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Issues Paper on Renewals Annuity or a Regulatory Depreciation Allowance:

SunWater's Water Supply Schemes 2011-2016 Price Paths

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SAHA

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Executive Summary

SunWater is a Queensland Government-owned Corporation, providing a range of services including bulk water services for irrigation purposes. SunWater currently services 22 Water Supply Schemes (WSSs) that supply water for irrigation.

A recent Ministerial Directive requires the Queensland Competition Authority (the Authority) to develop SunWater's 2011-2016 irrigation prices.

In providing for a recovery of expenditure on renewing and rehabilitating existing assets, the Ministerial Directive requires the Authority to consider whether this should be approached through a renewals annuity (as is currently the case) or a depreciation allowance. SunWater's current renewals annuity represents about 16% of the average annual revenue requirement across all WSSs.

The Authority has commissioned Saha International to prepare this *Issues Paper* relating to the application of a renewals annuity approach or a depreciation allowance approach to recover SunWater's expenditure on renewing and rehabilitating existing assets.

A typical renewals annuity approach recovers the cost of forecast asset renewal and rehabilitation expenditure through a smoothed annualised charge. It recovers the cash requirements needed to renew a system of assets over a medium to long-term period. The annuity paid inherently includes an allowance for the financing charge or interest component as, in general, the timing of the smoothed annuity payment differs from the timing of the renewals expenditure.

The annual charge can be held constant in nominal or real terms and the time profile of charges can be front loaded or back loaded provided the present value of the charges always equals the present value of the expected renewals expenditure.

The renewals annuity approach is a form of *renewal accounting.* The renewal accounting approach recognises that some infrastructural assets have indefinite lives and the recovery of expenditure on these assets should be specified accordingly. If depreciation can be considered as the recovery of the asset capital over its useful life, and the asset has an indefinite or perpetual life, then no depreciation is required for the asset that is being maintained indefinitely. With renewal accounting all costs incurred on these assets are simply recovered (directly expensed) at, or around, the time in which they were incurred. In the case of a renewals annuity approach, a long term forecast of the relevant renewal and rehabilitation expenditure is made, and this cost is converted into a smoothed annuity over the relevant period.

Having a simple constant charge for asset renewal is often considered beneficial for both administration and accounting. A renewals annuity approach assists the financial management of the utility and contributes to the financing of future capital expenditure. It does however typically require long term planning and adjustments for the inevitable forecast errors. In addition the sinking fund or reserve that has to be established and frequently adjusted, when implementing a renewals annuity approach, requires considerable administrative effort.

SunWater uses an asset refurbishment reserve/fund to account for the balance between funds received from the annuity charge and expenditure made. This means that unless the financing charge is specifically paid

into, or withdrawn from, the fund then the fund will have a residual balance. SunWater does not take a return from the sinking fund so any positive residual balance is potentially available for scheme expenditure.

SunWater's application of a renewals annuity approach is underpinned by detailed long term asset management plans. These do create an administrative burden but involve customers and also facilitate productive efficiency through the provision of high quality information about the network and its condition.

A typical regulatory depreciation allowance approach retrospectively recovers only the asset renewal and rehabilitation expenditure classified as capital in nature, over a period of time. The profile in which the capital is returned can be shaped to reflect the deterioration in the asset's condition. In this way, the allowance also provides for expenditure necessary for renewing and rehabilitating assets. However, as is the case for the renewals annuity approach, the profile in which capital is recovered under the regulatory depreciation approach can take any form as long as the same present value is returned.

Unlike the renewal accounting approach, a typical regulatory depreciation approach requires all asset replacement expenditure to be capitalised – irrespective of whether it changes the service potential of assets. The cost of individual assets is then spread over their useful or economic life (this "life" may be somewhat arbitrarily determined). Additionally under a typical regulatory depreciation approach, capital expenditure on asset rehabilitation and renewal is funded by the regulated business through debt or equity and the capital is recovered over time. The regulatory depreciation allowance is typically combined with a separate allowance for a financing charge, or return on capital, to compensate the regulated entity for the capital it has invested.

The regulatory depreciation approach is more widely accepted by regulators and makes the utility responsible for financing the asset expenditure. Conversely this means that the utility has to find funding for a potentially "lumpy" expenditure profile and also derive an appropriate estimate of the "useful" or economic life of the asset expenditure.

Both approaches have considerable acceptance by contemporary utility regulatory systems and both approaches can adequately meet all reasonable regulatory objectives subject to their application. In theory the application of either the regulatory depreciation allowance or the renewals annuity approach can be made identical. However, in practice it may be easier to apply one method over the other to achieve the various objectives.

Glossary

ACCC	Australian Competition and Consumer Commission
Act	Water Act 2007 (Commonwealth)
AMP	Asset Management Plan
Asset Augmentation Expenditure (or **Augmentation**)	Expenditure, which is expensed under a Renewals Annuity approach, incurred in modifying an asset, and includes asset substitutions required to improve general business and performance efficiency.
Asset Enhancement Expenditure (or **Enhancement**)	Expenditure, which is excluded from the Renewals Annuity approach, incurred in modifying an asset to improve its value and function, and includes capital expenditure: (a) on new water infrastructure assets covering both new schemes and major extensions to existing schemes (e.g. assets for new customers and expenditure to meet new demand from existing customers); and (b) to considerably improve the level of service to existing customers above the original standards of service.
Asset Maintenance Expenditure (or **Maintenance**)	Expenditure incurred in the routine maintenance and support of an asset. It includes expenditure related to corrective and preventative maintenance activities. This expenditure is expensed, but not pursuant to the Renewals Annuity approach.
Asset Refurbishment Expenditure (or **Refurbishment**)	Expenditure, which is expensed under a Renewals Annuity approach, incurred in the renovation of an existing asset.
Asset Renewal Expenditure (or **Renewal**)	Expenditure, which is expensed under a Renewals Annuity approach, incurred in restoring an asset to its former state.
Asset Replacement Expenditure (or **Replacement**)	Expenditure, which is expensed under a Renewals Annuity approach, incurred in replacing an existing asset with another that performs the same or a similar function, and also includes asset substitutions required to cover the replacement of individual assets due to technological change and process redundancy.
Asset Restoration Reserve	The Asset Restoration Reserve is the name adopted by SunWater for the sinking fund used to carry the accumulated balance (i.e. the unspent portion) or deficit of the annuity that applies, and the interest thereon.
ARR	Authorised Revenue Requirement
COAG	Council of Australian Governments
CSO	Community Service Obligations

ERA	Economic Regulation Authority, the regulatory authority in Western Australia
ESC	Essential Services Commission, the regulatory authority in Victoria (Australia)
ESCOSA	Essential Services Commission of South Australia, the regulatory authority in South Australia
FCM	Financial Capital Maintenance ... an *ex-ante* regulatory principle that ensures expected revenue is sufficient to recover the actual capital invested (i.e. in assets) in present value terms.
GPOC	Government Prices Oversight Commission, the regulatory authority in Tasmania (Australia)
IPART	Independent Pricing and Regulatory Tribunal, the regulatory authority in New South Wales (Australia)
IRC	Infrastructure Renewal Charge (UK) for recovery of asset renewal expenditure
NWI	National Water Initiative
Ofwat	Office of Water Regulation (UK), the regulatory authority in the United Kingdom
PV (or **NPV**)	Present Value, which refers to the current worth of a future amount (determined by discounting the future amount to account for the opportunity cost). Net Present Value is the current worth of a series of future amounts (and any initial amount).
QCA (or **Authority**)	Queensland Competition Authority, the regulatory authority in Queensland (Australia)
RAB	Regulated Asset Base
RAB approach	A method for identifying the holding period cost of assets included in the RAB. The method provides for both a return of the RAB over time (depreciation) and a return on the depreciated RAB.
ROP	Resource Operations Plans
Sinking Fund	A generic reserve/fund established by SunWater to account for the financing of anticipated future renewal and rehabilitation expenditure
SunWater	SunWater Limited
TER	Tax Equivalent Regime
WACC	Weighted Average Cost of Capital
WSS	Water Supply Scheme

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1 Introduction

Purpose of Issues Paper

1.1 On 19 March 2010 the Queensland Government issued a Referral Notice[1] (the Ministerial Direction) directing the Queensland Competition Authority (the Authority) to develop and recommend irrigation prices that apply to SunWater's water supply schemes (WSSs) from 1 July 2011 to 30 June 2016.

