	960	80	60	20
WPS040001002	MOUNT KANWARY WPS - CIVILWORKS	19,195	0	26/06/2006	960	80	60	20

Figure 1: Extract from FAR – Civil Assets – Showing Typical Differences in Calculated Useful Life and Minor Anomolies

In relation to Sewermains, there were no assets capitalised after 1970 which had lower Calculated Useful Lives. Where lower Calculated Useful Lives were found, these appeared to be typically associated with relined sewers where the useful life reflect the liner more so than the original carrier pipe but are noted to have retained the original Capital Date.

On review of water mains there appears to be a similar adjustment to older assets first capitalised around 1920, with a calculated useful life being adjusted downward. It is noted that the Calculated Useful Life generally remains in the order of 100 years where it differs from the FAR Useful life.

Asset Numb	Asset Description	GRC (not indexe	GRC Residual (not index	FAR Capital Date	FAR Useful L	Useful Life Yrs	Calculated Life (yrs)
SMN000042866	SEWERMAIN - VCRL - BURWOOD BEACH D.A.	17,220	0	30/06/1940	1548.00	129	50
SMN000045155	SEWERMAIN - VCRL- KURRI KURRI D.A.	36,745	0	30/06/1941	1548.00	129	50
SMN000045327	SEWERMAIN - VCRL- KURRI KURRI D.A.	33,471	0	30/06/1941	1548.00	129	50
SMN000045335	SEWERMAIN - VCRL BURWOOD BEACH D.A.	15,869	0	30/06/1941	1548.00	129	50
SMN000044232	SEWERMAIN - CONCRL - EDGEWORTH D.A.	12,880	0	30/06/1941	1545.00	128.75	50
SMN000044234	SEWERMAIN - CONCRL - KURRI KURRI	24,839	0	30/06/1941	1545.00	128.75	50
SMN000044238	SEWERMAIN - RCRL - EDGEWORTH D.A.	83,792	0	30/06/1941	1545.00	128.75	50
SMN000044250	SEWERMAIN - RCRL - TORONTO D.A.	33,692	0	30/06/1941	1545.00	128.75	50
SMN000042365	SEWERMAIN - RCRL - TORONTO D.A.	9,822	0	30/06/1941	1539.00	128.25	50
SMN000042367	SEWERMAIN - VCRL - TORONTO D.A.	15,961	0	30/06/1941	1539.00	128.25	50
SMN000042625	SEWERMAIN - CIRL - TORONTO D.A.	3,594	0	30/06/1941	1539.00	128.25	50
SMN000034367	SEWERMAIN - VCRL- BELMONT D.A.	14,183	0	30/06/1941	1537.00	128.0833333	50
SMN000042705	SEWERMAIN - VCRL - BELMONT D.A.	46,595	0	30/06/1941	1537.00	128.0833333	50
SMN000034369	SEWERMAIN - VCRL - EDGEWORTH D.A.	22,137	0	30/06/1941	1536.00	128	50
SMN000042645	SEWERMAIN - VCRL - TORONTO D.A.	3,949	0	30/06/1941	1536.00	128	50
SMN000042928	SEWERMAIN - RCRL - BELMONT D.A.	320,245	0	30/06/1941	1536.00	128	50
SMN000040675	SEWERMAIN - VCRL - KURRI KURRI D.A.	12,230	0	30/06/1941	1530.00	127.5	50
SMN000058790	SEWER - CIRL - BURWOOD BEACH D.A.	11,235	7183	30/06/1916	1878.00	156.5	80
SMN000045319	SEWERMAIN - CONCRL BURWOOD BEACH D.A.	20,480	0	30/06/1946	1488.00	124	50
SMN000045325	SEWERMAIN - VCRL MORPETH D.A.	18,617	0	30/06/1946	1488.00	124	50
SMN000042868	SEWERMAIN - VCRL - CESSNOCK D.A.	28,077	0	30/06/1947	1464.00	122	50

Figure 2: Extract from FAR – Civil Assets – Showing Typical Differences in Calculated Useful Life for Sewermains

1.4 Applied Useful Life v Standards- Civil

From a review of "Civil" items there were found to be 3 distinct groupings within the Calculated Asset Lives namely

1. >100 years useful life
2. 50-99 years useful life
3. <49 years useful life

The assets which have been provided with a Calculated Useful Life of 100 years or greater are generally aligned with both standards and industry practice, however there are number of assets which appear to have a larger than anticipated useful life. In the below extract is a typical example of such an instance where 120 year life is provided to what generally appear to be mechanical items and sewage pump station structures.

Asset Number	Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Dat	FAR Useful Li	LIFE YRS	Calculated Life Yrs
SPS283001002	NELSON BAY 2 SPS - GENERATOR CIVIL	22,880	0	1/12/2007	1440	120	120
SPS395001001	FERN BAY 2 SPS - CIVIL	639,995	0	1/12/2007	1440	120	120
SPS174001002	BLACKSMITHS 1 SPS - BASES/RISER PIPEWORK	61,478	0	1/11/2007	1440	120	120
SPS196001002	ELEEBANA 2 SPS - PEDESTAL BASES	26,292	0	1/11/2007	1440	120	120
SPS196001003	ELEEBANA 2 SPS - PEDESTALS & GUIDE RAILS	3,476	0	1/11/2007	1440	120	120
SPS020004005	NEWCASTLE 9 SPS - BUND WALL	26,968	0	31/07/2007	1440	120	120
SPS362001002	STOCKTON 4 SPS - COLLECTING CHAMBERS	150,657	0	1/07/2007	1440	120	120
SPS397001001	LOCHINVAR 1 SPS - CIVIL	954,011	0	1/07/2007	1440	120	120
SPS195001004	ELEEBANA 1 SPS - CIVIL UPGRADE	606,576	0	1/05/2007	1440	120	120
SPS251001003	WARNERS BAY 2 SPS - CIVIL	784,134	0	1/05/2007	1440	120	120
SPS252001002	WARNERS BAY 1 SPS - CIVIL UPGRADE	631,064	0	1/05/2007	1440	120	120
SPS007001004	MARYLAND 1 SPS - ROOF TIGER TAPE	3,179	0	14/01/2007	1440	120	120
SPS187001004	DUDLEY 2 SPS - SEWER VENT	14,800	0	14/01/2007	1440	120	120
SPS363001003	KOORAGANG 1 SPS - HATCH COVER	5,548	0	14/01/2007	1440	120	120
SPS388001001	KITCHENER 1 SPS - CIVIL WORKS	591,244	0	1/01/2007	1440	120	120
SPS389001001	KITCHENER 2 SPS - CIVIL WORKS	361,197	0	1/01/2007	1440	120	120
SPS394001001	FERN BAY 1 SPS - CIVIL	917,524	0	1/01/2007	1440	120	120
SPS342001002	MORISSET 7 SPS - AIR TIGHT HATCH COVER	3,684	0	21/12/2006	1440	120	120
SPS072001003	MAITLAND 3 SPS - AIR TIGHT HATCH COVER	7,356	0	19/12/2006	1440	120	120
SPS275001002	VALENTINE 3A - SPS - W/W HATCH COVER MOD	6,441	0	1/12/2006	1440	120	120
SPS021001003	NEWCASTLE 10 JESMOND - SEWER HATCH COVER	5,342	0	31/08/2006	1440	120	120
SPS098001002	RAY TCE 5 SPS - PEDESTALS & GUIDE RAILS	3,569	0	1/07/2006	1440	120	120
SPS017001002	NEWCASTLE 6 SPS - WICKHAM - HATCH COVER	9,156	0	30/06/2006	1440	120	120
SPS018001002	NEWCASTLE 7 SPS -MARYVILLE- HATCH COVER	9,058	0	30/06/2006	1440	120	120
SPS023001004	NORTH WALLSEND SPS - HATCH COVER	5,014	0	30/06/2006	1440	120	120
SPS171001002	BELMONT 6 SPS - CHAMBER SUBSTATION BUILD	156,569	0	30/06/2006	1440	120	120
SPS171001003	BELMONT 6 SPS - CIVIL UPGRADE WORKS	784,461	0	30/06/2006	1440	120	120
SPS240001002	VALENTINE 1 SPS - CIVIL UPGRADE WORKS	759,496	0	30/06/2006	1440	120	120
SPS240001003	VALENTINE 1 SPS - CHAMBER SUBSTATION BLD	145,595	0	30/06/2006	1440	120	120

Figure 3: Extract from FAR – Civil Assets – Showing 120 Year Life with Short Life Components

Similarly, assets with a 100 year life also contain similar shorter life components.

Asset Number	Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Dat	FAR Useful Li	LIFE YRS	Calculated Life Yrs
DTX002009004	THROSBY CRK - ANCHOR POINTS & STEP IRONS	1,500	0	1/07/2009	1200	100	100
DTX002009005	THROSBY CREEK - REHABILITATION WORKS	26,020	0	1/07/2009	1200	100	100
DTX002010001	THROSBY CREEK -REHABILITATION WORKS 2010	187,906	0	30/04/2010	1200	100	100
DWBMH033036B	WINDING CRK-MACQUARIE HILLS BRCH-BRIDGE	157,019	0	1/07/2000	1200	100	100
GEQ000004887	TOMAGO GENERATOR SHED - CONCRETE SLAB	5,894	0	31/03/2010	1200	100	100
SPS079001010	MAITLAND 9 SPS - EMERGENCY STORAGE	254,727	0	10/05/2012	1200	100	100
SPS209001003	RATHMINES 6 SPS - ACCESS ROAD	4,280	0	1/01/2011	1200	100	100
SPS211001004	BALMORAL 1 SPS - ACCESS ROAD	2,840	0	1/01/2011	1200	100	100
SPS232001002	WINDALE 1 SPS(BENNETTS GRN) EMRG STORAGE	190,491	0	15/07/2014	1200	100	100
SPS362001004	STOCKTON 4 SPS - GATES	5,947	0	1/11/2010	1200	100	100
STW000000001	EMERGENCY ASSEMBLY SIGNAGE ALL WWTW	2,502	0	1/01/2008	1200	100	100
STW000000002	DANGEROUS GOODS SIGNAGE ALL WWTW PLANTS	1,909	0	1/01/2008	1200	100	100
STW000000003	TRAFFIC SIGNS - VARIOUS WWTWS	5,612	0	1/01/2008	1200	100	100
STW001001004	BELMONT WWTW - SECURITY FENCE	14,760	0	1/10/2010	1200	100	100
STW001001005	BELMONT WWTW - BOUNDARY FENCE	12,260	0	1/05/2010	1200	100	100
STW001001006	BELMONT WWTW - SLUDGE CABLE LADDER	25,427	0	1/08/2010	1200	100	100
STW001001007	BELMONT WWTW - SAFETY SCREENS	8,023	0	1/06/2011	1200	100	100
STW001045018	BELMONT WWTW2008 - AERATION TANK A	220,441	0	30/06/2010	1200	100	100
STW001047004	BELMONT WWTW2008 - RAS PIPELINE DUPLIC'N	40,186	0	30/06/2010	1200	100	100
STW003001005	BOULDER BAY WWTW - FOUL WPS EARTHWORKS	106,954	0	27/10/2011	1200	100	100
STW003001006	BOULDER BAY WWTW-FOUL WPS CONCRETE WORKS	70,207	0	27/10/2011	1200	100	100
STW003001007	BOULDER BAY WWTW-REACTOR 1&2 EARTHWORKS	773,814	0	27/10/2011	1200	100	100
STW003001008	BOULDER BAY WWTW-REACTOR 1&2 CONCRETE	1,398,860	0	27/10/2011	1200	100	100
STW003001009	BOULDER BAY WWTW-REACTOR 1&2 METAL WORK	618,887	0	27/10/2011	1200	100	100
STW003001010	BOULDER BAY WWTW-RECLAIMED P/S EARTHWORK	220,540	0	27/10/2011	1200	100	100

Figure 4: Extract from FAR – Civil Assets – Showing 100 Year Life with Short Life Components

The frequency of low cost, low life civil and mechanical components is consistent throughout the register where asset life is calculated as greater than 50 years.

In the grouping where asset life is less than 50 years the extent by which typically mechanical items are represented as civil increases. The below example identifies such a grouping of mechanical pump and piping replacements and upgrades to HWCs existing bores, although the extent by which some of the cost may be assigned to refurbishment of bore casings is not clear.

Asset Number	Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Dat	FAR Useful Li	LIFE YRS	Calculated Life Yrs
WRS050001052	TOMAGO BORE STN 12 - REFURBISHMENT	51,322	0	1/11/2008	360	30	30
WRS050001053	BORE 2 REDEVELOPMENT CIVIL ANNA BAY	33,587	0	31/03/2009	360	30	30
WRS050001054	TOMAGO STN4 NO1 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001055	TOMAGO STN5 NO12 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001056	TOMAGO STN5 NO14 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001057	TOMAGO STN17 NO24 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001058	TOMAGO STN18 NO1 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001059	TOMAGO STN18 NO4 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001060	TOMAGO STN18 NO6 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001061	TOMAGO STN18 NO7 BOREWELL REPLACEMENT	103,663	0	30/11/2007	360	30	30
WRS050001062	ANNA BAY NO1 BOREWELL CAPACITY UPGRADE	273,240	0	30/11/2007	360	30	30
WRS050001063	ANNA BAY NO2 BOREWELL CAPACITY UPGRADE	273,240	0	30/11/2007	360	30	30
WRS050001064	ANNA BAY NO3 BOREWELL CAPACITY UPGRADE	273,240	0	30/11/2007	360	30	30
WRS050001065	ANNA BAY NO4 BOREWELL CAPACITY UPGRADE	273,240	0	30/11/2007	360	30	30
WRS050001066	ANNA BAY NO5 BOREWELL CAPACITY UPGRADE	273,240	0	30/11/2007	360	30	30
WRS050001067	ANNA BAY NO7 BOREWELL REPLACEMENT	273,240	0	30/11/2007	360	30	30
WRS050001068	ANNA BAY NO8 BOREWELL CAPACITY UPGRADE	273,240	0	30/11/2007	360	30	30
WRS050001069	TOMAGO NO4 STN NO1 PIPEWORK REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001070	TOMAGO NO5 STN NO12 BORE PIPEWORK REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001071	TOMAGO NO5 STN NO14 BORE PIPEWORK REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001072	TOMAGO NO17 STN NO24 BORE PIPE REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001073	TOMAGO NO18 STN NO1 BORE PIPEWORK REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001074	TOMAGO NO18 STN NO4 BORE PIPEWORK REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001075	TOMAGO NO18 STN NO6 BORE PIPEWORK REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001076	TOMAGO NO18 STN NO7 BORE PIPEWORK REPLCE	48,376	0	30/11/2007	360	30	30
WRS050001077	ANNA BAY NO1 BORE PUMP REPLCMT	283,638	0	30/11/2007	360	30	30
WRS050001078	ANNA BAY NO3 BORE PUMP REPLCMT	283,638	0	30/11/2007	360	30	30
WRS050001079	ANNA BAY NO4 BORE PUMP REPLCMT	283,638	0	30/11/2007	360	30	30
WRS050001080	ANNA BAY NO 2 BORE PUMP REPLCMNT	283,638	0	30/11/2007	360	30	30

Figure 5: Extract from FAR – Civil Assets – Showing 30 Year Life Typically Associated with Borehole Refurbishment

Similarly, the Civil category has a significant number of condition assessments and tests with a Useful life of 5 years. It is understood that these items are classified as equipment for the purposes of

calculation, however from this review it is unclear the extent that HWC can capitalise these activities which are often deemed as operational expenditure.

