Review of Central Coast Council's fixed asset register and asset lives

8 November 2021

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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)** is conducting a review of the maximum prices that Central Coast Council **(CCC)** can charge for its water, wastewater, stormwater, and other services.

CCC is an amalgamation of Gosford City Council and Wyong Shire created on 12 May 2016 by the release of the Local Government (Council Amalgamations) Proclamation 2016.

IPART's review will determine new prices to apply from 1 July 2022 (the 2022 Determination).

IPART's role is to set prices which reflect the efficient costs of delivering CCC's monopoly services. IPART protects customers from paying for inefficient or unnecessary expenditure, while ensuring that the utility raises adequate revenue to cover the efficient costs required to deliver its monopoly services. IPART seeks to set prices which do not reward inefficient investment and asset management decisions, or inefficient operations and practices.

IPART typically aim to set prices which generate revenue to meet a utility's efficient costs. IPART 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.

The efficient stock of assets (the 'regulatory asset base', or '**RAB**') held by the utility are used to calculate regulatory Depreciation using the economic life of those assets.

Depreciation has two components:

1. Depreciation of Existing Assets that are incorporated in the Opening RAB (**Existing Assets**).
2. Depreciation of assets that do not exist yet but are forecast to be created and incorporated into the RAB during the regulatory pricing period **(New Assets)**. At the next price review these assets are rolled into the Existing Asset base using the actual efficient cost of delivery.

A different rate of depreciation is applied to New and Existing Assets of the same type.

In 2000 IPART set the opening RABs for each of the former Gosford City Council and Wyong Shire. Importantly these RABs were significantly lower than the depreciated replacement cost **(DRC)**, or the book value, of the physical assets at that line in the sand **(LIS)**. Consequently, CCC's regulatory depreciation is lower than its accounting depreciation. There are currently 4 RABs for CCC, one for each of Water, Wastewater-North, Wastewater-South, and Stormwater.

CCC has proposed to disaggregate its RAB and capital expenditure from 4 categories to 20 sub-categories, and to significantly reduce average asset lives. This creates an increase in the Depreciation allowance in the short term and reduces the growth in the RAB over the long term.

CCC engaged Morrison Low to derive weighted average asset lives (**WAUL**) for each of its proposed 20 RAB subcategories. CCC is using the Morrison Low report in preparing its pricing submission to IPART. These WAULs are used to calculate depreciation by dividing the RAB for each subcategory by its respective WAUL. The shorter the WAUL the higher the value of depreciation

The Morrison Low Report:

- uses CCC's fixed asset register **(FAR)** to classify each asset into one of the 20 RAB sub-categories,
- assigns useful economic lives to New Assets
- derives remaining useful life of each asset to calculate a weighted average useful life **(WAUL)** for each RAB sub-category, and
- makes an assessment about the quality of information within the FAR.

A similar disaggregation approach was adoption by Hunter Water's in its proposed calculation of depreciation. The IPART decisions for RAB disaggregation and asset lives are set out in Chapter 6 and Appendix G of the Final Report IPART report, available at.

https://www.ipart.nsw.gov.au/sites/default/files/documents/final-report-review-of-prices-for-hunter-water-corporation-from-1-july-2020-16-june-2020_0.pdf .

2 Scope

R&L McLeod Holdings Pty Ltd have been engaged to form an opinion on whether the depreciation allowance included in setting prices for Central Coast Council's (CCC) water, wastewater and stormwater charges are an accurate reflection of the rate at which the regulatory value of those assets is being consumed.

In summary the work consists of two stages:

2.1 Stage 1

Investigate the allocation of assets from the existing 4 RAB categories **(Categories)** into each of the 20 RAB sub-categories **(Subcategories)** proposed by CCC and consider the impact on WAUL based on the following alternate methodologies:

Subcategory Scenarios

Scenario 1. Use the gross replacement cost **(GRC)** and the depreciated replacement cost **(DRC)** of Assets in the FAR (**Full Valuation Approach)** to calculated WAUL weighted by asset value for each of the 20 Subcategories proposed by CCC.

Scenario 2. Calculate WAUL weighted by asset value for the 20 Subcategories proposed by CCC using:

a) impaired GRC **(DGRC)** and DRC **(DDRC)** of assets created before LIS by applying the impairment ratio used to create the RAB in 2000 (57%), and
b) use full GRC and DRC values for assets created after the line in the sand.

(Together a) and b) are the **LIS Approach).**

Category Scenarios

Scenario 3 Use the Full Valuation Approach to calculate WAUL for each of the 4 Categories Water, Wastewater-North, Wastewater-South, and Stormwater.

Scenario 4 Use the LIS Approach to calculate WAUL for each of the 4 Categories:

2.2 Stage 2

Investigate and scrutinise asset lives proposed by CCC and how those asset lives have been used to generate weighted asset lives for RAB Categories and Subcategories. Including providing advice on:

- the quality of CCC's FAR, and the accuracy of the asset lives for assets included in that FAR
- the proposed lives of New Assets and the remaining lives of Existing Assets, to be applied to forecast capital expenditure
- the method used to generate weighted average asset lives, and the impacts of weighting by asset value, by depreciation or using the FAR generated depreciation. This required the generation of additional scenarios 7, 8, 9, & 10 that repeat scenario 1 - 4 in section *2.1 Stage 1* using WAUL weighted by depreciation.

3 Executive Summary

The **Stage 1** review resulted in materially different calculation of WAUL weighted by value (**WAUL V**) than those recommended in the Morrison Low report. Further this is not the recommended methodology of this review for calculating Depreciation.

The **Stage 2** review of the comparison of impacts of weighting age of assets by value (**WAUL V**) or by depreciation (**WAUL D**) resulted in the following findings:

1. Weighting WAUL by depreciation (WAUL D), is a more accurate method for calculating depreciation and closing RAB in each year, assuming RAB and depreciation are escalated every year and assets are replaced at the end of their useful life.
2. The use of New WAUL to calculate depreciation of New Assets capitalised during a pricing period under-recovers depreciation of New Assets.
3. Disaggregating the RAB into 20 Subcategories does not add any material value in calculation of depreciation of Existing Assets in any year.
4. Disaggregating the RAB into 20 Subcategories will generally provide a more accurate calculation of depreciation of New Assets. The WAUL does not need to be recalculated at each price reset. Generic WAUL representative of the categories can be used, as any over or under-recovery is corrected, when the New Assets are rolled into the existing RAB.

5. FAR depreciation can be scaled to provide the same quantum of RAB Depreciation as that calculated by dividing the RAB depreciable assets by WAUL. This avoids the complexity of recalculating WAUL at each pricing reset.

More detail is provided in *section 3.2 Stage 2 Findings*

3.1 Review of Morrison Low Report

The Morrison Low Report used the weighting asset age by value method to calculate WAUL. The WAUL calculations of this review using the same method are generally materially different from the recommendations in the Morrison Low Report. The differences are in the following areas:

- calculation method for WAUL of Existing Assets,
- incorrect LIS impairment ratio applied to some assets to arrive at impaired GRC and DRC for calculation of new and existing WAUL of Categories and Subcategories,
- integrity of the data in the Morrison Low analysis,
- incorrect allocation of assets to subcategories, and
- method of calculating remaining life.

Table 1 below summarises the difference between the values derived in the Morrison Low Report and the value calculated by the review team. The Morrison Low Report used the parameters described in Scenario 2 (refer section *2 Scope*) for calculating New and Existing WAUL. The reasons for the differences are summarised above and explained in more detail in section *5.4 Data review & observation*. Difference of more than 10% are highlighted red in *Table 1* below.