1.2 In recommending prices, the Ministerial Direction, amongst other things, requires the Authority to consider either a renewals annuity or a regulatory depreciation allowance to recover SunWater's expenditure on renewing and rehabilitating existing assets.

1.3 Where the Authority considers it appropriate to transition from an existing renewals annuity approach to a regulatory depreciation allowance approach, the Ministerial Direction requires the Authority to consider how to treat existing renewals reserves.

1.4 The Ministerial Direction requires a return of, and on, prudent capital expenditure on existing assets (or for constructing new assets). Renewal and rehabilitation expenditure on existing assets therefore qualifies in this regard. However, the Ministerial Direction does not require a return of capital on the initial regulated asset base (RAB) at 1 July 2011.

1.5 The purpose of this Issues Paper is to identify:

- the key issues relevant to establishing whether a renewals annuity or a regulatory depreciation allowance should be applied in the setting of SunWater's irrigation prices for the 5 year period from 2011/12 to 2015/16; and
- options for the treatment of accumulated renewals reserves (in the event that the current renewals annuity approach is changed to a regulatory depreciation approach).

1.6 It should be noted that where the Authority is required to establish a price path for a particular period, it takes into account all expenditures over that period and related demand, and 'solves' for a price which when indexed gives a net present value (NPV) of revenue equal to the NPV of costs for that period. This approach leads to a smooth price path for the regulatory period.

Context of the QCA's Considerations

1.7 SunWater's current irrigation charges include a renewals annuity to ensure that existing and future customers contribute to the recovery of expenditure incurred in maintaining the serviceability and integrity of its WSS assets. This expenditure varies from year to year. However, the annuity approach ensures a smooth recovery of this expenditure through prices.

The period-by-period payment of the annuity is designed to completely fund all future renewals expenditure, but not necessarily as it is incurred.

*A **renewals annuity approach** recovers the cost of forecast asset renewal and rehabilitation expenditure through a period-by-period annual charge which is typically held constant in nominal or real terms but can take other forms. This charge covers the cash requirements needed to renew a system of assets over a medium to long-term period including direct capital expenditure and an implicit financing charge*

1.8 SunWater accounts for the difference between actual expenditure and the annuity amount by way

[1] Ministers Referral Notice – Queensland Government Gazette; 19 March 2010

of an asset refurbishment reserve (i.e. sinking fund[2]) which is known as the Asset Restoration Reserve. The balance in the sinking fund reflects either:

- monies that have been contributed by customers, but not yet spent on asset refurbishment by SunWater (i.e. a credit balance representing unearned income); or
- asset refurbishment expenditure that has been funded by SunWater, but not yet recovered from customers (i.e. a debit balance representing capital invested by SunWater).

Returns of Capital / Returns on Capital

Capital is invested to finance expenditure that is not normally immediately recoverable in the year it is incurred. This expenditure is ultimately recovered over time as:

- *a **return of the capital** invested (e.g. depreciation); and*
- *a **return on the capital** outstanding (e.g. a rate of return for investing in assets).*

... for the purposes of this Issues Paper, the capital may be provided by the firm and/or its customers

1.9 'Interest' payments to customers or to SunWater in respect of any funds contributed in advance, are factored into the annuity through the choice of a discount rate. SunWater does not receive interest (or a return on capital) on renewal expenditure because it is consumers that have funded it. In the case of consumer prefunding, this means that the nominal amount paid by consumers is less than the expected asset refurbishment expenditure when it is incurred – the discount implicitly reflecting the interest the consumer would earn on the credit balance of the sinking fund.

1.10 A typical renewals annuity approach therefore requires a sinking fund to be established on behalf of those contributing to the funding of renewals expenditure, and incorporates a return on any capital expenditure that is funded in advance of its recovery through the renewals annuity charge (as reflected by the discount rate).

A period-by-period depreciation allowance may approximate the expenditure needed for renewing / rehabilitating assets. It does not provide a return on capital by itself, but is typically combined with one in a regulatory context.

1.11 The Authority must consider a regulatory depreciation allowance as an alternative to a renewals annuity approach for recovering expenditure on renewing and rehabilitating existing assets.

1.12 Under a typical regulatory depreciation approach, a depreciation allowance is calculated in respect of:

- existing assets (the initial RAB); and

*A **regulatory depreciation allowance** typically recovers the expenditure classified as capital in nature, retrospectively over a period of time. The profile in which the capital is returned can reflect the deterioration in the asset's condition and make provision for expenditure necessary for renewing and rehabilitating assets. Financing costs are typically not recovered in the regulatory depreciation allowance but reflected in a separate allowance for return on capital.*

[2] We have used the generic term "sinking fund" throughout this *Issues Paper* to refer to the balance sheet reserve generated by a renewals annuity approach. This is consistent with the National Water Initiative Pricing Principles (p6) which states "… the renewals annuity should be structured as a sinking fund to include a provision on a forward-looking basis for the cost of replacing the relevant asset and/or asset components…". The reference to a sinking fund, however, does not imply that funds/monies are set aside by SunWater in a separate account or accounts for the purposes of financing future expenditure.

- capital expenditure incurred for renewing and rehabilitating existing assets[3].

1.13 Depreciation makes provision for renewing a proportion of each asset in order to maintain its condition and/or serviceability. In this sense, depreciation has similarities with a renewals accounting approach.

1.14 The key difference between the annuities and the regulatory depreciation approaches is that annuities are funded more or less continuously regardless of when the expenditure is incurred whereas typically an allowance for depreciation is mainly an *ex post* mechanism for returning the capital tied up in assets. Under such an approach, the regulated entity, not consumers, typically prefunds the acquisition of most assets.

1.15 In a regulatory environment the 'regulatory' depreciation allowance is typically combined with a separate allowance for a return on capital in order to ensure that the regulated entity receives appropriate compensation for allowable capital invested. Where prices are set to recover total costs over a specific period, the depreciation approach can be specified to achieve an identical outcome (in NPV terms) to that of a renewals annuity approach.

[3] Depreciation is also calculated in respect of prudent capital expenditure incurred to enhance existing assets or to construct new assets.