Asset Number	Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Dat	FAR Useful Li	LIFE YRS	Calculated Life Yrs
SPS021011003	NEWCASTLE 10 - COND ASSESS 2015	109,803	0	3/12/2015	60	5	5
SPS067001003	KURRI KURRI 3 SPS - COND ASSESS 2013	300	0	6/10/2013	60	5	5
SPS100001004	RAYMOND TERRACE 7 SPS - COND ASSESS 2014	3,465	0	28/01/2014	60	5	5
SPS107001004	N'BAY 9 SPS ACOUSTIC LEAKS 2016	16,377	0	22/09/2016	60	5	5
SPS164001003	BARNSLEY 1 SPS -SMOKE TESTING 2014	4,332	0	25/05/2014	60	5	5
SPS171011001	BELMONT 6 SPS - COND ASSESS 2014	1,500	0	15/05/2014	60	5	5
SPS174001003	BLACKSMITHS 1 SPS - CCTV 2015	3,940	0	24/05/2015	60	5	5
SPS176001004	BLACKSMITHS 3 SPS - CCTV 2016	35,929	0	13/04/2016	60	5	5
SPS185011001	CARDIFF 1 SPS - SS316 ERS COND ASSMNT 14	1,876	0	25/08/2014	60	5	5
SPS193001004	EDGEWORTH 1 SPS -SMOKE TESTING 2014	664	0	25/05/2014	60	5	5
SPS202001004	GARDEN SUBURB 1 SPS - SS316 ERS TRIAL 14	5,628	0	25/08/2014	60	5	5
SPS208001003	MARMONG PT 2 SPS - COND ASSESS 2014	14,889	0	28/01/2014	60	5	5
SPS213001003	SWANSEA 1 - CONDITION ASSESSMENT 2015	54,502	0	3/12/2015	60	5	5
SPS217001006	SWANSEA 5 SPS -SMOKE TESTING 2015	53,430	0	17/05/2015	60	5	5
SPS226001003	SWANSEA 14 SPS - SMOKETEST 2016	13,045	0	25/05/2016	60	5	5
SPS234001004	TORONTO 1 SPS - COND ASSESS 2013	525	0	6/10/2013	60	5	5
SPS254001002	WINDALE 1 -SMOKE TESTING 2015	439	0	17/05/2015	60	5	5
SPS254001003	WINDALE 1 -SMOKE TESTING 2016	1,708	0	12/09/2016	60	5	5
SPS255001004	WINDALE 2 SPS -SMOKE TESTING 2014	58,267	0	22/06/2014	60	5	5
SPS359011002	MEDOWIE 10 SPS - COND ASSESS 2014	49,349	0	18/03/2014	60	5	5
SPS359011003	MEDOWIE 10 SPS - COND ASSESS 2016	23,620	0	19/06/2016	60	5	5
SPS359011004	MEDOWIE 10 SPS -SMOKE TESTING 2016	624	0	5/05/2016	60	5	5
SPS393001003	WALLSEND 1 SPS - COND ASSESS 2014	24,766	0	28/01/2014	60	5	5
SPS457001001	MARYLAND 4 SPS - COND ASSESS 2014	4,042	0	28/01/2014	60	5	5
STW000000016	COND'N ASSESSMENT - VAR WWTW INLET WKS	21,815	0	26/02/2014	60	5	5
STW000000017	COND'N ASSESSMENT - VARIOUS WWTW'S	64,341	0	26/02/2014	60	5	5
STW000000018	WWTW - CONDITION ASSESSMENT	33,761	0	30/06/2014	60	5	5
STW005001038	BURWOOD BEACH WWTW - COND/ASS FLAGGY CK	29,063	0	28/01/2014	60	5	5
STW005001039	BURWOOD BEACH WWTW - SMOKE TESTING 2014	2,474	0	15/05/2014	60	5	5

Figure 6: Extract from FAR – Civil Assets – Showing 5 Year Useful Life for Condition Assessments, CCTV Surveys etc

1.5 Applied Useful Life v Standards -Sewer mains

The total GRC for Sewer mains is $2,432M and comprises a significant component of the asset register with approximately 24,500 entries.

On review the assets are mainly comprised of sewer gravity main with less than 700 of those assets with a total GRC of less than $26M assigned as other components.

Of the gravity assets, these generally comprise of gravity sewers and manholes. Sewers are identified as either pipe or relined.

The Sewermains were found to generally follow the similar 3 broad groupings identified for the broader civil works in relation to commonalties in asset age as described above.

As would be expected for network sewer assets Useful lives for this group are predominantly greater than or equal to 100 years with to a total GRC of approximately $1.9Bn. This aligns with expectations and industry design life standards.

The intermediate group of assets have a useful life which typically ranges from 65-85 years. These form a large component of the older assets and are generally denoted as a relining. In most instances manufacturers of Cure in Place Pipe (CIPP) liners will advise their products can last for 50 years however it is recognized that their useful life may be extended beyond this horizon.

In this sub-category for assets which have been identified as having a design life of less than 50 years, there are number of instrumentation and mechanical items which may have been incorrectly categorized. The extract below shows the bulk of items below 50 year useful are either mechanical in nature.

Asset Numb	Asset Description	GRC (not indexe	GRC Residual (not index	FAR Capital Date	FAR Useful L	Useful Life Yrs	Calculated Life (yrs)
SPS005002003	VARIABLE SPEED DRIVE PUMP3 BURWOOD BCH	9,705	0	29/11/2004	420.00	35	35
SPS122002003	FINGAL BAY 1 SPS-MECH-SUMP PUMP	5,756	0	13/02/2002	420.00	35	35
STW016012001	RAYMOND TERRACE WWTW INTERNAL FENCING	1,997	0	2/07/2003	420.00	35	35
SPS000007588	INSTALL FLOAT SWITCHES AT 53 DIFF SPS	39,171	0	1/06/2005	360.00	30	30
SPS013001002	COTTAGE CREEK OVERFLOW VALVE NEW NO 1SPS	105,220	0	1/07/2004	360.00	30	30
SMN000007617	DORA CREEK - VACUUM CONTROL VALVES	39,070	0	1/12/2006	360.00	30	30
SMN000007624	DORA CREEK -AIRVAC AV3-E VACUUM VALVES	24,492	0	1/01/2007	360.00	30	30
SMN000007625	DORA CREEK -AIRVAC VACUUM CONTROLLERS	9,297	0	1/01/2007	360.00	30	30
SPS363003003	KOORAGANG 1 SPS - GENERATOR CON' POINT	130,326	0	1/05/2011	360.00	30	30
SPS215004002	SWANSEA 3 SPS - REPLACE VSD FOR PUMP 1	30,055	0	1/06/2005	360.00	30	30
SPS048002003	METFORD 2 SPS - PUMP 2 REPLACEMENT	24,907	0	2/07/2003	300.00	25	25
SPS069002002	LARGS 2 SPS - MECH - REPLACE PUMP 2	10,437	0	2/07/2003	300.00	25	25
SPS104002002	ANNA BAY 1 SPS - PUMP 2 FLYGT	1,463	0	1/07/2004	300.00	25	25
SPS147005001	SALAMANDER BAY 15 SPS - DUCKBILL VALVE	779	0	1/06/2005	300.00	25	25
SPS174005001	BLACKSMITHS 1 SPS - PUMP REPLACE 1999	17,104	0	1/07/2004	300.00	25	25
SPS313004002	WATER PRESSURE MONITORING POINTS	1,320	0	28/06/2006	300.00	25	25
SPS072006001	MAITLAND 3 SPS - LOG RETAINING WALL	8,301	0	1/07/2004	240.00	20	20
STW008013003	EDGEWORTH WWTW - REPLACE RAS PUMP 1	23,535	0	26/02/2004	240.00	20	20
STW008013004	EDGEWORTH WWTW - REPLACE RAS PUMP 4	23,535	0	26/02/2004	240.00	20	20
STW017008003	SHORTLAND WWTW REPL CHLORINE PUMPS 1 & 2	2,792	0	2/07/2003	240.00	20	20
STW021008001	TORONTO WWTW - MECH - AERATOR REPLACEMNT	9,768	0	2/07/2003	240.00	20	20
STW005040001	BURWOOD BEACH WWTW- TURBIDITY METER	8,960	0	1/07/2004	204.00	17	17
SPS021002003	NEWCASTLE 10 JESMOND - PUMP MOTOR CONTRO	47,519	0	29/11/2004	180.00	15	15
SMN000007656	SWANSEA 3A RISING MAIN - CHANNEL FENDERS	13,100	0	14/01/2007	180.00	15	15
SMN000007776	PARTI-MAG GRAVITY FLOW METER - HMRI	1	0	12/06/2012	180.00	15	15
SMN000007821	LOCHINVAR PRESSURE UNITS	45,000	0	1/10/2015	180.00	15	15
SMN000007822	MILLFIELD PRESSURE UNITS	15,343	0	1/10/2015	180.00	15	15
SMN000007823	MILLFIELD PRESSURE UNITS	15,343	0	1/10/2015	180.00	15	15
SMN000007824	MILLFIELD PRESSURE UNITS	41,516	0	1/10/2015	180.00	15	15
SPS008004003	WATER PRESSURE MONITORING POINTS	1,895	0	28/06/2006	180.00	15	15
SPS013004003	WATER PRESSURE MONITORING POINTS	2,182	0	28/06/2006	180.00	15	15
SPS171004003	WATER PRESSURE MONITORING POINTS	4,530	0	28/06/2006	180.00	15	15
SPS209004001	WATER PRESSURE MONITORING POINTS	10,977	0	28/06/2006	180.00	15	15
SPS228004002	WATER PRESSURE MONITORING POINTS	1,619	0	28/06/2006	180.00	15	15
SPS250004001	WATER PRESSURE MONITORING POINTS	50,000	0	28/06/2006	180.00	15	15
SPS269004001	WATER PRESSURE MONITORING POINTS	50,000	0	28/06/2006	180.00	15	15
SPS289004001	WATER PRESSURE MONITORING POINTS	50,000	0	28/06/2006	180.00	15	15

Figure 7: Extract from FAR –Sewermains – Showing Assets <50 Year Life Typically Associated with Mechanical Equipment

1.6 Applied Useful Life v Standards-Watermains

The total GRC for Watermains is $1,481M and comprises a significant component of the asset register with approximately 11,780 entries.

Unlike other civil components Water Mains appear to have 2 asset useful life groups namely

1. >100 years useful life
2. <30 years useful life

In general terms over 95% of the watermains had a useful life of 100 years which is aligned to expectations and standards. Only 136 in-ground pipe items were found to have lower than 100 years applied useful life with 80 years being typical for this small group.

There are few assets which have less than an 80 year life, these generally comprise of mechanical components e.g. valves where a useful life of 20-30yrs is provided; or condition and leakage monitoring programmes, which although classified as equipment for the purposes of calculation, the ability of which to capitalise is to be determined.

Items with less than 30 years were generally found to be valves, hydrants and other mechanical items which is within expectations.

Asset Number	Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Date	FAR Useful Li	FAR Useful Li	Calculated Life (Yrs)
WMN000008038	RENEW GALV SERVICES 00/01-IN ROAD	535,266	0	1/07/2001	960	80	30
WMN000008044	RENEW GALV SERVICES 01/02-NO ROAD CROSS	266,889	0	1/07/2002	960	80	30
WMN000008045	RENEW GALV SERVICES 01/02-ROAD CROSS	287,130	0	1/07/2002	960	80	30
WMN000008046	RENEW GALV SERVICES 01/02-IN ROAD CROSS	597,870	0	1/07/2002	960	80	30
WMN000008057	RENEW GALV SERVICES 02/03-NO ROAD CROSS	226,476	0	20/11/2003	960	80	30
WMN000008058	RENEW GALV SERVICES 02/03-ROAD CROSS	292,919	0	20/11/2003	960	80	30
WMN000008059	RENEW GALV SERVICES 02/03-IN ROAD CROSS	477,766	0	20/11/2003	960	80	30
WMN000008084	RENEW GALV SERVICES 03/04-NO ROAD CROSS	116,441	0	1/07/2004	960	80	30
WMN000008085	RENEW GALV SERVICES 03/04-ROAD CROSS	188,504	0	1/07/2004	960	80	30
WMN000008086	RENEW GALV SERVICES 03/04-IN ROAD	256,209	0	1/07/2004	960	80	30
WMN000008087	STOCKTON BRIDGE W/MAIN SUPPORTS	584,494	0	1/07/2004	756	63	30
WMN000008097	PRV INSTALLATION - SOUTH ST WINDALE	43,263	0	15/06/2006	600	50	30
WMN000008129	PRV INSTALLATION DUNBLANE CL NEW LAMBTON	60,911	0	1/07/2008	600	50	30
WMN000008094	TINGIRA HTS - REPLACEMENT PRV	4,008	0	1/06/2005	600	50	30
WRT047003001	NTH ROTHBURY RESERVOIR - REPLACE AIV	19,893	0	12/01/2005	600	50	30
WRT072001008	SALAMANDER RESERVOIR - ALUM PRV	7,963	0	12/01/2005	600	50	30
WRT101003001	MOUNT HUTTON RES-MECH-AIV REPLACEMENT	9,466	0	6/07/2000	600	50	30
WMN000008101	INSERTION OF WATER VALVES 04/05 (100MM)	86,404	0	1/07/2006	599	49.91666667	30
WMN000008102	INSERTION OF WATER VALVES 04/05 (80MM)	32,401	0	1/07/2006	599	49.91666667	30
WMN000008104	INSERTION OF WATER VALVES 04/05 (150MM)	18,120	0	1/07/2006	599	49.91666667	30
WMN000008105	INSERTION OF WATER VALVES 04/05 (200MM)	29,919	0	1/07/2006	599	49.91666667	30
WMN000008107	INSERTION OF WATER VALVES 04/05 300MM)	14,831	0	1/07/2006	599	49.91666667	30
WMN000008108	INSERTION OF WATER VALVES 04/05 (375MM)	12,918	0	1/07/2006	599	49.91666667	30
WMN000008176	VALVE REPLACEMENT / INSERTION 2011/12	450,657	0	1/07/2012	360	30	30
WMN000008236	VALVE REPLACEMENTS - VARIOUS AREAS	594,596	0	30/06/2013	360	30	30
WMN000008237	STOP VALVE REPLACEMENTS VARIOUS	170,343	0	27/04/2011	360	30	30
WMN000008238	AIR VALVES VARIOUS	4,199	0	1/04/2013	360	30	30
WMN000008239	VALVE REPLACEMENTS VARIOUS	79,190	0	1/04/2013	360	30	30
WMN000008240	HYDRANT CONTROL VALVE REPLACEMENT	10,629	0	1/04/2013	360	30	30