TABLE 1 SUMMARY OF DIFFERENCES TO ML REPORT

		New WAUL			Existing WAUL		
	Subcategory	Scenario 2	MLC	Difference	Scenario 2	MLC	Difference
Wastewater North	Building	45.8	54.1	-8.3	28.6	27.6	1.0
	Civil	82.9	63.7	19.2	58.3	50.0	8.4
	Mechanical	30.2	32.5	-2.3	23.4	13.0	10.3
	Equipment	14.0	16.8	-2.8	9.9	9.3	0.7
Sewer South	Building	53.4	55.2	-1.8	49.3	42.6	6.7
	Civil	82.9	57.1	25.8	57.2	48.2	9.0
	Mechanical	30.3	33.7	-3.4	22.6	18.4	4.3
	Equipment	14.9	17.0	-2.1	11.8	10.7	1.1
Water	Building	66.7	96.8	-30.1	52.2	68.8	-16.6
	Civil	82.2	71.8	10.4	58.6	54.5	4.1
	Mechanical	34.1	42.5	-8.4	27.0	29.3	-2.3
	Equipment	15.3	23.9	-8.6	11.2	7.9	3.3
Stormwater	Building	N/A	N/A	N/A	N/A	N/A	N/A
	Civil	95.0	95.0	0.0	67.6	60.5	7.1
	Mechanical	49.1	20.0	29.1	40.3	9.3	30.9
	Equipment	No assets	50.4	N/A	No assets	34.7	N/A

3.2 Stage 2 Findings

3.2.1 Impact on depreciation of WAUL weighted by value and depreciation

The impact of weighting asset ages by value to weighting asset ages by depreciation was assessed by comparing the sum of depreciation on each individual asset in the Wastewater North portfolio (**Actual Depreciation**) with depreciation calculated by using WAUL V and WAUL D. This comparison was carried out over 100 years and used:

1. existing Wastewater North portfolio assets,
2. FAR DRC with assets created before LIS impaired by 57%,
3. renewed assets are added to the Portfolio every year. (i.e., when an asset is fully depreciated it is added back at its nominal replacement value in that year and then depreciated in each subsequent year.),
4. growth assets are not included. (i.e., this comparison only includes the existing network, not any future expansion or augmentation to meet the demand of new customers.), and
5. escalation per annum of 2%

The results are graphed in *Figure 1* below and show that depreciation calculated using WAUL D track Actual Depreciation closer than using WAUL V and that WAUL V consistently under recovers depreciation.

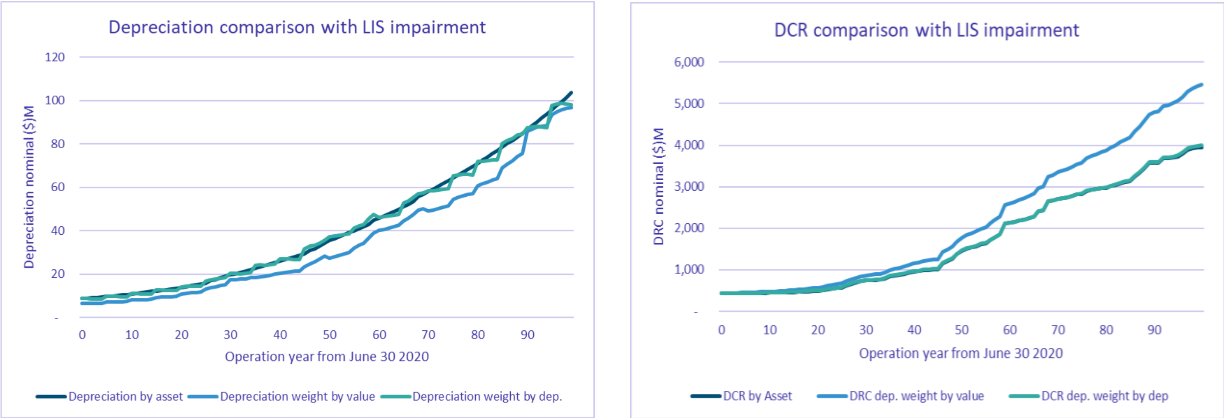


FIGURE 1 COMPARISON OF WAUL WEIGHTING METHODS TO ACTUALL DEPRECIATION

The second graph demonstrates that calculation of DRC for subsequent years using WAUL D closely tracks actual DRC and using WAUL V consistently overstates DRC compared to actual DRC.

It was also noted that there is a material volatility in WAUL V and WAUL D over time reinforcing the need to recalculate WAUL applied to depreciation at each price reset. The graphs in *Figure 2* below shows the variance in WAUL D at Category and Subcategory Level. The first graph compares WAUL V & WAUL D at Category level over time demonstrating that WAUL V is always higher that WAUL D. This is consistent with observation of depreciation calculated using WAUL V under-recovering regulatory Depreciation if used.

The second graph shows that WAUL D of Wastewater North Subcategories are more volatile at Subcategory level than at Category level.

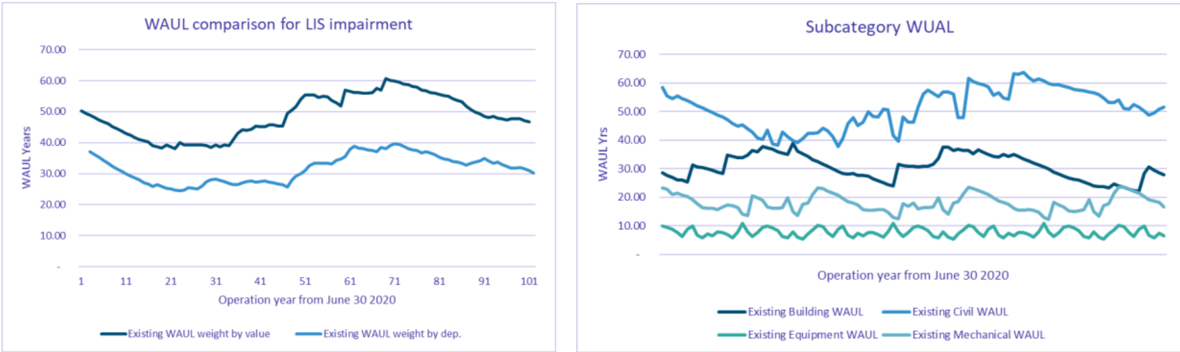


Figure 2 Variation of WAUL over time

3.2.2 Alternate method for calculating Existing Asset depreciation

A comparison was undertaken of Wastewater North FAR depreciation scaled by the FAR to RAB ratio with RAB Depreciation calculated using WAUL D. This comparison summarised in *Table 2* below indicates there is no material difference between the two methods.

Table 2 Comparison of alternate depreciation calculation method

Wastewater North Existing depreciation year 1	
FAR depreciation	8,689,764
RAB:DRC ratio	0.64
FAR depreciation scaled to RAB	5,535,739
RAB	210,382,513
Existing WAUL D	38
Open RAB divided by WAUL	**5,535,840**
Variance	100

This indicates the Open Existing Asset RAB depreciation can be calculated from the FAR after impairing pre-LIS assets DRC values by 57% (**Adjusted DRC**) and scaling the resultant sum of Adjusted DRC depreciation by the ratio of opening depreciable RAB to Adjusted DRC.

Accordingly, the recommended Open Existing Asset RAB depreciation values by Category using this method are summarised in *Table* 3 below. This method has the advantage of simplifying the calculation of regulatory Depreciation. As discussed in *section 3.2.4 Comparison of 4 Categories v 20 Subcategories,* this Existing asset depreciation only needs to be calculated at Category level, as calculating at Subcategory level arrives at the same value.

Table 3 RAB depreciation using alternate method

Category	RAB (depreciable)	FAR DCR impaired for LIS	Ratio RAB/DRC	DRC impaired depreciation	RAB depreciation
Wastewater North	210,382,513	330,249,359	0.64	8,689,901	5,535,827
Wastewater South	408,062,642	362,639,800	1.13	9,695,161	10,909,539
Water	661,022,240	626,917,501	1.05	17,175,342	18,109,692
Stormwater	113,300,205	481,626,413	0.24	8,169,566	1,921,850
Total	**1,392,767,600**	**1,801,433,073**		**43,729,971**	**36,476,908**

3.2.3 Depreciation of New Assets

New WAUL is used to calculate depreciation of assets forecast by CCC to be created during the pricing period. New WAUL is the weighted average of all assets in the portfolio assuming they are all new e.g., weighted using total economic life of a New Asset as opposed to Actual used life of the asset.