2 Background

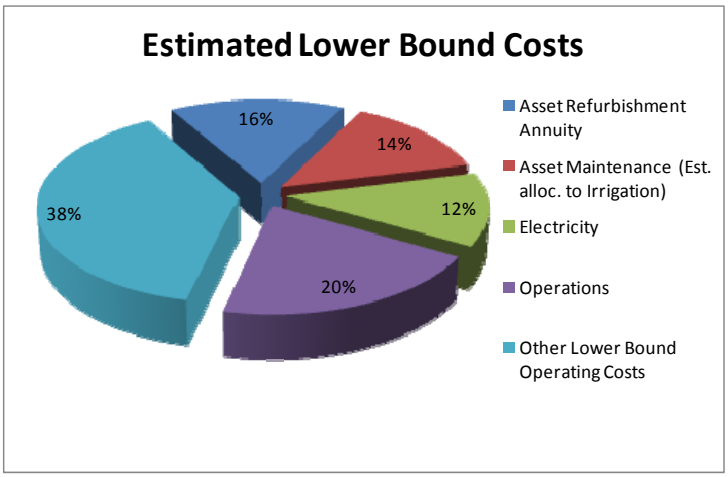
2.1 Since the water reforms were introduced in 2000, irrigation prices have been set for specific periods (usually 5 years). These are referred to as price paths. The current price paths applying to SunWater's WSSs are due to expire on 30 June 2011.

2.2 SunWater's price paths aim to recover (at least) efficient operating, maintenance, refurbishment, and debt servicing costs. These are referred to as the Lower Bound costs[4]. It is intended that, in the future, prices will also provide a return on SunWater's RAB to compensate investors for their investment (i.e. to cover the cost of capital). [5]

SunWater's asset related cost recoveries represent about 30% of the revenue requirement it needs for its ongoing viability. The renewals annuity accounts for just over half of this (16%).

2.3 In April 2006, SunWater's Lower Bound costs for the current price path (2006/07 to 2010/11) were estimated to be $51.2 million per annum (on average for the 5 year period). The asset refurbishment annuity accounted for about 16% of this, and asset maintenance expenditure accounted for a further 14% (refer to Figure 1 below).

Figure 1 – Key Components of Lower Bound Costs



Annual averages estimated from forecasts for 2006/07 to 2010/11

Source: *Based on information from the SunWater Irrigation Price Review 2005-2006 – in particular: (a) "Statewide Irrigation Pricing Working Group: Tier 1 Report" April 2006, and (b) "Scheme Variance Reports" Tier 1 Working Paper No. 30; 15 September 2005.*

2.4 *Asset maintenance* expenditure and *asset refurbishment annuity* expenditure are both essential to SunWater's asset renewals program. Asset maintenance expenditure relates to routine corrective and preventative maintenance that is ordinarily regarded as operating expenditure. The asset refurbishment annuity is based on long-term forecasts of the expenditure needed for:

[4] Lower Bound Pricing is defined by the Council of Australian Governments (COAG) as, in the interests of water business viability, the recovery of at least operations (including maintenance and administration), interest cost on debt, dividends (if any) and the provision of future asset refurbishment/replacement. Dividends should be set at a level that reflects commercial realties and stimulates a competitive market outcome. Refer to *National Water Initiative* Pricing Principles; Appendix A; p 18

[5] A more complete description of Lower and Upper Bound pricing is provided in Section 3 of this *Issues Paper*.

- asset renewal/replacement to maintain service potential and meet all compliance requirements;
- asset substitutions in the case of asset replacement due to technological change and process redundancy; and
- improving general business and performance efficiency.[6]

2.5 Under a depreciation approach, the expenditure underlying the asset refurbishment annuity would be regarded as capital expenditure. However, with SunWater's renewals annuity approach, the separate maintenance and asset refurbishment (annuity) expenditures are both treated as (recoverable) operating expenditure.

SunWater

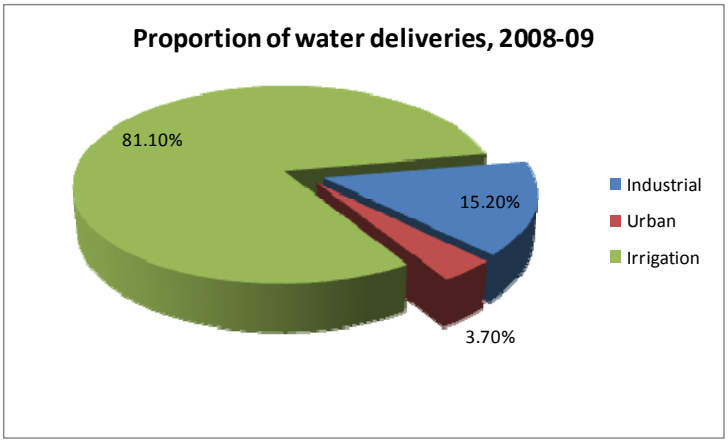
2.6 Over the last 80 years, SunWater (and its predecessors) has built a regional network of bulk water supply infrastructure throughout Queensland which supports irrigated agriculture, mining, power generation, industrial and urban development.

2.7 SunWater is a Queensland Government-Owned Corporation providing a range of services including infrastructure ownership, water delivery, operation and maintenance of infrastructure and engineering consultancy services. SunWater owns and operates water storage and distribution infrastructure, including 19 major dams, 63 weirs and barrages, 80 major pumping stations, and more than 2,500 kilometres of pipelines and open channels.

2.8 The majority of SunWater's customers are irrigators. SunWater currently has 22 WSSs that supply water for irrigation[7]. At the time of the last price review[8], SunWater had 27 WSSs that supplied water for irrigation purposes. Five of these WSSs were subsequently transferred to Seqwater.

2.9 SunWater also provides bulk water to industrial, mining and power generation customers, and to local government for urban water deliveries (Figure 2 below). Despite, the irrigation sector accounting for the majority of SunWater's customers and delivered water volumes, irrigation accounts for less than a third of its overall revenues (Figure 3 below).

Figure 2 – SunWater's Customers



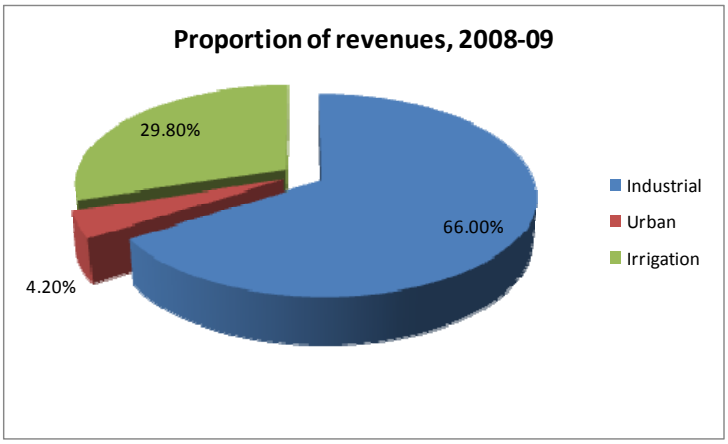
Source: *"Rural Water Pricing – Business and Scheme Overview"; Report to the Queensland Competition Authority by Synergies Economic Consulting; January 2010; p3.*

[6] "Refurbishments and Augmentations"; Tier 1 Working Paper No. 10; 24 June 2005; p3

[7] An additional WSS, the Julius Dam, does not provide irrigation water.

[8] SunWater Irrigation Price Review 2005-2006

Figure 3 – SunWater's Sources of Revenue by Customer



Source: *"Rural Water Pricing – Business and Scheme Overview"; Report to the Queensland Competition Authority by Synergies Economic Consulting; January 2010; p3.*

2.10 Irrigators typically pay less on a per volume basis because of the priority assigned to water entitlements through formal planning documents such as Resource Operations Plans (ROPs). For example, a greater share of the costs of water storage infrastructure is allocated to (say) industrial customers who have a higher priority than irrigators. In addition, Government historically has provided Community Service Obligations (CSOs) that subsidise providing water to irrigators.