Asset Number	Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Date	FAR Useful Li	FAR Useful Li	Calculated Life (Yrs)
WMN000008116	AUTO FLUSHING DEVICE - MAYFIELD	2,257	0	1/04/2007	180	15	15
WMN000008117	AUTO FLUSHING DEVICE - SALAMANDER	2,256	0	1/04/2007	180	15	15
WMN000008179	LEAK DETECTION SURVEY - EAST LAKE MACQ	118,230	0	12/06/2012	180	15	15
WMN000010934	CHICHESTER - CTGM - HUNTER RIVER TUNNEL	3,759	0	1/07/2008	120	10	10
WRS040003002	LEMON TREE PASSAGE-BORES-TELEMETRY	22,898	0	16/02/2002	120	10	10
WRS331001003	NTH STOCKTON - AQUIFER PIEZOMETERS	28,674	0	1/07/1999	120	10	10
WMN000008180	CONDITION ASSESSMENT - BELMONT	328,461	0	1/07/2013	60	5	5
WMN000008181	CONDITION ASSESSMENT - RAYMOND TERRACE	155,875	0	1/07/2013	60	5	5
WMN000008182	CONDITION ASSESSMENT - MAYFIELD	227,200	0	1/07/2013	60	5	5
WMN000008183	CONDITION ASSESSMENT - WARATAH STH	255,587	0	1/07/2013	60	5	5
WMN000008222	CCTV INSPECTION - FENNELL BAY BRIDGE	11,549	0	30/06/2014	60	5	5
WMN000008223	CONDITION ASSESSMENT - ABERMAIN - PAXTON	305,204	0	30/06/2014	60	5	5
WMN000008224	CONDITION ASSESSMENT - RUTHERFORD-GRETA	206,662	0	30/06/2014	60	5	5
WMN000008225	TRUNKMAIN CONDITION ASSESSMENT DATABASE	22,448	0	30/06/2014	60	5	5
WMN000008226	CONDITION ASSESSMENT - TRUNKMAIN FMEA'S	106,560	0	30/06/2014	60	5	5
WMN000008227	CONDITION ASSESSMENT - CP SYSTEMS	35,504	0	30/06/2014	60	5	5
WMN000008228	CONDITION ASSESSMENT - SOIL SAMPLING	3,429	0	30/06/2014	60	5	5
WMN000008229	CONDITION ASSESS - WALLSEND-NTH LAMBTON	91,826	0	30/06/2014	60	5	5
WMN000008230	CONDITION ASSESSMENT - TRUNKMAINS	191,101	0	30/06/2014	60	5	5
WMN000008231	CONDITION ASSESS - WALLSEND-NTH LAMBTON	66,119	0	30/06/2014	60	5	5
WMN000008232	ADHOC PIPELINE CONDITION ASSESSMENT	8,356	0	30/06/2014	60	5	5
WMN000008233	TRANSIENT PRESSURE MONITORING E'LAKE	10,941	0	30/06/2014	60	5	5

Figure 8: Extract from FAR –Watermains – Showing Assets <80 Year Life Typically Associated with Valves and Condition Assessments

1.7 Applied Useful Life v Standards - Buildings

There are 211 entries identified as buildings, 49 of those are identified as having a useful life beyond 60 years. Typical examples shown below include Cessnock &, Chicester Cottages, public toilets and amenity buildings all with useful lives of 80 years.

It is also observed below, that the Building entries with a useful life of 80 years include assets arising from renovations which include split system air conditioning, carpets, gutter screens, all of which typically have much lower design lives, usually 25 years at the most.

Asset Description	GRC (not indexed	GRC Residual (not indexed	FAR Capital Date	FAR Useful Life	
FARLEY WWTW - MCC - STRUCTURE	180339	0	1/10/2010	1200	100
CHI/STER DAM - AUTOMATION CIPOLLETI WEIR	21208.72	0	1/07/2004	1200	100
LOWER PICNIC AREA CHICHESTER-FACILITIES	85,222.00	0	30/06/1935	1104	92
CESSNOCK-COTTAGE-GOVT RD (BK 123M2)	246,000.00	0	30/06/1934	1080	90
TARRO WPS - (NIS) HERITAGE BUILDING	1,097,495.00	0	30/06/1931	1080	90
G/TOWN CTGE FINNAN DRIVE-FENCING	0	0	13/11/2001	960	80
TOMAGO TRG CTR-REPLACE TIMBER ARCHITRAVE	0	0	1/07/2002	960	80
TOMAGO TRG CTR - GUTTER LEAF SCREEN	0	0	1/07/2002	960	80
TOMAGO WORKSHOP OFFICE CARPET	0	0	15/06/2006	960	80
CHICHESTER NO 1 COTTAGE - RENOVATION	0	0	1/05/2008	960	80
CHICHESTER NO 1 COTTAGE - SPLIT SYS A/C	0	0	1/05/2008	960	80
CHICHESTER NO 1 COTTAGE - BLINDS	0	0	1/05/2008	960	80
CHICHESTER NO 1 COTTAGE - FLOOR COVERING	0	0	1/05/2008	960	80
GRAHAMSTOWN RANGERS COTTAGE - REFURBISHM	0	0	15/06/2006	960	80
TOMAGO OFFICE REFURBISHMENT - RANGERS	0	0	1/11/2008	960	80
TOMAGO W/R AMENITIES - AIR CONDITIONER	0	0	1/07/2008	960	80
DUNCAN PK & LOWER PIC AREA-LADIES(29.9M2	114,000.00	0	30/06/1968	960	80
DUNCAN PK & LOWER PIC AREA-MENS(29.9M2)	114,000.00	0	30/06/1968	960	80
DUNCAN PK & LOWER PIC AREA-LADIES(28M2)	112,000.00	0	30/06/1936	960	80
CESSNOCK-GARAGE-GOVT RD-GARAGE (40M2)	28,000.00	0	30/06/1934	960	80
CHICHESTER DAM-NO 1 QUARTERS (W/B 162M2)	388,800.00	0	30/06/1953	960	80
CHICHESTER DAM-CARETAKERS COTTAGE W/B	321,600.00	0	30/06/1953	960	80
CHICHESTER DAM-COTTAGE (FIBRO/GI 133M2)	332,500.00	0	30/06/1953	960	80
CHICHESTER DAM-COTTAGE (W/B 105M2)	262,500.00	0	30/06/1953	960	80
LAMBTON-LOOKOUT RES-BRICK BUILDING(8M2)	5,000.00	0	30/06/1970	720	60
SUGARLOAF-BRICK BUILDING-RELAY STN	30,172.00	0	30/06/1992	720	60
NORTH LAMBTON DEPOT-AMEN & OFFICE(289M2)	505,237.00	0	30/06/1987	720	60
NORTH LAMBTON DEPOT - ROADWAY (4500M2)	500,000.00	0	30/06/1987	720	60
NORTH LAMBTON DEPOT - STORAGE BINS (8)	82,000.00	0	30/06/1987	720	60
CESSNOCK DEPOT-STORAGE BINS (4)	42,000.00	0	30/06/1982	720	60
CESSNOCK DEPOT-STORAGE BINS (3)	6,800.00	0	30/06/1952	720	60
DUNCAN PARK-FACILITIES	165,000.00	0	30/06/1967	720	60
LOWER PICNIC AREA CHI-12 SEATING FACIL	-	0	1/10/1997	720	60
BALICKERA PS PARK-FACILITIES	35,000.00	0	30/06/1965	720	60
FINNAN PARK-SHELTER	52,000.00	0	30/06/1965	720	60
FINNAN PARK-SHELTER	55,000.00	0	30/06/1965	720	60
FINNAN PARK-FACILITIES	345,000.00	0	30/06/1965	720	60
TORONTO OVAL-AMENITIES(22.8M2)	69,000.00	0	30/06/1967	720	60
TORONTO OVAL-PLAYERS' SHED(86.6M2)	87,000.00	0	30/06/1967	720	60
TARRO DEPOT-STORE & GARAGE (163M2)	73,350.00	0	30/06/1963	720	60
TARRO DEPOT-AMENITIES (113M2)	248,600.00	0	30/06/1980	720	60
TOMAGO DEPOT/STORE AMENITIES-167M2	501,000.00	0	30/06/1960	720	60
DORA CREEK WWTW-AMENITIES BLD-MORISSET	630,428.00	0	30/06/1995	720	60
BALICKERA DEPOT-STORAGE BINS 2	13,558.65	0	30/06/1958	720	60
GRAHAMSTOWN WKS BLD-FINNAN PARK SUB STN	145,664.65	0	30/06/1965	720	60

Figure 9: Extract from FAR –Buildings – Showing Assets <80 Year Life Including Low Design Life Components

Of the 211 entries 82 of have been identified as having a useful life of less than 50 years, 15 of which are below 20 years. It is noted that most of these items relate to fencing. With AS2312.1 and 1725.1 indicating that typical fencing coats last from 5-25 years a useful life greater than 20 years may be difficult to achieve.

The Balickera Depot Office building is noted only to have a useful live of 13 years which seem unusually low however it is noted that it carries a zero GRC.

1.8 Applied Useful Life v Standards - Recycled

Only 3 entries are classed as recycled water once retired assets and non HWC Capital assets are removed. Calculated useful lives range between 80 to 100 years which is typical for assets of this type. These assets are excluded from the RAB and do not form part of the assessment of economic life.

2 Mechanical

2.1 General Overview of Category

The items identified with a FAR depreciation classification of "Mechanical" were captured, providing 3228 entries after entries associated with retired and non-HWC Capital funded assets were removed.

The Mechanical Category was found to contain a number of assets, predominantly:

- Waste Water Treatment Works Assets
- Sewer Pumping Station Assets
- Water Pumping Station Assets
- Water Treatment Works Assets
- WatStn/Sbed/BHole Assets

The total GRC for these items is $271M

On review of the descriptions against these items the Mechanical assets also included:

- Building Assets
- Dam Assets
- General Equipment
- Sewer Main Assets
- Vehicles and Plant
- Water Storage Assets
- Water Main assets
- Waterway Structure Assets
- Weir Assets

Other items noted included:

- Condition Assessments
- Chlorinators
- Tools and Working Plant

These items contribute $5.8M to the total GRC for the Mechanical items,

2.2 Referred Standards

Advisian consulted a number of standards and practices adopted by water supply authorities in Australia, these included

- Water Services Association of Australia
- Specifications from Water Corporation, Unitywater and Water Supply Authorities and Councils

2.3 Applied Useful Life

On review of the supplied data a comparison of the FAR Useful life was initially undertaken against the Calculated Useful life. The Calculated Useful Life was predominantly the same as the FAR Useful Life. Where there was a reduction in Useful Life, it was applied to ageing assets constructed prior to June 2000 and the majority prior to 1980. The reductions applied appear to generally correct the FAR Useful Life, which may be inappropriately high e.g. a 100 year life on pumps (reduced to 30 years) and brings the life into line with industry norms. A small number of assets (predominantly those constructed since 2000) have had an increase applied to the Calculated Useful Life. This applies, generally appears to correct a FAR Useful life that is below industry norms.

There were 24 Assets with a Useful Life of 5 years or less, totalling $1.1M.

- The largest of these was a Sugar Dosing System, Valued at $865k, with a useful life of 4 years. This should be clarified.
- The remainder were predominantly Condition Assessments, with a useful life of 5 years. The ability to capitalise these should be determined.

2.4 Waste Water Treatment Works Assets

The total GRC for Waste Water Treatment Works Assets is $187M (approximately 67% of the Mechanical asset register) in 779 entries.

Calculated Useful Lives match FAR Useful Lives in all cases. Useful lives are predominantly in the range 20-30 years, which is consistent with industry norms, however there are many (128 listed assets) with a 17 year life, accounting for $45M. There does not appear to be any mis-allocated items.

2.5 Sewer Pumping Station Assets

The total GRC for Sewer Pumping Station Assets is $40M (approximately 14% of the Mechanical asset register) in 1455 entries.

Calculated Useful Lives match FAR Useful Lives in all but 11 cases. These all appear to bring the useful life in line with industry norms. Useful lives are predominantly in the range 20 to 30 years, with chemical dosing systems at 15 years. 25 assets, with a GRC of $726k have a useful life of 50 years or greater. The majority of these were installed before 1960. There does not appear to be any mis-allocated items.

2.6 Water Pumping Station Assets

The total GRC for Water Pumping Station Assets is $20M (approximately 7% of the Mechanical asset register) in 1455 entries.

Most assets in this category have had their useful lives adjusted, with roughly equal numbers adjusted up and down. They generally appear to bring the useful life in line with industry norms. Useful lives are predominantly in the range 20 to 30 years. 25 Assets, with a GRC of $624k have a useful life of 50 years or greater. These were all installed in 1970 or before. There does not appear to be any mis-allocated items.

2.7 Water Treatment Works Assets

The total GRC for Water Treatment Works Assets is $12M (approximately 4% of the Mechanical asset register) in 291 entries.

Calculated Useful Lives match FAR Useful Lives in all cases. Useful lives are predominantly in the range 20 to 30 years. 8 Assets, with a GRC of $224k have a useful life of 50 years or greater. They include sedimentation tanks; filtration equipment and pit covers. There does not appear to be any mis-allocated items.

2.8 WatStn/Sbed/BHole Assets

The total GRC for WatStn/Sbed/BHole Assets is $5.7M (approximately 2% of the Mechanical asset register) in 123 entries.

Calculated Useful Lives match FAR Useful Lives in all cases and are predominantly in the range 20 to 30 years. There does not appear to be any mis-allocated items.

3 Equipment – I&C and Telemetry

3.1 General Overview of Category

The items identified with a FAR depreciation classification of I&C and Telemetry were captured, providing 2,573 entries after entries associated with retired and non-HWC Capital funded assets were removed.

The I&C and Telemetry Category was found to contain predominantly

- Telemetry and Telecommunications Assets
- Instrumentation
- Control Systems

3.2 Methodology

- Completed aggregate analysis using Microsoft excel
- The data has been grouped and analysed as per the following 3 categories.
    - Telemetry systems
    - Instrumentation
    - Control systems
- Design life analysis has been generally based on previous design life studies performed by Worley and industry best practice

3.3 Assumptions

Where equipment has been generically identified, we have assumed the design life of that equipment.