A review was undertaken of the impact of using New WAUL to calculate depreciation of New Assets. The WAUL of only the subset renewed assets created in each year was calculated and compared to the New WAUL of all assets in the Wastewater North portfolio. Both were calculated using age weighted by value. The graph at *Figure 3* indicates that New WAUL is generally higher than actual WAUL of the smaller subset of New Assets renewed each year. The conclusion drawn is that deprecation using New WAUL generally under recovers Actual Depreciation of new asset created in a pricing period.

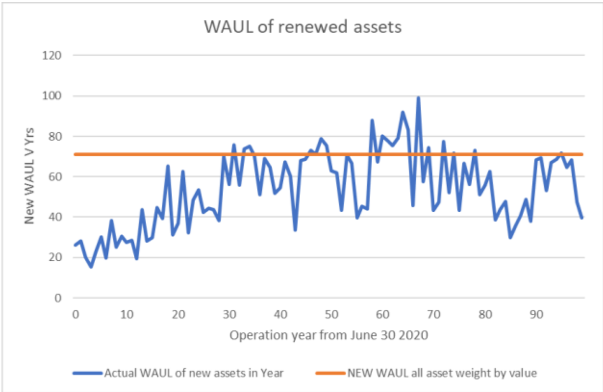


FIGURE 3 COMPARISON OF NEW WAUL ACTUAL WAUL OF RENEWED ASSETS

3.2.4 Comparison of 4 Categories v 20 Subcategories

A review was undertaken of the impact of grouping assets by Subcategory or Category by comparing the calculation of:

1. Depreciation of existing asset using Category and Subcategory WAUL V, and
2. Depreciation of New Assets by using Category and Subcategory WAUL V and comparing them to Actual Depreciation for New Assets created in the first year of the pricing period.

The comparison established that grouping assets by subcategories for the purposes of calculating depreciation on Existing Assets has limited value as it has the same depreciation value as grouping assets by Category.

TABLE 4 COMPARISON OF DEPRECIATION CALCUATION BY CATEGORY AND SUBCATEGORY.

Subcategory and Category	Depreciation ($)
Building	8,547
Civil	4,857,181
Equipment	624,124
Mechanical	3,200,262
Total	**8,690,114**
Total from Category method	8,689,901
Difference	**213**

Grouping New Assets by Subcategory generally provides a more accurate calculation of depreciation for New Assets. If Subcategory WAUL is used to calculate depreciation of New Assets, it is unlikely that recalculating New WAUL by Subcategory at each price reset is warranted. The rolling of New Assets into the existing RAB has the effect of correcting any under or over recovery of new asset depreciation occurring during the pricing period.

Consideration could be given to setting the New WAUL for all Categories to those indicated in Table 5 Below. These figures are based on the average WAUL V over 100 years for Wastewater North. This will result in a more accurate outcome than using Category level WAUL and a moderate under recovery in the pricing period that will be recovered at the next price reset.

TABLE 5 PROPOSED WAUL FOR NEW ASSETS

Subcategory	WAUL
Building	50
Civil	80
Mechanical	30
Equipment	15

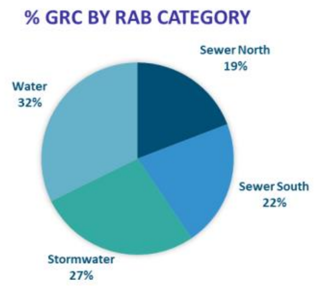
This on the basis that New Assets are incorporated based forward estimates of time and cost and will be adjusted and rolled in the RAB at their actual cost and depreciated from the actual date of installation at the next prices reset.

4 Summary of asset base value

The following *Table 6* is a summary of the GRC, and DRC by Category. More detailed breakdowns are provided in *section 7 Asset condition integration with remaining lives of assets.* These are CCC FAR values with no impairment for pre-LIS assets.

TABLE 6 GRC & DRC VALUE BY RAB CATEGORY

RAB Category	Gross Replacement Cost ($)	Depreciated Replacement Cost ($)
Wastewater North	1,110,918,374	766,023,654
Wastewater South	1,237,353,000	843,593,843
Stormwater	1,577,838,538	999,021,461
Water	1,871,888,402	1,028,505,268
Grand Total	**$5,797,998,313**	**3,637,144,227**



The following *Table 7* summarises the DGRC and DDRC of asset by the Category with assets created before the LIS discounted by the impairment applied in 2000 on initial setting of the RAB. DDRC should theoretically be consistent with the opening RAB values.

TABLE 7 GRC & DRC DISCOUNTED FOR LIS

RAB Category	DGRC ($)	DDRC ($)	Opening RAB 2022 (2021$)	Variance ($)	Variance (%)
Wastewater North	605,180,248	433,892,989	231,114,426	202,778,563	88%
Wastewater South	645,239,564	455,004,624	427,472,821	27,531,803	6%
Stormwater	817,988,932	553,102,462	124,718,605	428,383,857	343%
Water	1,035,505,829	626,917,501	661,022,240	-34,104,739	-5%
Grand Total	**3,103,914,573**	**2,068,917,576**	**1,444,328,092**	**624,589,484**	43%

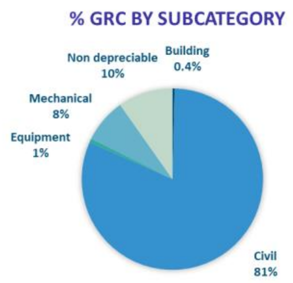
There is a significant variance between the Stormwater DRC and its Opening RAB. CCC advised that part of the reasoning for the difference is there are Waterway's assets in the FAR that had not been added to the RAB as they relied on the Stormwater levy funding.

It could not be determined from the Wastewater North FAR and ML spreadsheets, if the GRC for large bore sewerage pipes has been discounted in accordance with the "NSW Reference Rates Manual Valuation of water supply, sewerage and stormwater assets". If this discount was not applied comprehensively or correctly is could partly explain the variance between the DDRC and the Wastewater North 2021 opening RAB.

The *Table* 8 below groups the DGRC and DDRC asset values by Subcategory.

TABLE 8 GRC & DRC W LIS DISCOUNT GROUPED BY SUBCATEGORY

Subcategory	GRC ($) (LIS Impaired)	DRC ($) (LIS Impaired)
Building	14,645,684	9,611,723
Civil	2,432,569,111	1,527,725,685
Mechanical	350,699,749	240,717,294
Equipment	38,515,525	23,378,371
Non depreciable	267,484,503	267,484,503
Grand Total	**3,103,914,573**	**2,068,917,576**



The ratio of Civil assets to total assets is consistent with a Water, Wastewater and Stormwater business. The majority of non-depreciable asset are civil asset and when combined with the depreciable Civil assets account for approximately 80% of all assets, however this ratio may be lower if the value of Stormwater Civil DDRC is overstated, bearing in the mind the Stormwater DDRC is over three times greater than the Stormwater opening RAB value.

5 Scenario Analysis

This *section 5* sets out the WAUL review under various scenarios. The method, formulae, assumptions, and limitations of these calculations are provided in detail in section *8.1 Methodology applied*.

5.1 Lives grouped by Category & Subcategory

Scenarios 1 & 2 disaggregate the assets in the RAB into 20 Subcategories, consisting of 4 RAB Categories: Water, Wastewater-North, Wastewater-South, and Stormwater, which are further disaggregated into 5 subcategories:

- Building
- Civil,
- Mechanical, (includes electrical and mechanical assets)
- Equipment, and
- Non-depreciable

The Category non-depreciable is only included in the valuation tables and does not attract a WAUL. The Stormwater Category does not have any buildings. No equipment was identified in the review of the Stormwater assets. Assets in the equipment Category are typically short life control equipment, instrumentation, or other light duty short life assets. The Morrison Low Report includes assets in this Stormwater Category that are not consistent with the categorisation of equipment in other Categories. This review identified and classified Stormwater assets into two Subcategories: Civil and Mechanical. Bearing in mind the small ratio of Mechanical to Civil assets, there is no material benefit in disaggregation of the Stormwater Category (refer *Table 9 & Table 10*).