SunWater's Price Paths

2.11 Some significant reforms of the water sector followed the passing of the *Water Act 2000 (Queensland)*. Five year price paths[9] were first set in 2001/02 – with these price paths commencing the transition toward Lower Bound prices.

SunWater's renewals annuity represents about 16% of the average annual revenue requirement across all Water Supply Schemes. However, for most schemes the annuity revenue has exceeded actual renewal expenditure.

2.12 SunWater's tariffs are set on a scheme-by-scheme basis and by certain segments. For the setting of the current prices, SunWater's prices were approved by Government following a Tier 1 and Tier 2 review.

2.13 For the Tier 1 review, representatives of SunWater management, its customer base and peak industry groups established overarching principles, and approved the continued use of a renewals annuity for asset consumption based on:

- a 30 year rolling annuity;
- an estimated opening annuity (sinking fund) balance as at 30 June 2006 reflecting the 30 June 2005 actual balance and estimated annuity related revenues and expenditures over 2005/06[10]; and
- a discount rate referencing an appropriate weighted average cost of capital (WACC) for SunWater[11].

[9] Several WSSs, however, were due to expire on 30 June 2007.

[10] Based on the 30 June 2005 closing annuity balance, together with estimated annuity related revenue and expenditure for the 2005/06 year.

2.14 Further, Tier 1 determined that the tariff, based in part on the asset refurbishment annuity, be indexed for inflation.

2.15 A financial summary of SunWater's 2006/07 to 2010/11 price paths (aggregated for all its WSSs) is provided in Table 1 below.

Table 1 – SunWater's 2006/07 to 2010/11 Price Path Summary

SunWater WSS Summary	Annual Average based on 2006/07 to 2010/11 Forecasts			2008/09 Annual Report
	Lower Bound Costs ($m)	Asset Refurbishment Annuity ($m)	*Annuity as % of Costs*	Asset Restoration Reserve ($m)
	$51.2	$8.0	*16%*	$7.6m

2.16 SunWater's 2008/09 accounts show an aggregate WSS balance of $7.6m in its Asset Restoration Reserve[12], as the refurbishment annuity revenues recovered from customer tariffs have, to date, exceeded actual refurbishment expenditures by this amount. This may relate to renewals expenditure that is planned but has not yet occurred. However, it should also be noted that some WSSs have spent more on asset refurbishment than has been recovered through the annuity.

2.17 The SunWater Irrigation Price Review 2005-2006 noted that "[t]he next irrigation price review should review whether the renewals annuity is the most appropriate method to recover the funds SunWater requires to replace and refurbish existing assets." [13]

Ministerial Direction

The Ministerial Direction is seeking both a return of capital and a return on capital, but not necessarily on all forms of capital, through the application of either a renewals annuity or a regulatory depreciation approach.

2.18 The Ministers' Referral Notice requires that bulk water supply and channel prices/tariff structures are set so as to provide a revenue stream that allows SunWater to recover:

a. its efficient operational, maintenance and administrative costs;
b. its expenditure on renewing and rehabilitating existing assets, whether through a renewals annuity or a regulatory depreciation allowance;
c. a rate of return on assets valued at 1 July 2011 (the initial RAB); and
d. after 1 July 2011, a return of, and on, prudent capital expenditure on existing assets or for constructing new assets.

2.19 In recommending an initial RAB for irrigation supply assets the Authority is to:

a. value particular channel distribution systems assets at zero; and
b. apply a 'line in the sand' approach to value assets for bulk water supply based upon:
   - *the level of service attributed to the supply of water for irrigation;*
   - *the efficient operating cost of meeting the required level of service;*
   - *water prices that reflect the irrigators' anticipated capacity to pay; and*

[11] SunWater; "Statewide Irrigation Pricing Working Group: Tier 1 Report (re: SunWater Irrigation Price Review 2005-2006)"; April 2006; p67 (para 7.2.12)

[12] Information extracted from SunWater Limited Annual Report 2008-2009 (Asset Sustainability section). The financial accounts, however, show an Unearned Annuity of $9.1m (in respect of the Asset Refurbishment Reserve). The financial accounts only show liability amounts (i.e. no offset from WSS Asset Refurbishment Reserves with debit balances).

[13] SunWater; "SunWater Irrigation Price Paths 2006/07 – 2010/11: Final Report"; p93

- *water prices achieving a commercial return over a period not longer than 15 years.*

2.20 The Ministerial Direction is seeking both returns of and on capital but not necessarily for all forms of capital. This topic is further considered in Sections 4 and 5 of the *Issues Paper*. Subsequent Sections of this *Issues Paper* also consider how effectively the renewals annuity approach and the regulatory depreciation approach achieve the policy objectives outlined in the Ministerial Direction.

3 Recovering Asset Related Costs in Water Charges

3.1 Prices have an effect on consumption and investment outcomes. Increasing the efficiency of water use is a matter of Government Policy as expressed in the National Water Initiative, 2004 (NWI)[14]. The NWI promotes the principle of user-pays (i.e. cost reflectivity) in order to promote the economically efficient and sustainable use of water resources and water infrastructure assets.

3.2 It is generally accepted that prices need to be cost reflective for economic efficiency to be achieved. For instance, the Authority notes:

> *"... all customers will be best served by a well functioning ... market. The key to achieving this in a sustainable way is to ensure that prices reflect costs and the manner in which those costs are incurred."* [15]

3.3 In a similar vein, the Australian Competition and Consumer Commission (ACCC) notes:

> *"Water charges based on the full cost recovery for water services will contribute to achieving an economically efficient and sustainable use of water resources and water infrastructure assets. Water charge rules applied consistently across the basin will facilitate the efficient functioning of water markets by removing distortions to trade and by sending signals to water users about efficient investment in water infrastructure assets."* [16]

Tariffs should recover efficient costs—including the cost of assets used in providing the service

3.4 There is, however, an important distinction between cost recovery and cost reflectivity. The process for setting regulated prices involves: first, the identification of efficient costs that need to be recovered (cost recovery); and, second, the formulation of tariffs to recover those costs in a manner that signals appropriate information to consumers (cost reflectivity). Again the Authority notes:

> *"... cost recovery could be achieved by averaging the costs of supply between different tariffs or between different classes of customers but it would then depend on cross-subsidies between different classes of customers. Cost reflectivity requires regulated tariffs to mirror the costs incurred by a retailer in supplying a customer on a particular regulated tariff.*
>
> *... the Authority found that the key to ensuring that customers receive adequate information and appropriate price signals is to achieve cost reflectivity, not just cost recovery."* [17]

3.5 This *Issues Paper* deals with aspects of cost recovery, and not tariffs *per se*. More specifically, the paper deals with the recovery of costs related to the intertemporal use of assets.

Lower and Upper Bound Pricing

Upper Bound Prices differ from Lower Bound Prices through the inclusion of a rate of return on assets

3.6 In 2004, the National Water Initiative (NWI) reaffirmed rural water pricing principles established by the Council of Australian Governments (COAG) in 1994. These provided for a transition towards full-cost recovery pricing through the concept of a lower and upper boundary for water prices.