The FAR Useful Life and Calculated Useful Life are determined numbers from the initial installation

3.4 Applied Useful Life V's Industry Best Practice

On review of the supplied data a comparison of the FAR Useful life was initially undertaken against the Calculated Useful life. It was found that the Calculated Useful Life was predominantly the same as the FAR Useful Life with only a few anomalies were observed.

There were found to be 3 distinct groupings within the Calculated Asset Lives namely

- >21 years useful life
- 10-20 years useful life
- <10 years useful life

3.4.1 Telemetry System

The Telemetry equipment which have useful lives of 10-15 years are generally aligned with industry best practice, however there are number of assets which appear to have a larger or very much lower than anticipated useful life. In the below extract is a typical example of such an instance where 7-94 years life is provided to general Telemetry items.

1	Asset Number	Asset Description	FAR Useful Life	Calculated Useful Lif	FAR Useful life YR	Calculated Useful life YRS
78	STW003004003	BOULDER BAY WWTW-RECLAIMED P/S TELEM	300	300	25	25
79	STW008015007	EDGEWORTH WWTW - AERATION TELEMETRY 2010	300	300	25	25
89	STW016004002	R'TERRACE WWTW - TELEMETRY UPGRADES 2010	300	300	25	25
95	STW088084002	DORA CK WWTW -INLET WKS - TELEM ITEMS	300	300	25	25
127	GEQ000004295	TOMAGO E/L WS - TELEMETRY TOWER	240	240	20	20
133	STW014020004	MORPETH WWTW - TELEMETRY	240	240	20	20
1565	WPS002004002	LAMBTON WPS NCLE/CRDCE RD-TELEM (2001)	300	236	25	19.66666667
1566	WPS008004002	MEREWETHER WPS-CHARLOTTE ST-REPL TELEM	300	242	25	20.16666667
1567	WPS019005003	WINDELLA DOWNS WPS - PUMP 3 TELEM	960	194	80	16.16666667
1568	WPS020004003	BELLBIRD WPS - REPLACE WORMALD TELEMETRY	732	242	61	20.16666667
1569	WPS021004001	BOLWARRA WPS-TELEMETRY	1200	243	100	20.25
1571	WPS024004005	HEDDON GRETA BOOSTER WPS-TELEM UPGRADE	1200	240	100	20
1573	WPS031007001	POKOLBIN NO1A WPS - ALLANDALE RD - TELEM	180	200	15	16.66666667
1574	WPS033004001	RAYMOND TCE WPS-IRRAWANG ST-TELE-VSDRIVE	480	238	40	19.83333333
1575	WPS034004003	RUTHERFORD WPS-TELEM-PRESSURE MONITORING	180	222	15	18.5
1577	WPS035004001	TENAMBIT WPS-MAIZE ST-TELEM-PRESS MONIT	180	222	15	18.5
1578	WPS035008001	EAST MAITLAND WPS - NARANG ST - TELEM	180	200	15	16.66666667
1585	WPS050004002	CARDIFF WPS-MURRAY RD-TELEM-PRESS MONIT	180	222	15	18.5
1589	WPS058004002	DUDLEY WPS-DUDLEY RD-TELEM-PRESS MONIT	180	222	15	18.5
1594	WPS074004005	WEST CESSNOCK WPS-TELEM-PRESSURE MONITOR	180	222	15	18.5
1595	WPS078004002	SPEERS POINT BOOSTER WPS-TELEM-PRESS MON	180	222	15	18.5
1599	WPS083004001	CAMERON PARK 1 WPS - TELEMETRY	180	222	15	18.5
1601	WPS085004001	WILLIAMTOWN 2 WPS - TELEMETRY	180	219	15	18.25
1602	WPS086004001	BOBS FARM 1 WPS - TELEMETRY	180	219	15	18.25
1603	WPS087004001	TOMAGO FLOW METER - TELEMETRY	180	219	15	18.25
1604	WPS088004001	SALAMANDER FLOW METER - TELEMETRY	180	219	15	18.25
1605	WPS089004001	WILLIAMTOWN 1A WPS - TELEMETRY	180	219	15	18.25
1609	WPS093001005	SWANSEA HEADS WPS 1 TELEM	180	212	15	17.66666667
1664	WRT051004001	RUTHERFORD RESERVOIR - TELEMETRY	180	224	15	18.66666667
1670	WRT091002002	DORA CK RESERVIOR TELEMETRY	348	207	29	17.25
1749	SPS058004001	CLIFTLEIGH 1 SPS-TELEMETRY-CON LSE	240	240	20	20
1858	SPS178005001	PELICAN 2 SPS-TELEMETRY	204	204	17	17
1866	SPS188004001	DUDLEY 3 SPS-TELEMETRY	228	228	19	19
1888	SPS213004001	SWANSEA 1 SPS TELEMETRY	240	240	20	20
1889	SPS214004001	SWANSEA 2 SPS TELEMETRY	240	240	20	20
1906	SPS231004001	TERALBA 1 SPS TELEMETRY	204	204	17	17
1918	SPS251004001	WARNERS BAY 2 SPS - TELEMETRY	204	204	17	17
1990	WCL004004001	WATER CHLORIN UNIT-BUTTAI-TELEMETRY	1128	1128	94	94
1991	WCL005004001	WATER CHLORIN UNIT - CARDIFF - TELEMETRY	324	324	27	27
1992	WCL006004001	WATER CHLORIN UNIT - TORONTO - TELEMETRY	684	684	57	57
1993	WCL007004001	CHLORINATOR - TELEM - NTH LAMBTON	684	684	57	57
1994	WMN004003001	CHICHESTER - CTGM - TELEMETRY	1080	1080	90	90
1996	WPS002005001	LAMBTON WPS FLOW METER - TELEMETRY	600	344	50	28.66666667
1998	WPS004004001	MAYFIELD WPS-BULL ST.-TELEMETRY	552	254	46	21.16666667
1999	WPS005003004	CHICHESTER-BERESFIELD PS - TELEMETRY	300	300	25	25

1	Asset Number	Asset Description	FAR Useful Life	Calculated Useful Lif	FAR Useful life YR	Calculated Useful life YRS
78	STW003004003	BOULDER BAY WWTW-RECLAIMED P/S TELEM	300	300	25	25
79	STW008015007	EDGEWORTH WWTW - AERATION TELEMETRY 2010	300	300	25	25
89	STW016004002	R'TERRACE WWTW - TELEMETRY UPGRADES 2010	300	300	25	25
95	STW088084002	DORA CK WWTW -INLET WKS - TELEM ITEMS	300	300	25	25
127	GEQ000004295	TOMAGO E/L WS - TELEMETRY TOWER	240	240	20	20
133	STW014020004	MORPETH WWTW - TELEMETRY	240	240	20	20
1565	WPS002004002	LAMBTON WPS NCLE/CRDCE RD-TELEM (2001)	300	236	25	19.66666667
1566	WPS008004002	MEREWETHER WPS-CHARLOTTE ST-REPL TELEM	300	242	25	20.16666667
1567	WPS019005003	WINDELLA DOWNS WPS - PUMP 3 TELEM	960	194	80	16.16666667
1568	WPS020004003	BELLBIRD WPS - REPLACE WORMALD TELEMETRY	732	242	61	20.16666667
1569	WPS021004001	BOLWARRA WPS-TELEMETRY	1200	243	100	20.25
1571	WPS024004005	HEDDON GRETA BOOSTER WPS-TELEM UPGRADE	1200	240	100	20
1573	WPS031007001	POKOLBIN NO1A WPS - ALLANDALE RD - TELEM	180	200	15	16.66666667
1574	WPS033004001	RAYMOND TCE WPS-IRRAWANG ST-TELE-VSDRIVE	480	238	40	19.83333333
1575	WPS034004003	RUTHERFORD WPS-TELEM-PRESSURE MONITORING	180	222	15	18.5
1577	WPS035004001	TENAMBIT WPS-MAIZE ST-TELEM-PRESS MONIT	180	222	15	18.5
1578	WPS035008001	EAST MAITLAND WPS - NARANG ST - TELEM	180	200	15	16.66666667
1585	WPS050004002	CARDIFF WPS-MURRAY RD-TELEM-PRESS MONIT	180	222	15	18.5
1589	WPS058004002	DUDLEY WPS-DUDLEY RD-TELEM-PRESS MONIT	180	222	15	18.5
1594	WPS074004005	WEST CESSNOCK WPS-TELEM-PRESSURE MONITOR	180	222	15	18.5
1595	WPS078004002	SPEERS POINT BOOSTER WPS-TELEM-PRESS MON	180	222	15	18.5
1599	WPS083004001	CAMERON PARK 1 WPS - TELEMETRY	180	222	15	18.5
1601	WPS085004001	WILLIAMTOWN 2 WPS - TELEMETRY	180	219	15	18.25
1602	WPS086004001	BOBS FARM 1 WPS - TELEMETRY	180	219	15	18.25
1603	WPS087004001	TOMAGO FLOW METER - TELEMETRY	180	219	15	18.25
1604	WPS088004001	SALAMANDER FLOW METER - TELEMETRY	180	219	15	18.25
1605	WPS089004001	WILLIAMTOWN 1A WPS - TELEMETRY	180	219	15	18.25
1609	WPS093001005	SWANSEA HEADS WPS 1 TELEM	180	212	15	17.66666667
1664	WRT051004001	RUTHERFORD RESERVOIR - TELEMETRY	180	224	15	18.66666667
1670	WRT091002002	DORA CK RESERVIOR TELEMETRY	348	207	29	17.25
1749	SPS058004001	CLIFTLEIGH 1 SPS-TELEMETRY-CON LSE	240	240	20	20
1858	SPS178005001	PELICAN 2 SPS-TELEMETRY	204	204	17	17

Figure 10: Extract from FAR –Telemetry – Typical Assets

It is expected that, due to equipment obsolescence, Telemetry system will require replacement approximately every 6-10 years.

For telemetry equipment, the evaluation of the FAR Useful Life has identified two key findings:

- There are significant discrepancies between the FAR Useful life and the Calculated Useful Life in a few instances
- Where minor variations between the Calculated and FAR Useful Life values exist, the FAR Useful Life values are typically in line with industry best practice. However, those assets where when compared with Calculated Useful Life is significantly different, e.g. a variances of 10+ years, the Calculated Useful Life is more aligned to expectations.

3.4.2 Instrumentation

Instrumentation with a useful life of up to 20 years is generally aligned with industry best practice. However, there are number of assets that fall outside of this band. Below is a typical example of instances where a 4-94 years useful life has been applied to instrumentation. Additionally, there are minor discrepancies between the FAR Useful life and the Calculated Useful life for certain instruments e.g. a flowmeter identified below.

1	Asset Number	Asset Description	FAR Useful Life	Calculated Useful Lif	FAR Useful life YR	Calculated Useful life YRS
2	WMN000008158	WYEE TO WYONG MAIN FLOWMETER	1404	360	117	30
3	WRS018001028	GRAHAMSTOWN WTW - VALVE PIT COVER	840	840	70	70
24	WRS003005003	DUNGOG WTP - LIME AUGER	360	360	30	30
25	WRS003005004	DUNGOG WTP - LIME SWITCH BOX	360	360	30	30
27	WRS031003035	TOMAGO BORE STN 17- EMM REPLACE 2006/07	360	360	30	30
28	WRS031003036	TOMAGO BORE STN 21 - EMM REPLACE 2006/07	360	360	30	30
29	WRS031003037	TOMAGO 17 BOREWELL STATION - EMM 2007-08	360	360	30	30
30	WRS031003038	TOMAGO 18 BOREWELL STATION - EMM 2007-08	360	360	30	30
31	WRS031003039	TOMAGO 5 BOREWELL STATION - EMM 2007-08	360	360	30	30
39	WRS050004002	ANNA BAY 1 BORE - EMM 2007-08	360	360	30	30
126	WMN000008157	SANDGATE FLOWMETER ON WATERMAIN	288	360	24	30
1990	WCL004004001	WATER CHLORIN UNIT-BUTTAI-TELEMETRY	1128	1128	94	94
1992	WCL006004001	WATER CHLORIN UNIT - TORONTO - TELEMETRY	684	684	57	57
1993	WCL007004001	CHLORINATOR - TELEM - NTH LAMBTON	684	684	57	57
1994	WMN004003001	CHICHESTER - CTGM - TELEMETRY	1080	1080	90	90
1996	WPS002005001	LAMBTON WPS FLOW METER - TELEMETRY	600	344	50	28.66666667
2001	WPS006003015	GRAH/TOM-WTW/ WPS SECUR TRANSMISSION	660	660	55	55

1	Asset Number	Asset Description	FAR Useful Life	Calculated Useful Lif	FAR Useful life YR	Calculated Useful life YRS
653	STW017003011	SHORTLAND WWTW -DURESS ALARM TRANSPONDER	48	48	4	4

Figure 11: Extracts from FAR –Instrumentation – Typical Assets

Note: The failure rate of the instrumentation (typically 20 years), post design life expiry, is expected to rise exponentially and compromise the integrity of the associated control function.