For the purposes of recommending WAUL there are 14 subcategories. These 14 categories were analysed in two ways:

Scenario 1. Uses GRC to calculate New WAUL of each Subcategory. That is, the weighted average life using GRC is calculated as though all the assets in the Subcategory inventory were new. The GRC is then used to calculate DRC for each asset based on the remaining useful life of each asset in the FAR. DRC is then used to calculate Existing WAUL by Subcategory, (refer detail of formula for calculating New and Existing WAUL in section *8.1 Methodology applied*).

Scenario 2. Uses the same process to calculate New WAUL and Existing WAUL for each Subcategory but uses DGRC and DDRC values i.e., the GRC and DRC of assets that were existing before the LIS are discounted by 57%, being the impairment applied in creating the initial RAB in 2000.

TABLE 9 WAUL BY CATEGORY AND SUBCATEGORY

	Scenario 1 (not impaired)		Scenario 2 (impaired)		Variance	
Category & Subcategory	New WAUL (1)	Existing WAUL (1)	New WAUL (2)	Existing WAUL (2)	New WAUL	Existing WAUL
Wastewater North						
Building	45.9	27.9	45.8	28.6	0.3%	-2.4%
Civil	83.0	54.5	82.9	58.3	0.1%	-7.1%
Mechanical	30.3	24.0	30.2	23.4	0.4%	2.7%
Equipment	14.0	10.1	14.0	9.9	0.3%	1.7%
Wastewater South						
Building	51.8	46.5	53.4	49.3	-3.1%	-6.1%
Civil	83.0	53.7	82.9	57.2	0.1%	-6.6%
Mechanical	30.3	22.6	30.3	22.6	-0.1%	-0.4%
Equipment	14.9	11.8	14.9	11.8	0.0%	0.0%
Water						
Building	65.9	46.6	66.7	52.2	-1.2%	-12.1%
Civil	82.8	54.2	82.2	58.6	0.8%	-8.0%
Mechanical	34.8	26.4	34.1	27.0	2.0%	-2.2%
Equipment	15.3	11.2	15.3	11.2	0.0%	-0.3%
Stormwater						
Civil	95.3	62.2	95.0	67.6	0.2%	-8.6%
Mechanical	51.0	38.9	49.1	40.3	3.7%	-3.4%

Scenario 7. Uses the rate of depreciation of assets for weighting ages of New Assets and Existing Assets to calculate New WAUL of each Subcategory. The rate of depreciation is calculated by dividing GRC (not impaired) by the Useful life of

the asset. New WAUL D is calculated as though all the assets in the Subcategory inventory were new using the economic useful life of the assets. Existing WAUL D is calculated using the remaining life of assets (refer detail of formula for calculating New and Existing WAUL in *section 8.1 Methodology applied*).

Scenario 8. Uses the same process to calculate New WAUL D and Existing WAUL D for each Subcategory but uses depreciation calculated from the DGRC, GRC impaired for LIS i.e., the DRGC is divided by the useful economic life of the assets from new.

TABLE 10 WAUL WEIGHTED BY DEPRECIATION

	Scenario 7 (not impaired)		Scenario 8 (impaired)		Variance	
Category & Subcategory	**New WAUL (1)**	**Existing WAUL (1)**	**New WAUL (2)**	**Existing WAUL (2)**	**New WAUL**	**Existing WAUL**
Wastewater North						
Building	41.67	24.15	40.90	24.41	1.9%	-1.1%
Civil	81.54	49.06	81.59	52.66	-0.1%	-7.3%
Mechanical	30.25	21.94	30.15	21.61	0.3%	1.5%
Equipment	13.52	8.36	13.46	8.19	0.5%	2.1%
Wastewater South						
Building	46.91	29.66	48.25	33.34	-2.9%	-12.4%
Civil	81.71	49.77	81.71	52.58	0.0%	-5.6%
Mechanical	30.21	20.38	30.23	21.01	-0.1%	-3.1%
Equipment	14.83	10.99	14.83	10.99	0.0%	0.0%
Water						
Building	61.71	34.47	63.15	41.44	-2.3%	-20.2%
Civil	78.67	42.70	77.18	46.23	1.9%	-8.3%
Mechanical	30.06	18.61	29.40	19.25	2.2%	-3.4%
Equipment	15.11	8.11	15.11	8.14	0.0%	-0.3%
Stormwater						
Civil	93.73	55.56	93.46	60.20	0.3%	-8.4%
Mechanical	45.34	29.74	43.22	30.00	4.7%	-0.9%

A comparison of the result of Scenarios 1 & 2, reveals that there are minor differences in the New WAUL between the two scenarios. Similarly for Scenarios 7 & 8, there are minor differences in the New WAUL between the two scenarios.

There are material differences between the Existing WAUL values when pre-LIS GRC values are impaired. Impairment has the effect of reducing the weighting of pre-LIS assets and increasing the weighting of post-LIS assets. The resultant WAUL can move either way depending on the relative movement of pre and post LIS weighting. The example below (*Table 11*) is an example for WAUL of Existing Wastewater South Civil assets using WAUL V. This shows a reduction in the WAUL of Pre-LIS asset after impairment as expected, in this example the upward movement in post-LIS assets is higher resulting in a net upward movement in WAUL for the Subcategory and consequent reduction in depreciation.

TABLE 11 EXAMPLE IMPAIRMENT IMPACT OF WAUL

WAUL component	Existing WAUL (no impairment)	Existing WAUL (with impairment)	Difference
Pre-LIS WAUL	42.72	35.84	6.88
Post-LIS WAUL	10.96	21.39	-10.43
Total WAUL	**53.7**	**57.2**	**-3.54**

The Civil Subcategory accounts for approximately 80% of the value of the RAB and the variance in existing WAUL after impairment of the FAR will have a material impact on the quantum of economic depreciation. In addition, the sum of GRC of assets pre-LIS is 80% of total GRC of total RAB for all Categories. This means that 80% of the assets attract less depreciation compared to accounting depreciation.

The advantage of Scenario 1 (Full Valuation Approach) is that the WAUL generates a rate of depreciation of actual GRC required to return capital expended where Scenario 2 (LIS Approach) more closely generates a rate of depreciation required to return the capital value in the initial RAB. In other words, because the initial RAB was impaired in 2000, for valuation reasons, the rate of return of capital or depreciation was reduced from that which would be required for replacement of asset at their gross replacement cost.

The advantage of Scenarios 7 & 8 (WAUL weighted by depreciation) is that as discussed in *section 3.2 Stage 2 findings*, it tracks actual depreciation more accurately than using the depreciation calculated from WAUL weighted by value.

5.2 Lives Grouped by Category only

Scenarios 3 & 4 group the asset by the 4 RAB Categories water, Wastewater-North, Wastewater-South, and Stormwater and calculate a New WAUL and Existing WAUL for each Category.

Like Scenarios 1 & 2, Scenarios 3 & 4 use GRC and DGRC respectively to calculate New and Existing WAUL V values.

TABLE 12 WAUL BY CATEGORY (WEIGHT BY VALUE)

	Scenario 3 (not impaired)		Scenario 4 (impaired)		Variance	
Scenario 3 & 4	New WAUL (3)	Existing WAUL (3)	New WAUL (4)	Existing WAUL (4)	New WAUL	Existing WAUL
Wastewater North	74.3	48.6	71.6	50.3	3.6%	-3.4%
Wastewater South	75.2	48.6	70.9	48.8	5.8%	-0.3%
Water	77.7	51.0	74.8	53.5	3.8%	-5.0%
Stormwater	94.7	61.9	94.1	67.0	0.6%	-8.3%

Further Scenarios 9 & 10 were also considered. These scenarios used depreciation to weight the age of Existing and New Assets. Scenarios 9 & 10 use GRC and DGRC respectively to calculate depreciation that is then used to weight ages of assets in calculating New and Existing WAUL D values.