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[14] Intergovernmental Agreement on a National Water Initiative (Between the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory); 25 June 2005 (Note: The Tasmanian Government joined the Agreement in June 2005 and the Western Australia Government joined in April 2006).

[15] QCA; "Final Report: Review of Electricity Pricing and Tariff Structures - Stage 2"; November 2009; p i

[16] ACCC; "Issues Paper: Water Charge Rules for Charges Payable to Irrigation Infrastructure Operators"; May 2008; p 1

[17] Supra, Note 15, p 4

3.7 According to the NWI[18]:

Lower Bound Pricing ...	***Upper Bound Pricing ...***
... the level at which to be viable, a water business should recover, at least, the operational, maintenance and administrative costs, externalities, taxes or TERs (except where income tax is not paid), the interest cost on debt, dividends (if any) and make provision for future asset refurbishment/replacement. Dividends should be set at a level that reflects commercial realities and stimulates a competitive market outcome.	*... the level at which, to avoid monopoly rents, a water business should not recover more than the operational, maintenance and administrative costs, externalities, taxes or tax equivalent regimes (TERs), provision for the cost of asset consumption and cost of capital, the latter being calculated using a weighted average cost of capital WACC.*

3.8 These NWI principles have been encapsulated in the *Water Act 2007* (the Act). Schedule 2 of the Act provides, *inter alia*, water charging principles and objectives—including ensuring *"sufficient revenue streams to allow efficient delivery of the required services"*. [19]

3.9 The ACCC interprets this sufficiency requirement as "*a 'revenue floor' for the revenue raised by the provider from access charges, being the efficient costs (including capital costs) of providing the required services.*" [20] This may fall short of full cost recovery, which, includes "*provision for an appropriate cost of capital...*". [21]

3.10 This interpretation is consistent with Lower Bound Pricing. For instance, the ACCC continues:

> *"Charges for required services are to be at a level that is sufficient to maintain the business viability of operators, as well as the efficient maintenance of the operator's investment in the infrastructure through which services are provided."* [22]

3.11 Arguably, SunWater's current prices are 'between' their lower and upper bounds. For instance, although there are certain WSS that are beyond lower bound pricing, most schemes do not provide a rate of return on the existing asset base. However:

> *"SunWater finances capital replacements for irrigation based assets through the renewals annuity. Capital investments in [enhancements] and expansions are funded via commercial contracts that incorporate appropriate commercial returns on the capital invested."* [23]

Building Blocks Method

The Building Blocks Method is typically used by regulators to determine the revenue that a regulated business can earn ... in order to meet efficiently incurred costs and provide an expected normal commercial profit commensurate with the capital invested

[18] Supra, Note 14

[19] Water Act 2007, Schedule 2, Clause 2(b)

[20] Supra, Note 16, p 13

[21] Ibid (also refer to Water Act 2007, Schedule 2, Clause 3)

[22] Ibid

[23] SunWater; "Public Submission: Water Charge Rules for Charges Payable to Irrigation Infrastructure Operators"; 15 July 2008; p5

3.12 Many regulators in Australia and overseas adopt a Building Blocks Methodology to identify the Authorised Revenue Requirement (ARR) for the regulatory period. The ARR represents the costs to be recovered from consumers, through prices[24]. In general, the key 'building blocks' in determining the ARR include:

- operating, maintenance, and administrative expenses;
- the cost of assets used in providing the service (the return of capital); and
- a return on funds invested in providing the service (i.e. the return on capital, or cost of capital).

3.13 Another building block component for taxes is generally included where a post-tax return on funds is specified. The regulatory process includes checks and balances to ensure that these costs are efficient.

The Building Blocks method is consistent with the recovery of both Lower and Upper Bound costs

3.14 The key building blocks outlined above are a restatement of Upper Bound Costs. The Building Blocks Method is consistent with Upper Bound Pricing (i.e. full cost recovery). By relaxing the 'return on funds' building block requirement, outcomes consistent with Lower Bound Pricing are achieved.

The assumption of ex-ante financial capital maintenance addresses returns of and on capital

3.15 Recovering a return of capital and (an appropriate) expected return on capital ensures the financial capital of a regulated business is maintained on an *ex-ante* basis which is important for providing efficient investment incentives.

3.16 This is referred to as *ex-ante* financial capital maintenance (FCM) and means that, irrespective of the depreciation / renewal profile adopted, the expected present value of the cost recovery will always be the same as the initial outlay on the asset.

3.17 The assumption of *ex-ante* FCM is adopted in this *Issues Paper* when comparing the regulatory depreciation approach implemented as part of the RAB or building blocks approach, and the renewals annuity approach.

The Building Blocks Method is not typically applied in a situation where assets are maintained indefinitely but could be amended to accommodate an indefinite life

3.18 Recovering expected returns of capital and (an appropriate) expected return on capital (as per the above Building Blocks Method) ensures the financial capital of a regulated business is maintained on an *ex-ante* basis. This is also known as the RAB approach, where the expected present value of the ARR will always be the same as the initial outlay on the asset—irrespective of the depreciation / renewal profile adopted. In other words, the business is indifferent to recovering the cost of the asset immediately (i.e. expensing the asset) or expecting to recover the asset's cost over time.

3.19 The building blocks or RAB approach typically assumes that there is some recovery of the RAB each period in a depreciation allowance.

3.20 However, some infrastructure assets may be maintained in 'perpetuity' through ongoing expenditure on their maintenance and on their renewal/refurbishment.

[24] Tariffs are set, using an approved pricing methodology, to recover the ARR.

3.21 If an asset is being maintained, at a specified level of service potential, on an indefinite basis then its associated value should be preserved and providing that an appropriate return on the asset is recovered on a perpetuity basis, there would be no need to provide a separate depreciation allowance to provide a return of capital. In these circumstances, renewal accounting rather than depreciation accounting may be applied to these infrastructure assets. However, it is possible to modify the RAB approach and associated depreciation allowance to relate to the assumption of an indefinite asset life.

3.22 Under renewal accounting the value of the infrastructure asset(s) is held constant (i.e. not depreciated) and, instead, all expenditure on maintaining and renewing the infrastructure is expensed. In the Water Industry in the United Kingdom (UK) where a renewal accounting approach is adopted, the expenditure on maintaining and renewing the infrastructure is referred to as an *Infrastructure Renewal Charge* (IRC).[25]

The Renewals Annuity Approach and SunWater's RAB

3.23 When an initial RAB is determined for SunWater (pursuant to the Ministerial Direction), for some WSSs it will almost certainly implicitly include assets which have had their condition maintained partially through funding from historical renewals annuities.

3.24 Therefore in any valuation of the initial RAB, where an asset has previously been maintained in perpetuity, care would need to be taken to ensure that only the original 'capital' value of the asset, and not any expenditure financed by the renewals annuity, is included in the value of the RAB. Failure to do this will result in any RAB charges effectively recovering some asset costs twice from customers. This issue is addressed more fully in Section 9.

[25] As described in paragraphs 2.4 and 2.5, asset maintenance expenditure and asset renewal/refurbishment expenditure are accounted for separately under the renewals annuity approach adopted by SunWater. Both are treated as operating expenditure, but only the latter is included in the annuity.

4 Renewals Annuity Approach

4.1 This Section describes the renewal accounting and renewals annuity approaches, and the use of the renewals annuity approach for the purpose of renewing and rehabilitating assets pursuant to the Ministerial Direction.