3.4.3 Control Systems

Control systems categorized into PLC, RTU and SCADA with a useful design life of 20 years is typically in line with industry best practice. There are no significant discrepancies identified as part of this evaluation

1	Asset Number	Asset Description	FAR Useful Life	Calculated Useful Lif	FAR Useful life YR	Calculated Useful life YRS
125	WRS012004006	BALICKERA WPS - PLC UPGRADE	300	300	25	25
131	STW008036021	EDGEWORTH WWTW - PLC EFFLUENT PUMP	240	240	20	20
169	SPS022004004	NEWCASTLE EAST 1 SPS - PLC	180	180	15	15
175	SPS025004004	SHORTLAND 4 SPS - PLC/TELEM UPGRADE	180	180	15	15
190	SPS033004003	WALLSEND 2 SPS - PLC UPGRADES 2016	180	180	15	15
198	SPS040004003	BERESFIELD 4 SPS - PLC & TELEMETRY	180	180	15	15
217	SPS057104003	CESSNOCK 4 SPS - PLC/TELEM UPGRADE	180	180	15	15
220	SPS058008002	CLIFTLEIGH 2 SPS - PLC/TELEM UPGRADE	180	180	15	15
222	SPS060004002	EAST BRANXTON 3 SPS - PLC & SCADA	180	180	15	15
228	SPS065004003	KURRI KURRI 1 SPS - PLC & SCADA	180	180	15	15
238	SPS074004003	MAITLAND 5 SPS - PLC & TELEMETRY	180	180	15	15
239	SPS075004005	MAITLAND 6 SPS - PLC & TELEMETRY	180	180	15	15
242	SPS079004005	MAITLAND 9 SPS - PLC & TELEMETRY	180	180	15	15
250	SPS088004002	MAITLAND 19 SPS - PLC	180	180	15	15
255	SPS093004002	PAXTON 2 SPS - PLC/TELEM UPGRADE	180	180	15	15
264	SPS102004002	RAYMOND TERRACE 9 SPS - PLC	180	180	15	15
274	SPS109104003	ANNA BAY 8 SPS - PLC/TELEM UPGRADE	180	180	15	15
275	SPS111004002	BOAT HARBOUR 1 SPS - PLC UPGRADES 2016	180	180	15	15
276	SPS112004002	BOAT HARBOUR 2 SPS - PLC UPGRADES 2016	180	180	15	15
288	SPS128004001	MEDOWIE 5A SPS - PLC UPGRADES 2016	180	180	15	15
292	SPS136004001	SALAMANDER BAY 7 SPS - PLC	180	180	15	15
300	SPS149004002	SOLDIERS POINT 5 SPS - PLC	180	180	15	15
302	SPS152004002	SOLDIERS POINT 8 SPS - PLC UPGRADES 2016	180	180	15	15
307	SPS160004003	TANILBA BAY 6 SPS - PLC UPGRADES 2016	180	180	15	15
339	SPS193004003	EDGEWORTH 1 SPS - PLC/TELEM UPGRADE	180	180	15	15
361	SPS212004002	REDHEAD 1 SPS - PLC & SCADA	180	180	15	15
398	SPS266004001	MALLABULA 2 SPS - PLC UPGRADES 2016	180	180	15	15
402	SPS273004003	MAITLAND 22 SPS - PLC	180	180	15	15
404	SPS279004001	SILVERWATER 4 SPS - PLC UPGRADES 2016	180	180	15	15
413	SPS289004002	NORDS WHARF S 335 - PLC/TELEM UPGRADE	180	180	15	15
420	SPS296004002	MORISSET PARK 3 SPS - PLC UPGRADES 2016	180	180	15	15
421	SPS297004002	BONNELLS BAY 2 SPS - PLC UPGRADES 2016	180	180	15	15
426	SPS303004001	BONNELLS BAY 4 SPS - PLC UPGRADES 2016	180	180	15	15
427	SPS304004001	YARRAWONGA PARK 3 SPS - PLC UPGRADE 2016	180	180	15	15
439	SPS317004005	BERESFIELD 15 SPS - PLC UPGRADES 2016	180	180	15	15
449	SPS332004004	SWANSEA SOUTH SPS - PLC UPGRADES 2016	180	180	15	15
451	SPS333004003	COORANBONG 1 SPS - PLC UPGRADES 2016	180	180	15	15

Figure 12: Extracts from FAR –Control Systems – Typical Assets

Note: It is expected that, due to equipment obsolescence, Control system assets will require replacement approximately every 10 years.

3.4.4 Review of Asset Economic Lives by Category

It was found that some items were incorrectly categorised and grouped under I&C. Refer to the Mechanical and Electrical equipment listed below.

WRS003005003	DUNGOG WTP - LIME AUGER	360	360	360
WRS003005004	DUNGOG WTP - LIME SWITCH BOX	360	360	360
SPS188004004	DUDLEY 3 SPS-REPLACE WORMALD TELEMETRY	180		180
WRS031003035	TOMAGO BORE STN 17- EMM REPLACE 2006/07	360	360	360
WRS031003036	TOMAGO BORE STN 21 - EMM REPLACE 2006/07	360	360	360
WRS031003037	TOMAGO 17 BOREWELL STATION - EMM 2007-08	360	360	360
WRS031003038	TOMAGO 18 BOREWELL STATION - EMM 2007-08	360	360	360
WRS031003039	TOMAGO 5 BOREWELL STATION - EMM 2007-08	360	360	360
SPS285004003	MORISSET 2 SPS - SUB PUMP 2	180	180	180
SPS383003002	BRANXTON 4 SPS - SUB PUMP 1	180	180	180
STW003024001	BOULDER BAY WWTW - PUMP 3 RAS	120		120
STW005059001	BURWOOD BCH WWTW - HYDRAULIC POWER PACK	120		120
STW003021001	EMM REPLACE 2004/05 - GRIT PUMP MOTOR	204		204
STW003021001	EMM REPLACE 2004/05 - GRIT PUMP MOTOR	204		204
SPS031014004	STOCKTON 2 SPS - SWITCH BOARD UPGRADE	180	180	180
SPS284003004	MORISSET 1 SPS - SWITCHBOARD REPAIRS	180	180	180

Figure 13: Extracts from FAR –I & C Classification – Typical Mechanical Assets Grouped Under This Category

4 Electrical Assets

4.1 General Overview of Category

The items identified with a depreciation classification of Electrical were captured, providing 2,573 entries, after retired and non-HWC Capital funded assets were removed.

4.2 Methodology

- Completed aggregate analysis using Microsoft excel
- Design life analysis has been generally based on previous design life studies performed by Worley and industry best practice

4.3 Assumptions

- Where equipment has been generically identified, we have assumed the design life of that equipment is in line with typical equipment of that type.
- Certain electrical equipment will have reduced design life due to the installation type of the environmental conditions where they are installed. Since this detail is not apparent in the schedules provided, we have assumed a standard installation free from degradation due to installation type of environmental conditions.
- The FAR Useful Life and Calculated Life are determined numbers from the initial installation.

4.4 Applied Useful Life V's Industry Best Practice

On review of the supplied data a comparison of the FAR Useful Life was initially undertaken against the Calculated Useful Life. It was found that the Calculated Useful Life was predominantly the same as the FAR Useful life however there were several anomalies observed.

The Electrical assets Category was largely grouped to the following categories:

- Transformers and Power Correction Equipment
- Electrical Equipment Rooms
- Electrical Distribution Equipment
- Electrical Cables & Conduits

There were found to be 3 distinct groupings within the Calculated Asset Lives namely

- >100 years useful life
- 10-99 years useful life
- <10 years useful life

4.5 General Observation

It was found that some of the electrical assets are generically described therefore commenting on the useful life for these assets was not possible due to the lack of equipment description. Refer to the below extract examples.

1	Asset Numbe	Asset Description	FAR Useful	Calculated Usefu	FAR usfuel life YR	Calculated Useful life YR
855	SPS013013003	NEWCASTLE EAST 1 SPS - EMM ELEC 2014	300	300	25	25
856	SPS014003007	NEWCASTLE 2 SPS - EMM ELEC 2014	300	300	25	25
857	SPS016013003	NEWCASTLE 5 SPS - EMM ELEC 2016	300	300	25	25
858	SPS017013001	NEWCASTLE 6 SPS - EMM ELEC 2015	300	300	25	25
859	SPS021013001	NEWCASTLE 10 SPS - EMM ELEC 2015	300	300	25	25
1776	SPS014003004	NEWCASTLE WEST 2 SPS - EMM ELEC 2016	240	240	20	20
1777	SPS014003005	NEWCASTLE 2 SPS - EMM ELEC 2015	240	240	20	20

1	Asset Number	Asset Description	FAR Useful Li	Calculated Useful Li	FAR usfuel life YRS	Calculated Useful life YRS
3	SPS378013003	WINDALE 3 SPS - EMM REPLACE 2006/07	1440	1440	120	120
2774	WPS002003001	LAMBTON WPS NCLE/CRDCE RD-ELECT-S/BY 1	1332	1332	111	111
2840	WPS069003001	WHITEBRIDGE WPS-BULA/DUDLEY RD-ELECT(0/S	1416	1416	118	118

Figure 14: Extracts from FAR –Electrical Classification – Typical Assets with Generic Descriptions

4.6 Transformers and Power Correction Equipment

Transformers have been allocated a useful life of 30-45 years. This is generally aligned with the industry best practice, however there are number of assets which appear to have longer or shorter useful lives. Refer to the below extract examples.

1	Asset Numbe	Asset Description	FAR Useful	Calculated Usefu	FAR usfuel life YR	Calculated Useful life YR
1102	STW003003009	BOULDER BAY WWTW - RAS P/S TRANSFORMERS	300	300	25	25
1119	STW004003022	BRANXTON WWTW - TRANSFORMERS	300	300	25	25
1140	STW005003018	BURWOOD BEACH WWTW - TRANSFORMERS	300	300	25	25
1155	STW005059002	BURWOOD BEACH WWTW - TRANSFORMER 2	300	300	25	25
1254	STW015003003	PAXTON WWTW - TRANSFORMERS	300	300	25	25
1422	WPS006003025	TOMAGO 1 WPS - PUMP 16 TRANSFORMER	300	360	25	30
1426	WPS006003029	TOMAGO 1 WPS - PUMP 17 TRANSFORMER	300	360	25	30
1531	WPS066003005	TORONTO WPS - ELECTRICAL TRANSFORMER	300	360	25	30
2035	STW014023003	MORPETH WWTW - HV SYSTEM & TRANSFORMERS	240	240	20	20
2112	STW001064004	BELMONT WWTW2008 - TRANSFORMERS	216	216	18	18

1	Asset Numbe	Asset Description	FAR Useful	Calculated Usefu	FAR usfuel life YR	Calculated Useful life YR
795	WPS016003004	WALLSEND WPS-NCLE RD-T'FORMERS 2X750KVA	600	600	50	50

Figure 15: Extracts from FAR –Transformers –Assets with Lower than Typical Useful Lives

Power correction units have been allocated useful lives between 18-45 years. This range suggests that there might be a mixture of active and static correction units. This generally aligns with the industry best practice.

4.7 Electrical Rooms

Switchrooms have been allocated a useful life of 30 years, which is generally aligned with the industry best practice, however there are number of assets which appear to have shorter useful lives. Refer to the below extract examples.

1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
47	WPS005003025	BERESFIELD WPS - SWITCHROOMS	540	360	45	30
131	WPS006003038	TOMAGO WPS - SWITCHROOMS	480	360	40	30
341	SPS171003004	BELMONT 6 SPS - SWITCHROOM FLOOR SUPPORT	360	360	30	30
444	SPS240003004	VALENTINE 1 SPS - SWITCHROOM FLOOR SUPPO	360	360	30	30
575	SPS404003001	THORNTON 1 SPS - SWITCHROOM ELECTRICAL	360	360	30	30
578	SPS405003001	CHISHOLM 2 SPS -SWITCHROOM ELECTRICAL	360	360	30	30
640	WRS003003019	DUNGOG WTP - SWITCHROOM UPGRADE	360	360	30	30
666	WRS010003009	SEAHAM WEIR - SWITCHROOM VENT FANS	360	360	30	30
671	WRS012003013	BALICKERA WPS - SWITCHROOM UPGRADE	360	360	30	30
673	WRS012003015	BALICKERA WPS - 3.3KV SWITCHROOM	360	360	30	30
689	WRS016003015	SCHRODER WPS - SWITCHROOMS	360	360	30	30
701	WRS018002038	G/TOWN WTW - SWITCHROOM IMPROVEMENTS	360	360	30	30
764	WRS042003009	LEMON TREE PSG WTW - SWITCHROOM IMPRVMTS	360	360	30	30
1220	STW010017035	KURRI WWTW - SWITCHROOM - SWITCHBOARDS	300	300	25	25
1221	STW010017036	KURRI WWTW - SWITCHROOM - ELECTRICAL	300	300	25	25
1469	WPS016003010	WALLSEND 1 WPS - SWITCHROOM 1 ELECTRICAL	300	360	25	30
1470	WPS016003011	WALLSEND 1 WPS - SWITCHROOM 2 ELECTRICAL	300	360	25	30
2016	STW010003001	KURRI KURRI WWTW - SWITCHROOM UPGRADE	240	240	20	20
2022	STW014003001	MORPETH WWTW - SWITCHROOM AIR CON	240	240	20	20
2044	STW017003004	SHORTLAND WWTW - SWITCHROOM UPGRADE	240	240	20	20
2061	STW088007005	DORA CREEK WWTW - SWITCHROOM AIR CON	240	240	20	20
2140	STW003005004	BOULDER BAY WWTW - SWITCHROOM AIR CON	216	216	18	18
2149	STW005003008	BURWOOD BEACH WWTW - SWITCHROOM UPGRADE	216	216	18	18
2183	STW017033001	SHORTLAND WWTW - SWITCHROOM ELECTRICAL	216	216	18	18

Figure 16: Extracts from FAR –Switchrooms –Assets with Lower than Typical Useful Lives

Note: Individual components will not meet the anticipated useful design life and may need to be replaced on failure, due to electrical system faults, lack of preventative maintenance and environmental degradation.

4.8 Electrical Distribution Equipment

Switchboards, distribution boards and MCC's have been allocated a useful life of 30-40 years, which is generally aligned with the industry best practice, however there are number of assets which appear to have longer or shorter useful lives. Refer to the below extract examples.

1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
86	WRS030002007	MASONITE RD SWITCHYARD - SWITCHBOARD	540	540	45	45
1669	WRS050003015	TOMAGO STN 21 - BORE 4 SWITCHBOARD	300	300	25	25
1670	WRS050003016	TOMAGO STN 21 - BORE 6 SWITCHBOARD	300	300	25	25
1671	WRS050003017	TOMAGO STN 21 - BORE 11 - SWITCHBOARD	300	300	25	25
1672	WRS050003018	TOMAGO STN 21 - BORE 12 SWITCHBOARD	300	300	25	25
1673	WRS050003019	TOMAGO STN 21 - BORE 14 SWITCHBOARD	300	300	25	25
1674	WRS050003020	TOMAGO STN 21 - BORE 15 SWITCHBOARD	300	300	25	25
1675	WRS050003021	TOMAGO STN 21 - BORE 16 SWITCHBOARD	300	300	25	25
1952	STW008030006	RHONDDA COLLIERY-REUSE PUMP SWITCHBOARD	240	240	20	20
2015	STW008036012	EDGEWORTH WWTW - INLET WKS - SWITCHBOARD	240	240	20	20
2026	STW014012004	MORPETH WWTW - SWITCHBOARD REPLACEMENT	240	240	20	20
2031	STW014020002	MORPETH WWTW - MAIN SWITCHBOARD	240	240	20	20
2032	STW014020003	MORPETH WWTW - SUB SWITCHBOARD	240	240	20	20
2057	STW022013006	FARLEY WWTW - INLET WORKS - SWITCHBOARDS	240	240	20	20
2109	STW001064001	BELMONT WWTW2008 - ADMIN SWITCHBOARD	216	216	18	18
2116	STW001064008	BELMONT WWTW2008 - SWITCHBOARD MSB003	216	216	18	18
2117	STW001064009	BELMONT WWTW2008-SWITCHBOARD MCC A & B	216	216	18	18
2141	STW003005005	BOULDER BAY WWTW - SWITCHBOARD HANDLES	216	216	18	18
2172	STW005063018	BURWOOD BCH WWTW - HV SEC PL SWITCHBOARD	216	216	18	18

Figure 17: Extracts from FAR –Electrical Distribution Equipment –Typical Assets with Lower than Anticipated Useful Lives

Note: Individual components will not meet the anticipated useful design life and may need to be replaced on failure, due to electrical system faults, lack of preventative maintenance and environmental degradation.