Table 13 WAUL by Category (weight by depreciation)

	Scenario 9 (not impaired)		Scenario 10 (impaired)		Variance	
Category	New WAUL (11)	Existing WAUL (12)	New WAUL (13)	Existing WAUL (14)	New WAUL	Existing WAUL
Wastewater North	62.34	38.69	57.71	38.00	7%	2%
Wastewater South	64.08	39.68	57.03	37.40	11%	6%
Water	66.23	36.39	60.29	36.50	9%	0%
Stormwater	92.48	54.89	91.38	58.95	1%	-7%

Like Scenarios 1 & 2 above, Scenarios 3 & 9 WAUL calculations using GRC & DRC (not impaired) more closely represents the WAUL for determining the accounting rate of depreciation to fund future renewal at GRC value. Scenarios 4 & 10 more closely represents WAUL required to calculate a rate of return of RAB Capital.

For example, if we consider Wastewater North the DRC total is $564,000,000 (excluding non-depreciable items) and the Existing WAUL (3) is 48.6 yrs. providing an annual depreciation rate of $11,600,000. Where the Discounted DRC (quasi RAB) for Wastewater North is $333,000,000 and the Existing WAUL (14) is 38 yrs. providing annual return of capital of $8,750,000.

The advantages of calculation by Category compared to calculation by Subcategory is:

1. the risk of incorrectly allocating assets to categories and distorting Depreciation is eliminated,
2. the regulatory burden of preparing and calculating Depreciation is simpler for IPART and the utility, and
3. The calculation is less complex and arrives at the same quantum of depreciation for Existing Assets (refer *section 3.2.4* above)

This could be further simplified by combining Wastewater South and Wastewater North Categories.

WAUL using depreciation to weight asset ages provides the most accurate method for calculating depreciation (refer *section 3.2.1*). As discussed, in the introduction Depreciation is for the purpose of return of asset (i.e., value of the RAB). On this basis Scenario 10 represents the simplest and most accurate method of calculating the rate of regulatory depreciation for Existing Assets and using generic Subcategory WAUL is recommended for calculating New Asset depreciation (refer *section 3.2.3* above).

Further as discussed in the *section 3.2.2* Scenario 10 can be further simplified by scaling the total depreciation calculated from the FAR (impaired) in the ratio of FAR DCR (impaired) to the RAB. This provides the same quantum of depreciation but derived with less complexity.

5.3 Lives grouped by Subcategory only

An alternative approach of grouping assets by Subcategories and calculating WAUL for the four subcategories was analysed. This approach is not favoured because of the large discrepancy between the Discounted DRC for Stormwater and the RAB. This will be distorting the WAUL values for Civil and could not be relied upon.

TABLE 14 WAUL BY SUBCATEROGY

	Scenario 5		Scenario 6	
Subcategory	New WAUL (5)	Existing WAUL (5)	New WAUL (6)	Existing WAUL (6)
Building	64.8	46.0	65.6	51.6
Civil	86.6	56.6	86.3	61.1
Mechanical	32.7	24.9	32.4	25.1
Equipment	14.9	11.1	14.9	11.1

5.4 Data review & observation

There were several anomalies noted in the review of the Morrison Low Report. Details of the observations and action taken in this report are detailed in Table 15 below:

TABLE 15 ML REPORT DATA & CALCULATION REVIEW

Observation	Action
The Morrison Low Report used GRC discounted to line in the sand to calculate Existing WAUL rather than, DRC or DDRC.	The calculation of Existing WAUL in this report uses GRC DGRC and remaining useful life to calculate DRC, DDRC and subsequently Existing WAUL.
The Morrison formulae for New WAUL uses the correct data points for calculation, noting the terminology in table headers is incorrect.	New column header was created in a combined data set used to calculate WAUL.
Wastewater Nth and Wastewater South GRC values were incorrectly discounted by 43% not 57% as required to calculate DGRC.	DGRC values are adjusted in this report using the correct discount rate.
The Calculation for Civil WAUL new and existing for Wastewater Nth and Wastewater South included approximately 380 mechanical /electrical, and equipment assets and those assets were duplicated in other asset groups that were used to calculate mechanical /electrical, and equipment WAUL.	Data was migrated to a single data base and cleaned to remove duplicate assets.
The Wastewater North building WAUL sheet included Wastewater South building assets and were duplicated in the Wastewater South building WAUL calculation.	Data was migrated to a single data base to clean data and remove duplicate assets.
The same asset (Asset number 1187113) was duplicated over 440 times in Wastewater North Mechanical Sheet that calculated Mechanical WAUL.	Data was migrated to a single data base to clean data and remove duplicate assets.
There were 387 civil assets that where in the CCC FAR but missing from the MLC Spreadsheet for calculating Water Civil WAUL.	Data was migrated to a single data source to clean data and removed duplicate assets.

<table>
<tr><th>Observation</th><th>Action</th></tr>
<tr><td>Some assets where not classified correctly.</td><td>An asset categorisation review was undertaken, and items reclassified. It is unlikely that this had a material impact on WAUL.</td></tr>
<tr><td>There were differences in the opinion on the new useful lives of assets.</td><td>Asset lives were adjusted refer section 6.1 Review of New Useful Lives below for details.</td></tr>
<tr><td>There are some assets that are still in service that are theoretically past the service life but still recorded as being in service in the FAR. The MLC method of calculating remaining life uses the ratio of DRC/GRC x New Life.</td><td>This represented about $12M dollars of assets. Most of the assets were mechanical assets. This report calculates remaining life assuming the assets were replaced, and a replacement asset was in service.</td></tr>
<tr><td>For Stormwater assets The Morrison remaining lives are estimates based on condition assessment. This appears to be driven by the fact that the date for bringing some assets into service are unknown or unreliable. Some assets are still in service after their theoretical useful life. The condition rating system is a five step no linear grading system that is subjective and coarse in its impact on remaining life, refer table below.
<table>
<tr><th>Condition</th><th>Remaining Life</th></tr>
<tr><td>1</td><td>90%</td></tr>
<tr><td>2</td><td>60%</td></tr>
<tr><td>3</td><td>35%</td></tr>
<tr><td>4</td><td>15%</td></tr>
<tr><td>5</td><td>5%</td></tr>
</table></td><td>This report uses the Morrison Low Report estimate for in service dates, where available, to calculate existing WAUL. This is considered a more accurate method.</td></tr>
</table>

6 Asset lives review

6.1 Review of New Useful Lives

In ascertaining the suitability of CCC's newly nominated useful lives and asset management practices in general, we reviewed the information documented in the ML report against several sources including industry standards, depreciation guidelines and professional experience. The following information sources were considered.

- Taxation Ruling (TR 2021/3), released by the ATO
- International Infrastructure Management Manual (IIMM) 2015
- AS ISO 55000:2014: Asset management - Overview, principles, and terminology
- AS ISO 55001:2014: Asset management - Management systems - Requirements
- AS ISO 55002:2019: Asset management - Management systems - Guidelines for the application of ISO 55001

- AS 3600 – 2001: Concrete structures
- AS/NZS 2327 – 2003: Composite Structures
- AS/NZS 2312 – Guide to the protection of structural steel against atmospheric corrosion using protective coatings
- AS 4678 – 2002: Earth-retaining Structures
- AS/NZS 3725: 2007 – Design for installation of buried concrete pipes
- AS/NZS 3500 – National Plumbing and Drainage Code
- Building Codes of Australia.
- Guide to valuation and depreciation - CPA Australia
- Infrastructure Assets Useful Lives, SA Councils' Current Practices, May 2014 (Tonkin Consulting - Ref No. 20110640FR1C)
- Local Government & Municipal Knowledge Base (http://lgam.wikidot.com/)

Generally, the nominated useful lives for every asset class are in alignment with standard industry practices. Several exceptions are documented below.