A renewals approach seeks to recover the medium to long-term expenditures needed to maintain the operating capability of infrastructure assets in perpetuity

4.2 A renewals approach seeks to recover ongoing asset renewal and rehabilitation expenditure necessary to maintain the serviceability and value of infrastructure assets indefinitely. The recoveries will, over a medium to long-term period, provide the cash requirements needed to renew a system of assets.

4.3 Infrastructure assets can have the following characteristics[26]:

- Renewable rather than replaceable – i.e. the system can be conceived of as a collection of components, each of which can be renewed, rehabilitated or replaced to maintain the operating capacity of the system as a whole.
- Ongoing demand – i.e. future demand expectations are such that a continual, indefinite extension of the asset system life (by renewal) is warranted.

The implication of this is that infrastructure assets (as a system) tend to have an indefinite service life.

4.4 The renewals approaches are more relevant to situations where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the ongoing renewal of its components. For instance, SunWater's approach treats a whole system/network (such as a WSS) as an asset – rather than its individual/discrete components. It is assumed that the system's (i.e. asset's) service potential will be maintained indefinitely.

4.5 An argument in favour of a renewals approach is that it does not require knowledge of the useful life of the asset that is being maintained. Such an uncertainty is particularly relevant to long lived assets and particularly for water supply assets where the asset lives can span decades and even, centuries. However, a decision would still have to be made in relation to the time period for the recovery of expenditure associated with maintaining the service potential of the asset.

4.6 Frontier Economics also note:

> *"Renewal accounting, and a forward-looking annuity, [still] requires the development of substantial knowledge of all the assets including their condition, the risks to service, the rate of degradation of the service capability of the assets over time, and the extent to which the assets will be necessary and useful part of the system in the future given expected demand. It is also important that the relationship between renewals expenditure and asset condition is well understood."* [27]

4.7 Where the assets are not being maintained indefinitely, then this will have important implications. In these circumstances, a maintenance annuity may be applied. It was noted by Frontier Economics that Goulburn-Murray Water had adopted a renewals profile that was *"based on the assumption that assets*

[26] Burns, P.; "Infrastructure Depreciation – An Alternative to Straight line"; AMQ International: Strategic Asset Management; Issue 84, March 22, 2002; p251

[27] Frontier Economics; "Review of Pricing Policies"; A report prepared for Goulburn-Murray Water; March 2005; p 115

would be 'run to failure' (rather than assuming that life-prolonging maintenance would be undertaken...)". [28]

4.8 If assets are being run to failure, this implies the value of the asset is not being preserved. However, the Ministerial Direction does not (explicitly) provide for a return of capital for assets valued at 1 July 2011.

Renewal Accounting

4.9 In broad terms, renewal accounting assumes that the service potential (and therefore the associated value) of a system of assets is maintained in perpetuity. From an accounting perspective, if the value of an infrastructure asset does not change, then the overall effect is that all costs involved in the replacement and refurbishment of that asset may be expensed. Further, it is assumed that the expenditure is representative of asset consumption (depreciation) expenditure.

Renewal accounting treats all asset related expenditure for renewing and rehabilitating assets as operating expenditure. Asset related expenditure is NOT capitalised. The water sector in the UK was an early adopter of Renewal Accounting.

4.10 In the United Kingdom a renewal accounting approach was developed for the infrastructure assets of water and waste water companies in the late 1980s. Ofwat, the water regulator in the UK, adopted a long-run normative charge (LRNC), which is now referred to as an Infrastructure Renewal Charge (IRC), as a means of funding 'investments' in the sector. A distinction is made between underground assets (to which a renewal accounting treatment applies because of their long life nature), and above-ground assets (which are depreciated over a shorter life).[29]

4.11 According to Ofwat, the LRNC *"should include expenditure of every kind involved in sustaining the system in its present state and protecting it from falling in value ..." including "... the cost of renewing any components that fail for whatever reason during the period; the cost of planned maintenance ..; the cost of emergency repairs ... ".* [30]

4.12 The LRNC/IRC is intended to recover both depreciation and maintenance expenditure in relation to particular infrastructure assets. Actual costs are expensed as they occur. Ofwat monitors actual expenditure against the IRC allowance, and has allowed both positive and negative balances (i.e. IRC accruals and prepayments) to be carried forward to the next pricing period. The IRC and carry-forward amounts may be indexed for inflation, but interest is not applied to positive and negative balances.

4.13 A worked example of a renewal accounting approach is provided in Table 2 below. Several worked examples are provided in this *Issues Paper* to illustrate various annuity and depreciation options. The same cash flows apply to each worked example to enable a comparison of their outcomes. A key outcome is the (net) present value of the revenue received over the 10 years, together with the present value of the RAB in year 10 is equivalent to the present value of the renewals expenditure plus the initial RAB. This establishes a 'stylised' valuation of that particular option.

[28] Ibid

[29] Ibid, p 113

[30] Ofwat; "The Long-Run Normative Charge for Infrastructure Renewals"; RD 7/93; p10. Also see Frontier Economics; "Review of Pricing Policies"; A report prepared for Goulburn-Murray Water; March 2005; pp 113-114

Table 2 – Worked Example of Renewal Accounting (Infrastructure Renewal Charge)

		Asset	Capital Expenditure									
		Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Opening RAB			$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
Less Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Xfer from Sinking Fund												
Capital Expenditure		$ 100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closing RAB		$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
PV Closing RAB	10%	$ 38.55										
Renewal Expenditure (Actual)			$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
Renewal Expenditure (Forecast)			$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
NPV (Capex/Renewal Actual)		*$24.82*										
NPV (Capex/Renewal Forecast)		*$24.82*										
Revenue												
- Infrastructure Renewal Charge			$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
- Annuity	10%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Return on RAB			$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
			$ 12.00	**$ 11.00**	**$ 19.00**	**$ 18.00**	**$ 12.00**	**$ 20.00**	**$ 11.00**	**$ 12.00**	**$ 12.00**	**$ 12.00**
NPV (Revenue)		$ 86.27										
NPV (Closing RAB)		$ 38.55										
Total NPV		**$ 124.82**										

Note: NPV of IRC / Annuity $24.82

**Assumes capex occurs at end of period.*

Note: Worked Examples in this Issues Paper all use the same cash flows

4.14 From Table 2 above it may be noted:

- the RAB is held constant (in nominal terms);
- instead of being added to the RAB, 'lumpy' renewal expenditure is recovered through a 'lumpy' IRC;
- the renewal expenditure and the IRC are the same in PV terms;
- no sinking fund is required, as the IRC exactly matches the actual renewal expenditure[31];
- the RAB is not depreciated, as it is being maintained through the IRC; and
- a return on the RAB is also recovered as revenue.

4.15 As described above, the renewal accounting approach will result in asset renewal expenditure being recognised as it occurs. Whilst securing the funding to undertake refurbishment (as the expenditure is recovered or 'paid for' as it occurs), this approach will potentially result in a lumpy expenditure recovery profile, and this may give rise to intertemporal equity and efficiency concerns (particularly in relation to major refurbishment projects).

The Renewals Annuity Approach

The renewals annuity approach is a form of renewal accounting that recovers asset expenditures through a smoothed annual charge (reflecting medium to long-term expenditures needed to maintain the operating capability of infrastructure assets in perpetuity)

4.16 The renewals annuity approach is an alternative approach that establishes a smoothed cost recovery profile, based on forecast asset renewal and rehabilitation expenditure over a (very) long time horizon

[31] In the UK a sinking fund was maintained in the short term as the IRC was based on average renewals and maintenance expenditure for a duration covering the regulatory period, and in addition, differences between actual expenditure and forecast expenditure occurred in practice.