4.9 Electrical Cables

Electrical cables have been allocated with a useful life of 25-45 years which is generally aligned with the industry best practice, however a few assets are noted to have either longer or shorter useful lives. As stated in the assumptions, this review is unable to determine from the schedule which cables may be subject to installation or environmental conditions that have a detrimental effect on their design life. Refer to the below extract examples.

1	Asset Number	Asset Description	FAR Useful Li	Calculated Useful Li	FAR usfuel life YRS	Calculated Useful life YRS
12	RTW003003009	KIWS - CABLE LADDER	360	360	30	30
13	RTW003003010	KIWS -CABLE INSTRUMENTATION & ELECTRICAL	360	360	30	30
48	WPS005003033	BERESFIELD WPS -HV CABLING & CABLING SYS	540	360	45	30
49	WPS005003034	BERESFIELD WPS - LV & ELV CABLING	540	360	45	30
52	WPS109003005	BUTTAI WPS - LV & ELV CABLING SYSTEM	540	360	45	30
56	WPS110003011	CAMPVALE WPS - HV CABLING SYS	540	360	45	30
57	WPS110003012	CAMPVALE WPS - LV & ELV CABLING SYST	540	360	45	30
64	WRS012003023	BALICKERA WPS - HV CABLING SYSTEM	540	540	45	45
65	WRS012003024	BALICKERA WPS - LV & ELV CABLING SYSTEM	540	540	45	45
75	WRS016003023	SCHRODER WPS - HV CABLING SYSTEM	540	540	45	45
76	WRS016003024	SCHRODER WPS - LV & ELV CABLING SYSTEM	540	540	45	45
100	WRS031003049	BORE FIELD - CABLES - TRANS TO S'BOARD	540	540	45	45
101	WRS031003050	BORE FIELD - AERIAL CABLES STN 21A & 21B	540	540	45	45
112	WRS036003003	TOMAGO - HV NETWORK CABLE RESTORE	540	540	45	45
122	STW001083017	BELMONT HV NETWORK - CABLE UPGRADE	480	480	40	40
141	WRS036004003	TOMAGO HV NETWORK - CABLE UPGRADE	480	480	40	40
142	WRS052004007	NELSON BAY HV NETWORK - CABLE UPGRADE	480	480	40	40
143	WRS054004013	ANNA BAY HV NETWORK - CABLE UPGRADE	480	480	40	40
218	SPS042003003	BERESFIELD 6 SPS - CABLING & CONDUIT	360	360	30	30
430	SPS234003006	TORONTO 1 SPS - CONTACTOR & CABLING	360	360	30	30
2130	STW001083007	BELMONT WWTW HV UPGRADE - HV CABLING S	216	216	18	18
2131	STW001083008	BELMONT WWTW HV UPGRADE- LV-ELV CABLING	216	216	18	18
2137	STW001083014	BELMONT WWTW HV U- HV CABLING S MAIN PLT	216	216	18	18
2138	STW001083015	BELMONT WWTW HV U- LV-ELV CABL MAIN PLT	216	216	18	18
2157	STW005063003	BURWOOD BCH WWTW - HV CABLING SYSTEM	216	216	18	18
2166	STW005063012	BURWOOD BCH WWTW - HV CABLING SYSTEM	216	216	18	18
2167	STW005063013	BURWOOD BCH WWTW - LV ELV CABLING SYS	216	216	18	18
2168	STW005063014	BURWOOD BCH WWTW - HV CABLES & CONDUITS	216	216	18	18
2193	STW021043007	TORONTO WWTW - HV CABLING SYSTEMS	216	216	18	18
2194	STW021043008	TORONTO WWTW - LV & ELV CABLING SYS	216	216	18	18

Figure 18: Extracts from FAR –Cables –Assets with Non-Typical Useful Lives

4.10 Review of Asset Economic Lives by Category

It was found that some items were incorrectly categorised and grouped under Electrical Assets. Refer to the I&C and telemetry equipment listed below.

1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
87	WRS030002008	MASONITE RD SWITCHYARD - PLC'S & TELEM	540	540	45	45
236	SPS055004003	CESSNOCK 1 SPS - TELEMETRY SYSTEM	360	360	30	30
445	SPS240004002	VALENTINE 1 SPS - TELEMETRY & SCADA	360	360	30	30
449	SPS241004002	VALENTINE 2 SPS - TELEMETRY & SCADA	360	360	30	30
2097	STW021009003	TORONTO WWTW - SCREENING SYSTEM - TELEM	240	240	20	20
2202	SPS452004001	ABERGLASSLYN 5 SPS - TELEMETRY	180	180	15	15
2214	WPS103004001	GRESFORD 1 WPS - TELEMETRY ITEMS	180	360	15	30
2215	WRT005003001	INSTALLATION POWER SUPPLIES & TELEMETRY	180	360	15	30
2217	WRT090003001	INSTALLATION POWER SUPPLIES & TELEMETRY	180	360	15	30
2218	WRT103003001	INSTALLATION POWER SUPPLIES & TELEMETRY	180	360	15	30
2219	WRT114003001	INSTALLATION POWER SUPPLIES & TELEMETRY	180	360	15	30

1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
81	WRS018003050	GRAHAMSTOWN WTP - PLC/SCADA FOR HV	540	540	45	45
87	WRS030002008	MASONITE RD SWITCHYARD - PLC'S & TELEM	540	540	45	45
154	SPS002003002	CARRINGTON 1 SPS - PLC	360	360	30	30
159	SPS010003003	MAYFIELD WEST 1 SPS - PLC	360	360	30	30
182	SPS017003005	NEWCASTLE 6 SPS - PLC	360	360	30	30
188	SPS021003005	NEWCASTLE 10 SPS - PLC	360	360	30	30
201	SPS027003007	SHORTLAND 1 SPS - PLC	360	360	30	30
223	SPS050003002	BERESFIELD 14 SPS - PLC	360	360	30	30
249	SPS068003001	LARGS 1 SPS - PLC	360	360	30	30
334	SPS167003004	BELMONT 2 SPS - PLC	360	360	30	30
352	SPS182003003	BOOLAROO 1 SPS - PLC	360	360	30	30
366	SPS194003002	EDGEWORTH 2 SPS - PLC	360	360	30	30
429	SPS234003005	TORONTO 1 SPS - PLC	360	360	30	30
436	SPS237003004	TORONTO 4 SPS - PLC	360	360	30	30
545	SPS368003002	SALAMANDER BAY 12 SPS - PLC	360	360	30	30
660	WRS003003040	DUNGOG WTP - BACKWASH PLC CODE	360	360	30	30
678	WRS012003020	BALICKERA WPS - PLC/SCADA	360	360	30	30
715	WRS018003029	G/TOWN WTW-AIR COMPRESSOR PLC EXPANSION	360	360	30	30
816	WRS054003014	ANNA BAY WTW - PLC	360	360	30	30
915	SPS128103002	MEDOWIE 8 SPS - PLC	300	300	25	25
1076	STW001003032	BELMONT WWTW - PLC	300	300	25	25
1282	STW017003007	SHORTLAND WWTW - PLC	300	300	25	25
1302	STW021003005	TORONTO WWTW - PLC	300	300	25	25
1398	WPS005003014	BERESFIELD 1 WPS - PLC	300	360	25	30
1316	STW022003003	FARLEY WWTW-PRESSURE TRANSMITTER SENSOR	300	300	25	25
2382	WRT029001003	TICKHOLE TUNNEL-PRESSURE MONITORING EQPT	240	360	20	30
22	BLD063332003	TOMAGO AMENITIES BUILD - SECURITY KEYPAD	960	960	80	80
156	SPS007003003	MARYLAND 1 SPS - SECURITY SYSTEM	360	360	30	30
209	SPS032003003	STOCKTON 3 SPS - SECURITY ALARM	360	360	30	30
266	SPS078003003	TELARAH 1 SPS - SECURITY	360	360	30	30

1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
661	WRS003003041	DUNGOG WTP - FIRE PANEL ALARM	360	360	30	30
730	WRS018003045	GRAHAMSTOWN WTP PRETREATMENT FIRE & SEC	360	360	30	30
733	WRS018003055	GRAHAMSTOWN WTP - FIRE HOSES & TAPS	360	360	30	30
1255	STW015003004	PAXTON WWTW - SECURITY & FIRE SYSTEMS	300	300	25	25
1346	STW096003007	CLARENCE TOWN WWTW-SECURITY, FIRE ALARMS	300	300	25	25
2317	WPS006003007	TOMAGO WPS-CHUBB FIRE PROTECTION SYSTEM	240	360	20	30

	A	B	F	H	I	J
1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
361	SPS190003002	DUDLEY 5 SPS-WET WELL LEVEL TRANSMITTER	360	360	30	30
1316	STW022003003	FARLEY WWTW-PRESSURE TRANSMITTER SENSOR	300	300	25	25

1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
305	SPS122003004	FINGAL BAY 1 SPS - LEVEL PROBE	360	360	30	30
335	SPS167003005	BELMONT 2 SPS - WET WELL LEVEL INDICATOR	360	360	30	30
361	SPS190003002	DUDLEY 5 SPS-WET WELL LEVEL TRANSMITTER	360	360	30	30
404	SPS218003005	SWANSEA 6 SPS - WELL LEVEL INDICATOR	360	360	30	30
435	SPS237003003	TORONTO 4 SPS - WELL 2 LEVEL INDICATOR	360	360	30	30
509	SPS298003002	BONNELLS BAY 3 SPS - LEVEL INDICATOR	360	360	30	30
528	SPS328003003	GILLIESTON HGTS 3 SPS - WELL LEVEL INDIC	360	360	30	30
719	WRS018003033	GRAHAMSTOWN WTW-FILTER BED LEVEL SENSOR	360	360	30	30
1197	STW010003005	KURRI KURRI WWTW - TANK LEVEL DETECTORS	300	300	25	25
1742	WRT075003001	AWABA 1 RESERVOIR - LEVEL CONTROL	300	360	25	30
1749	WRT088003002	CHARLESTOWN RESERVOIR - LEVEL SENSOR	300	360	25	30
1762	WRT114003002	NELSONS PLAINS RESERVOIR- LEVEL SENSOR	300	360	25	30
1296	WRS018003026	GRAHAMSTOWN WTW - CW TANK LEVEL SENSOR	120	120	10	10

Figure 19: Extracts from FAR –Electrical Classification – Typical I&C Assets Grouped Under This Category

Figure 20: Add Text

In these instances the Useful Lives assigned to these assets is generally longer than what would be anticipated. Section 3 details the useful lives for the Telemetry, Control Systems and Instrumentation groupings.

4.11 Miscellaneous Other Items

In addition to the I&C assets grouped under the Electrical Classification, it was also found that some Mechanical items have been incorrectly categorised. Refer to the Mechanical equipment listed below.

1	Asset Numbe	Asset Description	FAR Useful	Calculated Usefu	FAR usfuel life YR	Calculated Useful life YR
32	WPS023003002	HEDDON GRETA 1 WPS - PUMP 1	600	360	50	30
157	SPS008003003	MARYLAND 2 SPS - SUB PUMP 2	360	360	30	30
173	SPS015003005	NEWCASTLE 3 SPS - SUMP PUMP LINE	360	360	30	30
217	SPS042003002	BERESFIELD 6 SPS - SUB PUMPS 1 & 2	360	360	30	30
233	SPS055003007	CESSNOCK 1 SPS - SUB PUMP 3	360	360	30	30
234	SPS055003008	CESSNOCK 1 SPS - PUMP ACCESS GATES	360	360	30	30
238	SPS057002004	CESSNOCK 3 SPS - TEMPORARY PUMP	360	360	30	30
263	SPS076003002	EAST MAITLAND 4 SPS - SUB PUMP 2	360	360	30	30
281	SPS088003003	MAITLAND 19 SPS - SUB PUMP 1	360	360	30	30
290	SPS097003002	RAYMOND TERRACE 4 SPS - PUMP 2	360	360	30	30
292	SPS099003002	RAYMOND TERRACE 6 SPS - SUB PUMP 1	360	360	30	30
311	SPS137003002	CORLETTE 3 SPS - SUB PUMP 1	360	360	30	30
315	SPS143003002	SHOAL BAY 5 SPS - PUMP 1	360	360	30	30
316	SPS143003003	SHOAL BAY 5 SPS - DRYWELL PUMP 2	360	360	30	30
317	SPS143003004	SHOAL BAY 5 SPS - DRYWELL PUMP 1	360	360	30	30
320	SPS145003002	SALAMANDER BAY 17 SPS - SUB PUMP 1	360	360	30	30
324	SPS151003002	SOLDIERS POINT 7 SPS - SUB PUMP 2	360	360	30	30
326	SPS161003003	BUTTABA 2 SPS SPS - SUB PUMP 1	360	360	30	30
328	SPS162003002	ARCADIA VALE 2 SPS - SUB PUMP 2	360	360	30	30
337	SPS169003003	BELMONT 4 SPS - DEL. VALVE PUMPS 1,2 & 3	360	360	30	30
342	SPS172003002	BLACKALLS 1 SPS - SUMP PUMP & VALVES	360	360	30	30
350	SPS179002003	BOLTON PT 1 SPS - PUMPS	360	360	30	30

Figure 21: Extracts from FAR –Electrical Classification – Typical Mechanical Assets Grouped Under This Category

The following items found in the electrical schedule do not appear to be assets but rather activities. These have not been evaluated in this exercise. Refer to the below extract examples.