- Sewer outfalls are given 150 years of useful life which is longer than 80 to 100 years, the typical life for sewer civil assets.
- Roads associated with water reservoirs are given 50 years of useful life, which is lower than the typical industry expectation of 80 to 100 years for assets of this type.
- Building signage is given 50 years of life, which is longer than standard industry expectations of around 10 to 20 years, considering the deterioration of paintwork.
- Electrical solar systems are given 20 years of useful life, which is long considering sensitive power conditioning circuitry typically have a shorter life of 10 to 15 years.
- Telemetry ICT systems are given 15 to 30 years, which seems too long considering obsolescence and changing technology. Typically, 5 to 10 years is expected for assets of this type.
- Sewage pump station instrumentation is given 50 years of life, which seems too long. Typically 15 to 20 years is expected for assets of this type.
- Sewage SCADA is given 30 years of useful, which is long considering obsolescence and changing technology. Typically, 10 to 15 years is expected for assets of this type.

The useful lives recommended by the ML Report for Stormwater have been adopted in this report. Some of the useful lives for Wastewater North, South and Water assets have been adjusted in the report, generally downwards. Details of the Useful lives adopted are provide in Appendix 1 & 2 in this report.

6.1.1 Asset lives recommendations

1. Consider reviewing and shortening the useful lives of asset classes with software dependencies such as ICT, SCADA, and instrumentation. Whilst the capital value of these assets is not material to CCC's fleet, failure of such assets has the potential to lead to high consequence incidents.
2. 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 Review of Remaining Useful lives

In reviewing the new and existing WAUL as nominated by CCC, the supplied RAB datasets were analysed against the results documented in the Morrison Low Report. In doing so we observed the following:

6.2.1 Stormwater

1. The methodology for calculating new and existing WAUL for this asset class is unique to other asset classes. The calculations rely solely on asset condition adjusted remaining life in lieu of actual installation dates.
2. The dataset appears to be missing significant quantities of installation date information, which may explain the use of condition information instead.
3. This report recalculated the existing WAUL using Morrison Low's methodology and using actual installation dates where the information is available with medium to high confidence. The results yielded generally longer WAUL values. This suggests CCC's condition assessment methodology may be a more conservative, risk averse approach.
4. Significant quantities of channels have no financial values assigned, suggesting significant quantities of non-depreciable assets may be miscategorised. 599 of 1043 entries were observed with $0 GRC, comprising of:
    a. 591 assets marked as "in service"
    b. 2 assets marked as "removed"
    c. 6 assets marked as "unknown status"
    d. 411 assets had documented construction dates of varying confidence levels. The average age of these assets is 33 years, with the oldest asset being 60 years old, which is within the theoretical expected life of 100 years.
    e. No condition driven remaining life were observed for all 599 assets.

6.2.2 Wastewater South

1. There were no signs of asset condition information being used in the evaluation of remaining life.
2. We observed the nominated useful life was not consistently applied to individual assets in the RAB. Take Sewer Gravity Mains for example, some of the adopted lives are as high as 238 years, which is significantly higher than the nominated life of 100 years. Approximately $8.3m of PV Mains assets have adopted useful lives more than 200 years.
3. As the adopted useful life is used to calculate consumption ratio, the inconsistency propagates through to other key values such as WDV, MLC remaining life and the existing WAUL. This can lead to over optimistic results. For example, a $7.2m (GRC) sewer gravity mains built in 1986 was observed to still have 96% of useful life remaining.
4. 31,252 of 51,944 entries (about $85m total GRC) of assets in PV mains SL have GRC less than $5,000 (lowest was $3), which seems low considering they are main pipelines.
5. 15,372 of 15,377 assets in the non-depreciating long-life register have their depreciable portion documented in the short life spreadsheet. The non-

depreciable portions of these assets average to 43% of the total GRC (minimum 20% max 61%), which aligns with the NSW Reference Rates Manual.

6. The RAB hierarchy provided in the WAUL summary tables within the Morrison Low Report is inconsistent with the proposed disaggregation categories. In particular, the civil asset class is the sum of several subcategories (e.g., STP, PV Mains, PV SPS). These Subcategories do not strictly contain civil assets, and includes mech/elect, telemetry, and other asset classes already accounted for. This inconsistency results in the civil asset class to be overvalued.

6.2.3 Wastewater North

1. Significant number of asset entries (16051/43462) under north PV mains SL were discovered to have $0 GRC. The average age of these assets is 37 years, with the oldest asset being 57 years old, which is within the theoretical expected life of 100 years. 2 of the assets were marked as depreciable.
2. 7,034 of 5,1944 entries (about $22m total GRC) of assets in PV mains SL have GRC less than $5,000 (lowest was $22), which seems low considering they are mains pipelines
3. We observed the GRC of non-depreciating long life assets average to $8,000 (Range from $200 to $200,000), which seems low considering they are mostly gravity main civil structures.
4. Inconsistencies observed in the Wastewater South database were also evident in the Wastewater North data, however the level of discrepancy is less in comparison. For example, the highest adopted useful life for sewer gravity mains is 150 years, which is still higher than nominated but not as impactful as 238 years as seen in the Wastewater South dataset.

6.2.4 Water Supply

1. There were no signs of asset condition information being used in the evaluation of remaining life.
2. We observed the nominated useful life was not consistently applied to individual assets in the RAB. Take Transfer Mains for example, some of the adopted lives are as high as 256 years, which is significantly higher than the nominated life of 100 years. Approximately $122M GRC worth of Water Mains assets have adopted useful life more than 200 years.
3. Significant number of asset entries under Water Mains were discovered to have $0 GRC. 8,595 of 39,391 entries were observed, the average age of these assets is 41 years, with the oldest asset being 70 years old, which is within the theoretical expected life of 80 to 100 years. 33 of the assets observed have either exceeded or are about to exceed CCC’s currently adopted useful life.
4. Approximately $20M GRC of Water Mains assets have exceeded their theoretical useful life. The RAB value for these assets adopted as 43% of the GRC.
5. Approximately $10M GRC of mech/elect/telemetry assets in the Dams and Weirs asset classes are miscounted under civil in the ML report, also impacting the associated WAUL calculations.

6. Approximately $48.5M GRC of mech/elect/telemetry assets in the WTP asset classes are miscounted under civil in the ML report, also impacting the associated WAUL calculations.
7. Approximately $14M GRC of mech/elect/telemetry assets in the Reservoir asset classes are miscounted under civil in the ML report, also impacting the associated WAUL calculations.

7 Asset condition integration with remaining lives of assets

A review was undertaken of CCC asset management system to ascertain if there was a link between condition assessment, the FAR, adjustment of remaining useful lives, calculation of depreciation. We note the document and processes reviewed have been implemented post the production of the Morrison Low Report.

The following documents were examined:

- 185804_KA3_HA_07-HA_06_6_09_2019_Condition Assessment
- 12524579-REP-A_CCC Reservoir External Condition Assessment - Killcare
- 12555861-REG_Products and Manufactures Register Appendix
- CCC 2021 - Methodology for Condition Rating
- CCC Wastewater South RAB calc
- CH WWTP Condition Assessment - Appendices A-K_Draft 20190318
- Community-strategic-plan-2018-2025
- Copy of D14159594 Charmhaven STP - Condition Assessment - Appendices A-G (HH2O)
- Copy of Overall SPS Condition Assessment scores & SOW
- Copy of WPS Condition Assessment Analysis
- CW WSD v2 - Central Coast Council 20201203
- D14159963 Charmhaven STP - Condition Assessment Report Final (GHD)
- Delivery_and_Operational_Plan_2021-22_0_0
- Draft- 12555861-REP-A_Water Treatment Plant AMP
- HH2O - Reservoir Assessment Report - Bateau Bay
- IPWEA Useful Lives - useful_lives_-_version_1
- Mardi WTP O_M_Schedule_v1.0
- NSW Reference Rates Manual
- Response Notes
- Resourcing-strategy-2018
- Sewer Rising Main - FB1 - Site Operating Details - Pipe Sample Condition Assessment
- Somersby WTP O_M_Schedule_v1.0
- Useful Lives Table
- Work Order Example
- Woy Woy WTP O_M_Schedule_v1.0

The following observations are based on the information provided:

1. Asset condition assessment methodologies are developed and implemented in a robust, tiered approach with linkages to other corporate systems such as GIS.
2. Detailed condition assessments are conducted to a high standard, incorporating asset criticality and risk-based approaches to remediation.