– i.e. a period sufficiently long to represent the expenditure necessary to maintain the serviceability and value of a system of assets indefinitely.

4.17 Having first estimated the expenditure that is to be recovered over time, the renewals annuity approach then calculates the present value of this expenditure, and sets an annual period-by-period charge (the annuity) that provides for the PV of the expenditure to be recovered.

4.18 The annualised charge will, over a medium to long-term period, provide the cash requirements needed to renew a system of assets. The charge is often set in constant nominal terms but it can be set in constant real terms. The profile of charges can be tilted to be front loaded (to recover more costs yet to be incurred) or back loaded (to recover more costs already incurred) provided the stream of annual charges provides the same present value for a given discount rate.

4.19 When a renewals annuity is calculated using the appropriate opportunity cost of capital it effectively provides a return on and a return of the renewals capital expenditure. Depending on the timing of actual renewals expenditure, a typical renewals annuity approach may provide for the financing of that expenditure prior to it being incurred. This will particularly be the case where significant expenditure is not anticipated for several years. Conversely, where significant expenditure is imminent, the regulated business will need to finance the expenditure (via debt or equity) in advance of funds being provided by consumers (via the annuity) over time.

The renewals annuity approach was favoured for Australian water businesses as it provided a more predictable impact on prices

4.20 In Australia, the adoption of a renewals annuity approach was the considered response to consumer unease at proposals by the (former) Rural Water Corporation, in Victoria, for substantial price increases that, in part, reflected depreciation expenditure based on current cost accounting principles. Amongst the customer concerns was the contention that this depreciation approach would generate more funds than was required for future replacements. [32]

4.21 In 1991 Arthur Anderson reviewed current cost depreciation together with other options for funding the replacement of infrastructure, and concluded that a renewal accounting approach similar to that used in the UK would be preferable to current cost depreciation on the basis that it would:

- remove subjectivity associated with estimating replacement costs and asset lives; and
- require robust asset management plans (AMPs) and involve consumer groups in decisions related to future renewals expenditure.

4.22 The McDonald Review (reporting in 1992) considered the use of renewal accounting for the Victorian rural water sector. In their view, the renewal accounting approach assumed a fairly constant level of infrastructure renewal expenditure over time. As the future expenditure profile for the Victorian water sector was likely to be lumpy in nature, the McDonald Review recommended a 100 year annuity to smooth the asset consumption expenditure.

4.23 As actual expenditure would differ over time from the annuity, it is necessary to establish a sinking fund (reserve) as part of this approach. The McDonald Review recommended a 4 per cent real rate of return apply to the sinking fund.[33]

[32] Supra, Note 27, p 117

[33] Ibid. However, SunWater's current tariffs use a discount rate based on SunWater's WACC, as recommended by Tier 1 in the SunWater Irrigation Price Review 2005-2006 (Supra, Note 11). Southern Rural Water, for example, used a 4% real rate of return in the past, but no longer do so (Supra, Note 6, p3).

4.24 On 25 February 1994, COAG endorsed the implementation of a Water Resource Policy Framework. In relation to pricing and long-term infrastructure assets, the framework included, inter alia, the following element:

> *"The setting aside of funds for future asset refurbishment and/or upgrading of government supplied water infrastructure."*

4.25 The Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) was charged by COAG with the role of support and coordination in relation to implementation of COAG's 1994 water reform framework. One of the primary issues was to consider how the issue of asset consumption should be incorporated for pricing purposes.

4.26 On 27 February 1998, ARMCANZ recommended that asset consumption be measured by:

- traditional depreciation for non-infrastructure items, namely those short-lived items, where lives are known and not dependent on the life of the larger system of which they are part , e.g. motor vehicles, furniture and equipment.
- renewals annuities (condition based depreciation based on an asset management plan) for infrastructure assets, which are those system assets which are essentially renewable rather than replaceable. [34]

4.27 Recently (in 2005), the Authority noted that "*the renewals annuity approach is well suited to the water industry, which comprises network assets that are renewable rather than replaceable*". [35]

A renewals annuity approach is typically based on a long term expenditure profile to maintain the existing service potential of the assets

4.28 The renewals annuity approach is typically based on refurbishment and renewal expenditure for infrastructure assets—with the expenditure forecast over a long-term horizon—and not based on the value of the asset. For instance:

> *"An annuity is calculated to represent the amount of asset service potential used up by the cost of replacing it. Unlike conventional depreciation, the annuity approach is based on projected refurbishment and augmentation costs, not the value of the asset. It is only appropriate for infrastructure assets, defined as those that are being continuously renewed. The method of asset valuation will not affect the cost of replacing lost service potential. Therefore, the annuity for a particular asset has no connection with the asset value. The cost of replacing lost service potential will always be based on the replacement cost of the components to be refurbished."* [36]

4.29 It is also typically assumed that the system's service potential will be maintained indefinitely. This in turn implies that the value of the system does not depreciate in terms of its service potential.

4.30 To the extent that the service potential is maintained indefinitely then, as noted earlier, from an economic efficiency perspective there would be no justification for a separate charge for depreciation (i.e. return of capital) because the value of the asset to preserve its service potential is preserved.

4.31 A worked example of a renewals annuity approach is provided in Table 3 below.

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[34] Supra, Note 6, p1

[35] QCA; "Gladstone Area Water Board Investigation of Pricing Practices"; March 2005; p 135, 138, 139

[36] Supra, Note 6, p2

Table 3 – Worked Example of Renewals Annuity Approach

		Asset	Capital Expenditure									
		Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Opening RAB			$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
Less Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Xfer from Sinking Fund												
Capital Expenditure		$ 100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closing RAB		$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
PV Closing RAB	10%	$ 38.55										
Renewal Expenditure (Actual)			$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
Renewal Expenditure (Forecast)			$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
NPV (Capex/Renewal Actual)		*$24.82*										
NPV (Capex/Renewal Forecast)		*$24.82*										
Revenue												
- Infrastructure Renewal Charge			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Annuity	10%		$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04
- Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Return on RAB			$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
			$ 14.04	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**
NPV (Revenue)		$ 86.27										
NPV (Closing RAB)		$ 38.55										
Total NPV		**$ 124.82**										

Note: NPV of IRC / Annuity $24.82

**Assumes capex occurs at end of period.*

Note: Worked Examples in this Issues Paper all use the same cash flows

Sinking Fund												
- Opening Balance		$ -	$ -	$ 2.04	$ 5.28	$ 0.85	-$ 3.02	-$ 1.29	-$ 7.37	-$ 5.07	-$ 3.54	-$ 1.85
- IRC/Annuity		$ -	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04
- Interest	10%	$ -	$ -	$ 0.20	$ 0.53	$ 0.09	-$ 0.30	-$ 0.13	-$ 0.74	-$ 0.51	-$ 0.35	-$ 0.19
- Capex		$ -	-$ 2.00	-$ 1.00	-$ 9.00	-$ 8.00	-$ 2.00	-$ 10.00	-$ 1.00	-$ 2.00	-$ 2.00	-$ 2.00
- Xfer to RAB		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Closing Balance		**$ -**	**$ 2.04**	**$ 5.28**	**$ 0.85**	**-$ 3.02**	**-$ 1.29**	**-$ 7.37**	**-$ 5.07**	**-$ 3.54**	**-$ 1.85**	**-$ 0.00**
Cumulative Cash (Sinking Fund)		*$ -*	*$ 2.04*	*$ 5.08*	*$ 0.12*	*-$ 3.84*	*-$ 1.80*	*-$ 7.76*	*-$ 4.72*	*-$ 2.68*	*-$ 0.64*	*$ 1.40*
Net Interest on Sinking Fund		**$ 1.40**										
Total Annuity Revenue		$ 40.40										
Capex Payments		-$ 39.00										