1	Asset Numbe	Asset Description	FAR Useful	Calculated Useful	FAR usfuel life YR	Calculated Useful life YR
28	SPS007003002	MARYLAND 1 SPS - ELECT - UPGRADE	360	360	30	30
29	SPS008003002	MARYLAND 2 SPS - ELECT - UPGRADE	360	360	30	30
96	WRS030004003	MASONITE RD - SWITCHYARD UPGRADE	540	540	45	45
109	WRS031003062	10'S CORNER SWITCHGEAR UPGRADE	540	540	45	45
122	STW001083017	BELMONT HV NETWORK - CABLE UPGRADE	480	480	40	40
125	WPS006003020	G/TOWN 1 WPS - ELEC/MECH UPGRADES 09/10	480	360	40	30
141	WRS036004003	TOMAGO HV NETWORK - CABLE UPGRADE	480	480	40	40
142	WRS052004007	NELSON BAY HV NETWORK - CABLE UPGRADE	480	480	40	40
143	WRS054004013	ANNA BAY HV NETWORK - CABLE UPGRADE	480	480	40	40
145	SPS072005003	MAITLAND 3 SPS - UPGRADE ELECTRICAL	360	360	30	30
152	GEQ000003843	ELECTRICAL SWITCHBOARDS UPGRADE	360	360	30	30
158	SPS010003002	MAYFIELD WEST SPS - ELECTRICAL UPGRADE	360	360	30	30
163	SPS013003003	NEWCASTLE 1 SPS - CONTROL LINE UPGRADE	360	360	30	30
166	SPS013003006	NEWCASTLE SPS - ELEC/MECH UPGRADE	360	360	30	30
171	SPS014003003	NEWCASTLE 2 SPS - PUMP STARTER UPGRADE	360	360	30	30
237	SPS056003002	CESSNOCK 2 SPS - LIGHTING UPGRADE	360	360	30	30
247	SPS065003006	KURRI KURRI 1 SPS - POWER SUPPLY UPGRADE	360	360	30	30
299	SPS112003002	BOAT HARBOUR 2 - PUMP STARTER UPGRADE	360	360	30	30
302	SPS121003002	NELSON BAY 8 SPS - PUMP STARTER UPGRADE	360	360	30	30
303	SPS122002006	FINGAL BAY 1 SPS - LEVEL CONTROL UPGRADE	360	360	30	30
308	SPS129003002	NELSON BAY 1 SPS - PUMP STARTER UPGRADE	360	360	30	30
312	SPS141002004	SHOAL BAY 3 SPS - LEVEL CONTROL UPGRADE	360	360	30	30
318	SPS143003005	SHOAL BAY 5 SPS - STARTER UPGRADE	360	360	30	30
327	SPS161003004	BUTTABA 2 SPS - PUMP STARTER UPGRADE	360	360	30	30
330	SPS165003002	BARNSLEY 1 SPS - POWER SUPPLY UPGRADE	360	360	30	30
331	SPS165003003	BARNSLEY 1 SPS - ELECTRICAL UPGRADE 2008	360	360	30	30
332	SPS167003002	BELMONT 2 SPS - ELECTRICAL UPGRADE 2008	360	360	30	30
333	SPS167003003	BELMONT 2 SPS -POWER SUPPLY UPGRADE 2008	360	360	30	30
340	SPS171003003	BELMONT 6 SPS - UPGRADED POWER SUPPLY	360	360	30	30
348	SPS178003002	PELICAN 2 SPS - PUMP STARTER UPGRADE	360	360	30	30
358	SPS188003004	DUDLEY 3 SPS - PUMP STARTER UPGRADE	360	360	30	30
362	SPS192003002	DUDLEY 7 SPS - PUMP STARTER UPGRADE	360	360	30	30
363	SPS193003003	EDGEWORTH 1 SPS -ELECTRICAL UPGRADE 2008	360	360	30	30
364	SPS193003004	EDGEWORTH 1 SPS - POWER SUPPLY UPGRADE	360	360	30	30
367	SPS195003002	ELEEBANA 1 SPS -ELECT UPGRADE	360	360	30	30
375	SPS204003003	KILLINGWORTH 1 SPS - ELECT UPGRADES 2009	360	360	30	30
385	SPS212003006	REDHEAD 1 SPS - POWER SUPPLY UPGRADE	360	360	30	30
388	SPS213003005	SWANSEA 1 SPS - PUMP STARTER UPGRADE	360	360	30	30
437	SPS237003005	COAL POINT 3 SPS - PUMP STARTER UPGRADE	360	360	30	30
443	SPS240003003	VALENTINE 1 SPS - POWER SUPPLY UPGRADE	360	360	30	30
447	SPS241003003	VALENTINE 2 SPS - POWER SUPPLY UPGRADE	360	360	30	30
451	SPS243003003	WANGI WANGI 1 SPS - PUMP STARTER UPGRADE	360	360	30	30
452	SPS244003002	WANGI 2 SPS - PUMP STARTER UPGRADE	360	360	30	30
454	SPS246003002	WANGI 4 SPS - PUMP STARTER UPGRADE	360	360	30	30
455	SPS248003002	WANGI 6 SPS - PUMP STARTER UPGRADE	360	360	30	30

Figure 22: Extracts from FAR –Electrical Classification – Activities Recorded in FAR

5 Equipment - Other

5.1 General Overview of Category

The items identified with a FAR depreciation classification of 'Equipment' were captured, providing 1907 entries after entries associated with retired and non-HWC Capital funded assets were removed.

The Equipment Category was found in 25 subcategories, namely:

- Building
- Computer Facilities
- Computers and peripherals
- Dam Equipment
- Data Centre
- General Equipment
- IP Telephony
- Mobile Equipment
- Network Equipment
- Office Equipment
- Radio/Telephone Telemetry Equipment
- Safety Equipment
- Sewer Pumping Stations Equipment
- S'Water Structures Equipment
- Tools & Working Plant
- Vehicles & Plant
- Waste Water Treatment Works Equipment
- Wat Stn / Sbed / BHole Equipment
- Water Chlor Unit
- Water Flow Measurement Equipment
- Water Meters
- Water Pumping Station Equipment
- Water Storage Equipment
- Water Treatment Works Equipment
- Waterway Structure – Water Supply Equipment

The total GRC for these items is $70M, of which the subcategory "Water Meters" accounts for $38M

5.2 Water Meters

The total GRC for Water Meters is $38M (approximately 54% of the Equipment asset register) in 401 entries.

Useful lives are predominantly 15 years, with 1 minor item at 10 years and others ranging up to 46 years. There does not appear to be any mis-allocated items.

5.3 Minor Capital Works

Assets denoted as Minor Capital Works are generally comprised of condition assessments with a useful life of 5 years. There are 2 entries which are included in this category identified below including "Test Kits' and 'Com Info', the ability to capitalize these items is uncertain.

Asset Number	Asset Description	GRC (not indexed)	GRC Residual (not indexed)	FAR Capital Date	FAR Useful Life	Useful Life Yrs	Calculated Liufe Yrs
WRS041001011	LEMON TREE PASSAGE WTP - COND ASSESSMENT	4195.11	0	42257	60	5	5
WRS041001012	LEMON TREE PSG WTP -CONDITION ASSESSMENT	2633.15	0	42257	60	5	5
WRS052001008	NELSON BAY WTP - CONDITION ASSESSMENT	15853.49	0	42257	60	5	5
WRS054001010	ANNA BAY WTP - CONDITION ASSESSMENT	9769.46	0	42257	60	5	5
WRS336001013	GRESFORD WTP - CONDITION ASSESSMENT	4467.31	0	42257	60	5	5
WRT013001003	NEWCASTLE 1 RES (NIS) - COND ASSESSMENT	36827.81	0	42257	60	5	5
WRT081001008	MURRAYS BEACH 1 RES - COND ASSESSMENT	1862.17	0	42257	60	5	5
WRS001002012	CHICHESTER HYDRO GENERATOR - COM INFO	1425	0	42735	48	4	4
WRT000005002	CHLORINE TEST KITS - RESERVOIRS	7363.86	0	42170	36	3	15

Figure 23: Extracts from FAR –Equipment Classification – Typical Minor Capital Works

5.4 Remainder of Equipment Category

The total GRC for the remainder of the Equipment Category is $32M (approximately 46% of the Equipment asset register) in 1506 entries.

Only 2 entries have a GRC greater than $1M : an ICT Server with a useful life of 4 years, and stock gates and cattle proof fencing, with a useful life of 50 years. The latter would appear to be mis-allocated, and possibly with a useful life that is too high.

6 PLT Mech/EL/I&C

6.1 General Overview of Category

The items identified with a FAR depreciation classification of 'PLTMech and I&C' were captured, providing 91 entries after entries associated with retired and non-HWC Capital funded assets were removed. The PLT Mech/EL/IC category is applicable to both the Mechanical/Electrical and Equipment FAR depreciation classes.

The PLTMech and I&C was found in a number of asset types, predominantly:

- Water Treatment Works Assets
- Wat Stn/S Bed/BHole Assets
- Water Pumping Station Assets
- Waste Water Treatment Works Assets

The total GRC for these items is $93M.

Other items noted included:

- Dam Assets
- Mobile Equipment
- Sewer Pumping Station Assets
- Tools and Working Plant
- Vehicles & Plant
- Water Chlorination Units
- Water Storage Assets
- Waterway Structure – Water Supply Assets
- Weir Assets

These items contribute $4.5M to the total GRC.

6.2 Water Treatment Works Assets

The total GRC for Water Treatment Works Assets is $44M (approximately 45% of the PLTMech and I&C asset register) in 17 entries.

Calculated useful lives are all 30 years, except for one entry. That entry is $117k for turbidity meters with a life of 10 years. It is difficult to ascertain the assets being listed, as the majority (11 of 17, totaling $42M) simply refer to a facility with description "Mech/Elect".

6.3 WatStn/Sbed/BHole Assets

The total GRC for WatStn/Sbed/BHole Assets is $19M (approximately 20% of the PLTMech and I&C asset register) in 16 entries.

Calculated Useful Lives are in the range 20-30 years. It is difficult to ascertain the assets being listed, as the majority (12 of 16, totaling $18.5M) simply refer to a facility with description "Mech/Elect".

6.4 Water Pumping Station Assets

The total GRC for Water Pumping Station Assets is $19M (approximately 20% of the PLTMech and I&C asset register) in 110 entries.

Calculated useful lives are in a wide range 13 to 72 years. It is difficult to ascertain the assets being listed as the majority (6 of 10, totaling $18.7M) simply refer to a facility with description “Mech/Elect”. All 5 of those 6 have calculated lives 30 years or greater. The other, with a value of $2.0M had its useful life reduced from 121 to 15 years.

The remaining 4 assets, with useful lives below 20 years are electrical assets with a total GRC of $213k.

6.5 Waste Water Treatment Works Assets

The total GRC for Waste Water Treatment Works Assets is $11M (approximately 11% of the PLTMech and I&C asset register) in 19 entries.

Calculated Useful Lives range 10-40 years. It is difficult to ascertain the assets being listed, as the majority (13 of 19, totalling $10.6M) simply refer to a facility with description “Mech/Elect”. Items with useful lives less than 20 years contribute only $3.5k.

7 Land & Easements

Forming a GRC of approximately $61M the useful life of land has been applied to 9999 months for all entries. There were no anomalies or inappropriately assigned items to this category identified.

The total GRC for identified easements is $2.9M with an 90-100 year useful life. It is unclear why easement categorized in this manner have limited useful life, however it is noted that Easements have been identified as non-depreciating assets and do not form part of the economic life calculation.

Asset Numb	Asset Description	GRC (not indexed)	GRC Residual (not indexed	FAR Capital Dat	FAR Useful Li	Useful Life Ye
EAS0000Q5143	EASEMENT - 4/591952 & 63/569450	25138.84	0	41236	9999	833.25
EAS0000Q4628	DP709388 BELMONT	12800	0	38541	1200	100
EAS0000Q4629	DP208758 BELMONT	800	0	38541	1200	100
EAS0000Q4630	DP823738 BELMONT	50	0	38541	1200	100
EAS0000Q4631	DP817883 BELMONT	1950	0	38541	1200	100
EAS0000Q4633	DP874949 - KOORAGANG	6360	0	38541	1200	100
EAS0000Q4634	DP 594332 CORMORANT RD K'GANG	320	0	38541	1200	100
EAS0000Q4635	DP1015754 CORMORANT RD K'GANG	2540	0	38541	1200	100
EAS0000Q4636	DP608317 CORMORANT RD K'GANG	1030	0	38541	1200	100
EAS0000Q4637	DP262783 CORMORANT RD K'GANG	12530	0	38541	1200	100
EAS0000Q4638	DP126347 CORMORANT RD K'GANG	3580	0	38541	1200	100
EAS0000Q4640	R87047 MEMORIAL DR KARUAH	1000	0	38541	1200	100
EAS0000Q4641	DP753196 MUSTONS ST KARUAH	1000	0	38541	1200	100
EAS0000Q4642	DP817883 BELMONT	30000	0	38541	1200	100
EAS0000Q4650	DP270249 PAC HWY MAYFIELD WST	97605	0	38541	1200	100
EAS0000Q4666	DP573628 ALISTER ST SHORTLAND	1000	0	38541	1200	100
EAS0000Q3439	LOT 1 DP1072432	44529.97	0	40210	1200	100
EAS0000Q4719	LOT 3 DP839872 JIRRA WAY MARYLAND	1461	0	40603	1200	100
EAS0000Q4774	LOT2 DP159765	73793.3	0	39387	1200	100
EAS0000Q4811	LOT 3 DP805439	3644.18	0	40099	1200	100
EAS0000Q4813	LOT 33 DP1057379	24416	0	40210	1200	100
EAS0000Q4838	LOT 7013 DP 1057379	8681.34	0	40210	1200	100
EAS0000Q4847	LOT 1 DP664066	4952.36	0	40280	1200	100
EAS0000Q4850	LOT 818 DP1032401	15210	0	40330	1200	100
EAS0000Q4851	LOT 423 DP 790595	35247	0	39629	1200	100

Figure 24: Extracts from FAR –Non-Depreciating – Typical Land and Easements with Time Limited Useful Life

8 Intangibles

The items listed in this category with their typically applied useful lives are as follows: -

- Carbon & Ecological Credits & Technology Certificates – 9999+ months
- Easements – 90+ years
- Software – 4 years
- Other Miscellaneous Intangibles – 4-5 years

Of the other miscellaneous intangibles there is a mixture of items including models, business processes and standard development. The total GRC of these items $13M, approximately 50% is associated with IQMS development, which as business process could be anticipated to have a relatively longer life of approximately 10 years.

Carbon & Ecological Credits are noted to be excluded from the RAB and do not form part of the assessment of economic life.