3. Detailed condition summaries and defect elimination plans are developed at the facility level, including cost estimates to effectively inform funding strategies.
4. Some information management workflows are developed, with interface points across multiple business functions in the organisation.
5. High level corporate objectives, policies, metrics, and funding allocation are developed specifically to drive improvement outcomes in asset management
6. Whole of life management strategies are considered for certain asset types to include FMEA, standardised equipment specification and critical spares documentation.
7. CCC's work management system (Infor) allows for the input of condition information but is not utilised in the examples provided in the Morrison Low Report.

Based on the observations above, we believe CCC is progressing adequately in achieving the "core" level of asset management maturity under the IIMM and ISO 55000 framework and are confident that if applied as planned will achieve substantial improvements in data integrity for the next pricing submission.

8 Weighted Average lives

8.1 Methodology applied

The formulae for calculating new and existing WAUL is based on weighting by as follows:

Valued Weighted WAUL formulae

New WAUL = $\sum \frac{New\ Useful\ life\ asset\ x\ (yrs)\ x\ (GRC\ of\ asset\ x)}{\sum GRC\ of\ assets\ in\ category}$

Existing WAUL = $\sum \frac{Remaining\ Useful\ life\ asset\ x\ (yrs)\ x\ (DRC\ of\ asset\ x)}{\sum DRC\ of\ assets\ in\ category}$

Depreciation Weighted WAUL formulae

New WAUL = $\sum \frac{New\ Useful\ life\ asset\ x\ (yrs)\ x\ (Depeciation\ asset\ x)}{\sum Depreciation\ of\ assets\ in\ category}$

Existing WAUL = $\sum \frac{Remaining\ Useful\ life\ asset\ x\ (yrs)\ x\ (Depreciation\ \ of\ asset\ x)}{\sum Depreciation\ \ of\ assets\ in\ category}$

GRC and DRC values used in calculations may be the impaired values depending on the scenario.

The new lives of asset generally use the Morrison Low recommendation for new life with exceptions mentioned above.

The calculation of remaining useful life used the CCC date put into service (DPIS) or the ML Estimate Built Year for Stormwater to calculate the duration assets have been in services. This was deducted from the new useful life to calculate the remaining useful life of each asset. The alternate methods for calculating remaining useful life in the Morrison Low report were not used.

8.2 Detail Breakdown of GRC and DRC

Table 16 & Table 17 below provides detail breakdown of the GRC and DRC values with and without discount for LIS.

Table 16 Detail GRC and DRC values

	Gross Replacement Cost ($)	GRC % of Total and Subtotal	Depreciated Replacement Cost ($)	DRC % of Total and Subtotals
Wastewater North	**1,110,918,374**	**19.2%**	**766,023,654**	**21.0%**
Building	724,723	0.1%	419,945	0.1%
Civil	761,102,956	68.5%	457,929,205	59.8%
Equipment	8,841,630	0.8%	5,469,950	0.7%
Mechanical	138,481,909	12.5%	100,437,398	13.1%
Non depreciable	201,767,156	18.2%	201,767,156	26.3%
Wastewater South	**1,237,353,000**	**21.3%**	**843,593,843**	**23.2%**
Building	780,912	0.1%	493,678	0.1%
Civil	883,380,040	71.4%	538,066,744	63.8%
Equipment	10,121,647	0.8%	7,500,449	0.9%
Mechanical	139,861,543	11.3%	94,324,115	11.2%
Non depreciable	203,208,858	16.4%	203,208,858	24.1%
Stormwater	**1,577,838,538**	**27.2%**	**999,021,461**	**27.5%**
Civil	1,405,786,942	89.1%	833,219,868	83.4%
Mechanical	18,167,785	1.2%	11,917,782	1.2%
Non depreciable	153,883,811	9.8%	$153,883,811	15.4%
Water	**1,871,888,402**	**32.3%**	**1,028,505,268**	**28.3%**
Building	21,282,058	1.1%	11,889,192	1.2%
Civil	1,669,266,404	89.2%	905,976,810	88.1%
Equipment	20,289,695	1.1%	10,894,405	1.1%
Mechanical	161,050,245	8.6%	99,744,861	9.7%
Grand Total	**5,797,998,313**	**100.0%**	**3,637,144,227**	**100.0%**

TABLE 17 DETAIL GRC AND DRC VALUES DISCOUNTED FOR LIS

	Discounted GRC ($)	% of Total and Subtotals	Discounted DRC ($)	% of total and Subtotal
Wastewater North	**605,180,248**	**19.5%**	**433,892,989**	**21.0%**
Building	335,242	0.1%	200,119	0.0%
Civil	396,300,541	65.5%	255,789,091	59.0%
Equipment	8,398,798	1.4%	5,109,489	1.2%
Mechanical	96,502,036	15.9%	69,150,660	15.9%
Non depreciable	103,643,630	17.1%	103,643,630	23.9%
Wastewater South	**645,239,564**	**20.8%**	**455,004,624**	**22.0%**
Building	629,672	0.1%	435,034	0.1%
Civil	428,605,933	66.4%	275,804,297	60.6%
Equipment	10,111,683	1.6%	7,493,692	1.6%
Mechanical	113,527,452	17.6%	78,906,777	17.3%
Non depreciable	92,364,824	14.3%	92,364,824	20.3%
Stormwater	**817,988,932**	**26.4%**	**553,102,462**	**26.7%**
Civil	731,905,440	89.5%	471,488,235	85.2%
Mechanical	14,607,443	1.8%	10,138,178	1.8%
Non depreciable	71,476,049	8.7%	71,476,049	12.9%
Water	**1,035,505,829**	**33.4%**	**626,917,501**	**30.3%**
Building	13,680,771	1.3%	8,976,570	1.4%
Civil	875,757,196	84.6%	524,644,061	83.7%
Equipment	20,005,044	1.9%	10,775,190	1.7%
Mechanical	126,062,819	12.2%	82,521,680	13.2%
Grand Total	**3,103,914,573**	**100.0%**	**2,068,917,576**	**100.0%**