None of the categorized intangibles were identified as Pre-LIS

9 Summary Tables

CIVIL

	Typical Standards	ATO Standard	Typically Applied by HWC	Comment
Civil - Tanks	80 years – water supply -concrete 40 years – water supply - roofs and supporting works 60 years – Sewage Treatment – concrete tanks 25 years – Sewage Treatment supporting works	80 years – Water Treatment & Supply 80 years – Sewage Treatment	100 years – water supply 80 years – Sewage Treatment Plants	
Civil – Pump Stations	100 years are typical design lives for both water and sewage network assets	80 years – Water Supply 80 years – Sewerage	60 Years – Water Supply 120 years – Sewage Pump Stations 50 years – Sewage Pump Stations Supporting infrastructure e.g. handrails etc.	The civil works for water supply pump stations have a lower useful life than what could be typically expected for those assets
Civil - Stormwater	100 years is typical design life required for in-ground stormwater assets	100 years for channels and culverts Pipes not identified	100-150 years	

	Typical Standards	ATO Standard	Typically Applied by HWC	Comment
Sewermains	100 years typical design life required for sewers and manholes	80 years	100 years for sewer 80 years -relined sewers	Whilst design life is often 100 years, typical sewer systems require remediation at a much earlier time arising from displaced joints, tree roots and increased ingress and infiltration. Similarly, manholes often require remediation prior to reaching their design life owing to deterioration of the concrete in anerobic conditions. More recent construction would be typically PE lined to meet design life requirements
Watermains	100 years typical design life required	80 years	100 years	
Buildings	80 years design life typically applied to permanent structures 50 years design life – treatment plant low grade structures and workshops 20 years design life – fencing	Not identified	60-80 years typically applied to most structures regardless of grade 50-80 years for furnishings and ancillary items 40 years - fencing	Category includes items associated with interior fit-outs with useful lives beyond what could be anticipated Fencing useful life is typically beyond what expectations of current standards

ELECTRICAL

	Typical Industry Practice	ATO Standard	Typically Applied by HWC	Comment
Transformers	30-45 years for Transformers 18-45 years for Power Correction Units	40 years for Transformers	30-45 years for Transformers	Typical useful lives conform with expectations with few anomalies.
Electrical Rooms	30 years for Switchrooms	Not Found	18-45 years	Typical useful lives conform with expectations with few anomalies. It's noted that Individual components will not meet the anticipated useful design life and may need to be replaced on failure, due to electrical system faults, lack of preventative maintenance and environmental degradation
Electrical Distribution Equipment	30-40 years for Switchboards, distribution boards and	40 years	30-40 years	Typical useful lives conform with expectations with few anomalies. It's noted that Individual components will not meet the anticipated useful design life and may need to be replaced on failure, due to electrical system faults, lack of preventative maintenance and environmental degradation
Electrical Cables	25-45 for Cables	Not Found	25-45 years	Cables useful design life is subject to the Installation types and Environmental conditions

MECHANICAL

	Typical Standards	ATO Standard	Typically Applied by HWC	Comment
Mechanical Including relevant PLT Mech/EL/IC components	20-25 years design life for pumps 50 years design life for pipework	20-25 years depending on equipment	20-30 years for sewage and water treatment plant mechanical assets 20-25 years for sewage pump stations 15 years for chemical dosing facilities	Typical useful lives conform with expectations with few anomalies. Sugar Dosing System, Valued at $865k, with a useful life of 4 years. This should be clarified.
Equipment	Dependent on equipment considered	Not Identified	10 years for stock gates and fencing	

EQUIPMENT - INSTRUMENTATION & CONTROL

	Typical Standards	ATO Standard	Typically Applied by HWC	Comment
Telemetry Systems	10-15 years	10 years	10-20 years	It is noted that obsolescence in telemetry systems generally result in replacements in 6-10 year intervals
Instrumentation Including relevant PLT Mech/EL/IC components	15-20 year	20 years – Flowmeters 10 years – sensors, probes and other transmitters 7 year – chemical and water quality analysers	15 years	

	Typical Standards	ATO Standard	Typically Applied by HWC	Comment
Control Systems	15- 20 years	Not identified	15 years	It is expected that, due to equipment obsolescence, Control systems will require replacement approximately every 10 years
Equipment	Dependent on equipment considered	Not Identified	4 years for hardware and ICT infrastructure	

EQUIPMENT - OTHER

	Typical Standards	ATO Standard	Typically Applied by HWC	Comment
Minor Capital Costs				
Water Meters	15 years	20 years	15 years typically applied to most identified meters	The applied useful life is with typical expectations
Condition Assessments	Not Applied	Not Found	5 years	The applied useful life is within expectations before assets condition is materially affected by environment or wear

LAND, EASEMENTS, INTANGIBLES

	Typical Standards	ATO Standard	Typically Applied by HWC	Comment
Land	Non-Depreciating Asset			
Easements	Typically non-depreciating	Not identified	In most instances easements are shown as having 90-100 years useful life however it is noted that for purposes of HWC calculations, they are identified as Non-Depreciating	Easements may be potentially linked to fixed term dependent on existing agreements.
Intangibles	Business Systems - 5-10 years Software – 5 years	Not identified	Carbon & Ecological Credits & Technology Certificates – non-depreciating Software – 4 years Other Miscellaneous Intangibles – 4-5 years	
Sewer Cavity	Not individually identified on FAR			

Appendix B
Dam Infrastructure Review

Dam Infrastructure Assets Review

1.0 Assets

Raw water storage infrastructure represents a major investment in the provision of potable water services to the Lower Hunter region and forms a significant component of the overall asset base. The asset register value under this category is $142.0M based on the depreciated current worth assessment methodology.

Water storages consisting of dams and weirs are complex assets which involve a combination of civil, structural, electrical and mechanical components to varying degrees depending on the nature of the facility and the changes implemented throughout the facility lifecycle. The works are often staged over long periods of time either through planned augmentations or through necessity to upgrade for changes in engineering knowledge, environmental circumstances or social requirements. Assets within the register have been impacted by issues of this nature and this has a bearing on the appropriateness of asset life selected for valuation purposes.

Engineering requirements for dam design have been subject to considerable change due to improved understanding of risk from extreme rainfall and earthquake conditions. These changes have increased the risk of embankment and structural failure and in many instances the risks have been in excess of acceptable community expectations for loss of life applicable at the time. The consequence of these circumstances has been a need to upgrade or modify facilities with subsequent renewal of asset life. An understanding of these changes is necessary to allow definition of an applicable asset life and potentially can lead to divergence of opinion on the suitability or relevance of the selected life or inclusion of expenditure within the asset valuation process.

Dam facilities are assets with long term life for civil and structural components and with mechanical and electrical systems capable of componentry replacement and upgrade. A majority of dams built in Australia from 1900 onwards are still in service albeit with remedial works for acceptable engineering integrity.

The Lower Hunter region potable water supply system is serviced by the following headworks infrastructure:

- Chichester Dam
- Grahamstown Dam and Seaham Weir

Chichester Dam

The dam was the original raw water storage for the region and was constructed in 1923. The dam embankment is a concrete mass gravity structure with a centrally located uncontrolled spillway and dissipater.

In 1965 the spillway in dam was lowered to provide a greater flood immunity and this was subsequently restored in 1985 through the installation of post tensioned anchors and relocation of the spillway. Remedial works were performed in 1995 and 2003 to reduce seepage, improve drainage and provide greater flood immunity in order to restore the safety of the facility. The dam currently services approximately 35 percent of the Lower Hunter water supply need.

Grahamstown Dam and Seaham Weir

The dam was completed in 1964 as an off-stream storage to be supplied by raw water from the Williams River. The original dam works consisted of main and saddle earthen embankments with a gated concrete outlet channel. The weir is a rockfill clay core embankment barrage with gates to restrict tidal movement.

The scheme was initially operated using water collected from the local Grahamstown moorlands catchment. The construction of the Seaham Weir, Balickera Pumping Station and associated channels in 1967 allowed raw water to be transferred to the dam. The works were subsequently modified in 1973 by provision of an impervious cut-off trench and through provision of increased embankment height and rock protection works in 1979.

The dam was raised in 2005 to provide increased storage capacity. The works involved raising the core level of the existing embankment and construction of a zoned earth saddle dam with a labyrinth spillway and associated road crossing. The dam and weir system currently service 40% of the Lower Hunter water supply need.

2.0 Asset Life

The assets for Chichester Dam, Grahamstown Dam and Seaham Weir have been reviewed and tested to assess the suitability of the adopted asset life (FAR Useful Life & Estimated Life) for determination of the depreciated value.

The asset life for dam components adopted in the asset register is detailed in Table 2-1 along with typical asset life from literature.

Table 2-1 Asset Register – Life of Dam Assets

Asset Categories	Register Asset Life (years)	Typical Asset Life [1] (years)
Civil - Earthworks	100 -150	150 -200
Civil – Concrete	100 -150	50 - 125
Mechanical – Weir Gates	100	50 -125
Mechanical – Major Facilities	80	50 -125
Electrical – Major Facilities	80	50 - 125
Civil – Road Infrastructure	76	-
Civil - Buildings/ Facilities	50	50 -60
Civil – Other Minor Works	30	25
Electrical – Refurbishments/ Upgrades	25 - 30	15 -25
Mechanical - Refurbishments/ Upgrades	25 - 30	15 - 25
Trees	14	-
Instrumentation – Equipment & Telemetry	10	10

Notes -Obtained from NSW and Queensland Government historical guidelines and Australian Standards.

Civil – Earthworks

Earthworks for dam embankments are a non-deteriorating asset subject to stable foundation conditions and protection from erosion, seepage and extreme environmental conditions. An asset life of 150 years or greater is considered appropriate to these works provided the necessary failure protection mechanisms have been originally or subsequently implemented. Dam works suitably constructed in the last 30 to 50 years would be expected to have an asset life of 200 years or greater due to enhanced quality control systems and equipment. This assessment is consistent with historic experience of Australian dams and reflected in reviewed assets.

Civil – Concrete

Concrete works are subject to deterioration over time due to attack from aggressive ground and surface waters, air pollution, carbonation, alkali reaction by aggregates and chloride attack. These influences will limit the long-term life of reinforced and unreinforced concrete works.

Dam works are constructed with a high degree of protection to reinforcing steel and quality control in concrete manufacture and placement. Concrete is expected to achieve a design life of in excess of 80 years for reinforced concrete elements and greater than 100 years for unreinforced components. Dams are often a mix of reinforced and unreinforced elements.

The Lake Paramatta unreinforced mass gravity weir west of Sydney is currently operational and is more than 160 years old. Other much older functioning unreinforced structures exist elsewhere.

Mechanical – Weir Gates

Large steel gates are maintained by paint or galvanised systems and provided this protection is appropriately maintained the life can be prolonged indefinitely. The use of gates in waterway systems can result in corrosion from a variety of causes including chlorides, biological attack, crevice corrosion and debris impact. These influences over time will result in a reduced life for the facility. The life of an appropriately maintained steel structure is in excess of 60 years and can be in excess of 100 years.

Electrical and Mechanical – Major Facility

Major electrical and mechanical facilities for dams and weirs are heavy engineering cranes, winches, cables and motors for gate operation and maintenance. These assets are engineered and maintained for infrequent or emergency operation and are expected to have a life approaching that of the facility due to the specialised nature and reliability need of the system. Individual componentry can be refurbished or upgraded over time as required to maintain long term system operability. A life of 80 to 100 years for the overall installation would be a not unreasonable expectation for a well-maintained facility.

Civil – Road Infrastructure and Other Minor Works

Road infrastructure consists of pavements and associated appurtenant works such as drainage, fencing and signage. The asset life of roads is determined by heavy vehicle usage and substrate movement whereas appurtenant works are impacted by damage, corrosion and material degradation. The low usage of road surfaces which typically occurs on dam sites will generally lead to an extended life of at least 50 years whereas other assets will typically be in the 20 to 50 year range.

Civil – Buildings and Facilities

Building and other facilities are generally built in accordance with Building regulations, codes and standards and have a design asset life of 50 years.

Electrical – Refurbishments/ Upgrades

This equipment is generally generators, actuators, switchboards, wiring and control circuitry and is manufactured for renewal and replacement due to corrosion and deterioration risk. An asset life of between 15 to 25 years is a typical expectation for these components.

Mechanical – Refurbishments/ Upgrades

This equipment is generally pumps, hoists, winches, cranes, valves, trolleys and aeration systems with moving parts and is manufactured for renewal and replacement due to corrosion and deterioration risk. An asset life of between 15 to 25 years is a typical expectation for these components.

Instrumentation – Equipment & Telemetry

Instruments for recording, measurement, control and communication are manufactured electronic or scientific equipment or programmable devices such as computers or logic controllers. Instrumentation is manufactured for renewal and replacement due to corrosion, deterioration and performance advancement and have a typical asset life of 5 to 10 years.

3.0 Asset Grouping

The assets for Chichester Dam, Grahamstown Dam and Seaham Weir have been reviewed and tested to assess the suitability of the asset groupings for determination of the depreciated value.

The grouping of assets for dams has principally occurred for the major dam and weir projects constructed prior to 1980. These assets account for 67% of the depreciated residual value. The assets include the original construction costs for Chichester Dam, Grahamstown Dam and Seaham Weir.

Assets grouped within the original costs include major civil earth and concrete works and associated mechanical and electrical facilities. The grouped assets have been given asset lives ranging from 100 to 150 years which is consistent with asset life recommendations although will be conservative for depreciation assessment for some elements of mechanical and electrical componentry.

Assets post 1980 have greater granularisation into discipline asset classes and have been categorised based on civil, mechanical, electrical and instrumentation groupings. These assets have an asset life reflective of the performance of the respective asset class although do involve a variety of componentry and equipment with variable life expectation. The adopted asset lives are reflective of asset performance and considered conservative for depreciation assessment.

4.0 Asset Residual Life

The assets for Chichester Dam, Grahamstown Dam and Seaham Weir have been reviewed and tested to assess the suitability of the adopted expended life (Life Used) for determination of the depreciated value.

The residual life (Remaining Life) nominated for dam assets in the asset register appears to have been based on the capital expenditure date (FAR Capital Date) for the facility or component. The dates are generally consistent with construction and operational advice obtained from the public record with the following exceptions:

Chichester Dam

The dam was completed in 1923 but depreciation has been based on an expenditure date of 30 June 1965 with an asset life of 150 years. The spillway was modified in 1965 and the nominated asset value (GRC) probably includes valuation of all assets constructed at that time on the basis that the design functionality had been restored through the remedial works and the facility asset life would accordingly be extended.

Grahamstown Dam and Seaham Weir

Grahamstown Dam has been nominated in the register with an expenditure dates of 30 June 1961 which is consistent with the facility operational date on the public record.

Seaham Weir was constructed post completion of Grahamstown Dam and is noted in the public record as being operational in 1967. The asset register nominates the date as 30 June 1977 which is conservative for determination of depreciated value.

5.0 Observations

The following matters have been identified from asset register review which are relevant to the determined asset value:

Chichester Dam

The dam is understood to have had major remedial works for stability rectification in 1985 and these works have not been identified in the asset register

Grahamstown Dam

The dam was raised in 2005 to provide an increase in storage capacity. The work was undertaken in stages and included refurbishment of the original main and saddle embankments (Stage 1) and construction of a new spillway and outlet (Stage 2). The work raised the ponded water level by 2.4m. The expenditure date for the Stage 1 works is nominated as 1 January 1996 and 4 March 2000.

It can be argued that the dam was fully refurbished with the completion of the works in 2005, albeit over an extended period, and that the date adopted as the expenditure date should be recalibrated from 1961 to 1996 for the original embankment works