8.3 The following assumption applies to the findings in this report:

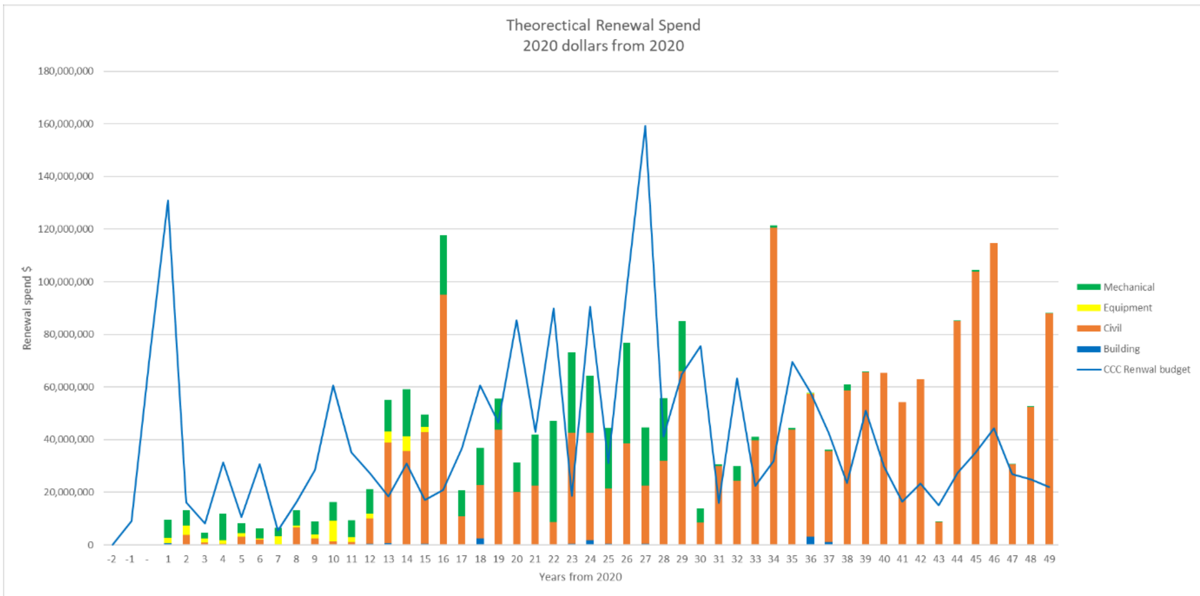
1. The "Cost 1" in the Council FAR is GRC as at 30/6/2020 is based on the 2016 revaluation escalated to 30/6/2020. The rate of escalation is not known.
2. Valuation of large bore sewer mains have been conducted in accordance with the "NSW Reference Rates Manual Valuation of water supply, sewerage and stormwater assets". Review date requested has not been received to be able to validate this assumption.
3. Pre LIS assets are discounted by 57%

8.4 Observations of Renewal forward spending profile

In the review of data there was approximately $12M of mostly mechanical assets identified that were in the FAR in service but had exceeded that theoretical useful life sometime by 2 to 3 times the useful life. It is unlikely these assets will have a material impact on the WAUL of assets. This anomaly triggered a review of the theoretical forward renewal budget for existing assets. The following graph indicates the forward renewal spend based on the modelling in this report and compares it to the CCC FAR indication of forward spend.

CCC renewal budget line (blue line) indicates a possible back log of renewals waiting to be implemented, other possible reasons for this are:

- inaccuracies in the FAR data set in service dates,
- asset have been refurbished or renewed extending the asset life and it is not evident in the FAR data set provided,
- the proposed new useful lives are too short, or
- Some combination of the above.



The graph also indicates a significant increase in renewal spend from Year 12 (2032) onwards.

Appendix 1 Useful lives of Wastewater Nth & Sth.

Asset Type	Useful life this report	ML Report useful Life
Mech/Elec		
Electrical-Property Connection Points	**30**	40
Electrical-Sewer Pump Stations	**30**	40
Electrical-Sewer Treatment Plants	**30**	40
Electrical-Tunnels	**30**	40
Electrical-Vacuum System	**30**	40
Mechanical-Property Connection Points	50	50
Mechanical-Sewer Pump Stations	30	30
Mechanical-Sewer Treatment Plants	30	30
Mechanical-Tunnels	30	30
Mechanical-Vacuum System	50	50
Buildings		
Building	70	70
Building Structure	**70**	100
Fire Services	30	30
Floor finishes	20	20
Floor structure	**70**	90
Internal Fitout	**35**	60
Mechanical services	30	30
Roof Coverings	50	50
STP's		
Civil	80	80
Electrical	30	30
ICT	15	15
Instrumentation	**10**	15
Mechanical	30	30
SCADA	**15**	30
PV SPS		
Civil	100	100
Electrical	**30**	40
Instrumentation	15	15
Mechanical	**30**	40
Telemetry	**15**	30
Network		
Sewer ICT	15	15
Outfall Tunnels		
Civil	**100**	150
Electrical	40	40
Mechanical	40	40

Asset Type	Useful life this report	ML Report useful Life
Civil		
Low Pressure Mains	100	100
Property Connection Points	50	50
Sewer Gravity Mains	100	100
Sewer Pump Stations	100	100
Sewer Reticulation Mains	100	100
Sewer Rising Mains	100	100
Sewer Treatment Plants	60	60
Tunnels	**100**	150
Vacuum System	90	90
Telecommunication		
ICT	**10**	30
Instrumentation	15	15
SCADA	**15**	30
Telemetry	15	15
Sewer Pipework		
Sewer Mains	100	100
AC	70	70
Assume 80UL	80	80
CI	60	60
CICL	70	70
CONC	100	100
DI	80	80
DICL	100	100
FRP	80	80
GRP	80	80
HDPE	80	80
HOBAS	80	80
MSCL	80	80
OPVC	80	80
PE	80	80
PP	80	80
PVC	80	80
RCP	100	100
UNK	80	80
UPVC	80	80
VAR	80	80
VC	70	70
Low Pressure Sewer Systems		
Civil	**80**	100
Electrical	**30**	40
Mechanical	40	40
Telemetry	**15**	30

Appendix 2 Useful lives of Water assets.

Asset Type	Useful life this report	ML Report useful Life
Buildings		
Building Structure	**70**	100
Floor structure	**70**	90
Internal Fit out	**35**	60
Roof Coverings	50	50
Fire Services	30	30
Other services	30	30
Mechanical services	30	30
Floor finishes	20	20
Transportation services	60	60
Dams and Weirs		
Road Pavement	100	100
Foundation	**100**	150
Structure	100	100
Mech - Intake	70	70
Intake Tower	70	70
Misc	**15**	50
Elec - Civil	**30**	50
Fencing	**20**	50
Other	50	50
Signage	**15**	50
Mech	50	50
Elec - Elec	30	30
Heat Fence	20	20
Telemetry	15	15
Monitoring	**15**	25
Mains		
AC	70	70
CI	60	60
CICL	70	70
MPVC	80	80
CONC	100	100
CU	70	70
DI	80	80
DICL	100	100
FRP/GRP	80	80
HDPE	80	80
MSCL	80	80
OPVC	80	80

Asset Type	Useful life this report	ML Report useful Life
PE	80	80
POLY	80	80
PVC	80	80
RC	80	80
UPVC	80	80
Mech	25	25
Telemetry	15	15
Unk	80	80
Assume UL50	50	50
Assume UL80	80	80
Assume UL100	100	100
Tunnel	**100**	150
Elec	30	30
Bores		
Bore	30	30
Elec Power	30	30
Elec Control	15	15
Mech	25	25
Telemetry		
Structure	**80**	85
Hardstand	80	80
Road Pavement	100	100
Elec	30	30
Solar	20	20
Elec Control	15	15
Communication Pole	**25**	50
Fence	**20**	50
Surge Tanks		
Structure	70	70
Tank	95	95
MechELec	**30**	50
Elec	30	30
Elec Control	15	15
Lining	15	15
Meters		
Meter	20	20
WTP		
Pump Mech	30	30
Elec	**30**	40
Telemetry	15	15
Filter	15	15
Metal - Metal	50	50
Structure	100	100

Asset Type	Useful life this report	ML Report useful Life
Tank Roof Structure	40	40
infrastructure - Metal	70	70
Fence	**20**	50
Flocculator	50	50
Valve	30	30
Tank	40	40
compressor	15	15
mech	30	30
elec - control	**15**	20
RES		
Pipework	100	100
Structure	**100**	115
Road Pavement	50	50
Hard stand	100	100
Infrastructure Metal	70	70
Fence	**20**	50
Roof Structure	50	50
Internal Coating	20	20
External Coating	30	30
Misc	**15**	50
Elec - Control	15	15
Elec	30	30
Valve	45	45
Cathodic Protection	20	20
Mech	30	30
Mech Elec		
Elec - Control	15	15
Valve	40	40
Mech	30	30
Pipe Work	**80**	100
Elec	**30**	40
Pump	**30**	45
Wet Well	100	100
Motor	30	30
Chamber	100	100
Access	70	70