4.32 From Table 3 above it may be noted:

- the RAB is held constant (in nominal terms);
- instead of being added to the RAB, 'lumpy' renewal expenditure is recovered through a 'smooth' annuity;
- the annuity in this example is calculated as a straight 10 year annuity based on 'forecast' renewal expenditure (*c.f.* a 30 year rolling annuity for SunWater);
- a sinking fund is needed to account for differences in the timing of annuity receipts and actual expenditure;
- interest on the sinking fund is at the same rate as used in the annuity calculation;
- the annuity provides a return of and on capital in relation to the 'actual' renewal expenditure, and as a consequence, both have the same present value (i.e. $24.82);
- the RAB is not depreciated, as it is being maintained through the actual renewal expenditure;
- a return on the initial RAB is also recovered as revenue; and
- the overall PV is the same as in the previous worked example.

4.33 Table 3 also provides the mechanics of the 'sinking fund'. It will be noted that the closing balance of the sinking fund is zero. However, because in this particular example, the firm has had to prefund

renewal expenditure more than the consumers have, there is net interest payable to the firm ($1.40). Where the sinking fund interest rate is the same as the discount rate implicit in the annuity, the interest received exactly matches the excess of annuity income over the actual renewal expenditure.

4.34 The worked example is based on actual renewal expenditure being the same as forecast (for the purpose of setting the annuity in advance). Where actual expenditure differs from that forecast, then a balance will be retained in the sinking fund. Ultimately, some action will need to be taken to 'clear' the balance (whether by increasing/reducing charges or by increasing/decreasing renewal expenditure).

A maintenance annuity does not maintain the system's service potential indefinitely

4.35 Where the assets are not being maintained indefinitely, then this will have important implications for the renewals annuity. A maintenance annuity may then apply instead of a renewals annuity and the issue of the recovery of the existing asset base also needs to be separately addressed as it is not being renewed in perpetuity. Examples of the application of a maintenance annuity are included in Appendix 1: Maintenance Annuity Worked Examples. Under a maintenance annuity, a balance in the sinking fund could be used to offset the RAB (similar to accumulated depreciation).

The renewals annuity approach typically has a longer term horizon than a regulatory depreciation approach and involves more scrutiny of longer term capital expenditure plans for water infrastructure

4.36 A standard renewals annuity approach is typically more forward looking than the standard (5 year) RAB approach (based on the Building Blocks Method) adopted in respect of many regulatory matters in Australia.

4.37 The longer time frame for the renewals annuity approach implies a need for asset management plans with sufficient detail to support long term capital expenditure plans. This tends to facilitate greater scrutiny by stakeholders in providing input to long term capital expenditure plans which can in turn promote productive and dynamic efficiency.

As a consequence of smoothing expenditure, the timing of capital expenditure will differ from when annuity funds are received

4.38 The renewals annuity approach recovers the cost of financing future expenditure before all of the expenditure is incurred.

4.39 This creates the need for keeping track of the contributions of the annuity charge to future capital expenditure to both avoid scope for double counting and to facilitate the financing of that expenditure when it occurs.

4.40 The difference between actual expenditure and the annuity amount (whether a timing difference or a permanent difference) is accounted for by way of an asset refurbishment reserve (i.e. sinking fund). The balance in the sinking fund reflects either:

- monies that have been contributed by customers, but not yet spent on asset refurbishment; or
- asset refurbishment expenditure that has been funded by the firm, but not yet recovered from customers.

4.41 By way of example, the McDonald Review of the Victorian rural water sector in 1992 recommended a 100 year annuity to smooth the asset consumption expenditure and a sinking fund (reserve) to finance

future asset refurbishment expenditure, with a 4 per cent real rate of return to apply to the sinking fund.[37]

SunWater applies a renewals annuity approach to each WSS.

4.42 Whilst the McDonald Review established an annuity period of 100 years, the practice at SunWater has been to use a 30 year rolling annuity period for determining the annuity.

4.43 In aggregate, SunWater has expended $7.6m less than it has collected in annuities, since it established the renewals annuity arrangements. This does not necessarily constitute an over-recovery by SunWater, as under a 'smoothed' annuity it may be the case that significant expenditure has yet to be incurred.

4.44 'Interest' payments to customers or to SunWater in respect of any funds contributed in advance, are factored into the annuity through the choice of a discount rate. SunWater does not receive interest (or a return on capital) on renewal expenditure because it is customers that have funded it. In the case of customer prefunding, this means that the amount paid by customers is less than the expected asset refurbishment expenditure – the discount implicitly reflecting the interest the customer would earn on the credit balance of the sinking fund. Effectively, by paying for expenditure in advance, customers pay a discounted nominal amount, although in real present value terms there is no benefit to users.

4.45 In its price path, SunWater also indexes the annuity. This is appropriate where the period-by-period charge has been set in constant real terms, provided the present value of the indexed charges equals the present value of the renewals expenditure using the same discount rate. It is also important that the forecast expenditure that is used for setting the annuity is as close as possible to the actual expenditure when that expenditure occurs. Where this does not occur and the difference is material, an adjustment would need to be made to the annuity payment. This adjustment could potentially occur towards the end of each five year regulatory period. Indexing is merely a means of providing a different profile for the charges, one which, in this case, is constant in real terms.

Advantages and Disadvantages of the Renewals Annuity Approach

4.46 Most advantages (and disadvantages) of a renewals annuity approach are not necessarily specific to the approach but are characteristics of how it is typically applied.

4.47 Advantages resulting from the **typical application** of a renewals annuity approach include:

- it is a simple approach to accounting for renewals expenditure as it specifies a single annual payment to cover the cost of all forecast 'renewals' expenditure;
- using customer funding to facilitate financing of future capital expenditure assists the financial management of the utility and therefore the objective of FCM;
- the discipline of asset management when long term asset management plans are specified and scrutinised by customers; and
- the automatic 'smoothed' payment profile over time.

4.48 Disadvantages from the **typical application** of any renewals annuity approach include:

- errors in forecasting asset expenditure over a long period and therefore the potential for frequent adjustments to the annuity;

[37] Supra, Note 27, p117

- the difficulty of determining the extent to which system augmentation or enhancement expenditure should also be incorporated into a renewals annuity or separated out and recovered under a different mechanism (if it increases service potential);
- the additional requirements on management to develop the asset management plans with long time horizons;
- the need to make regular adjustments to the annuity profile to reflect the time horizon for future expenditure and to correct for differences between forecast and actual expenditure; and
- the need to establish a sinking fund to account for timing differences between annuity receipts and actual expenditure.

4.49 The QCA suggests that a *"major disadvantage of a renewals annuity relates to the difficulty of developing realistic long term asset management plans"*.[38] Robust AMPs, are inherently difficult to develop, however they do facilitate productive and dynamic efficiency through high quality information about the network and its condition, and provide forward looking costs to assist decision making.

Application to the Ministerial Direction

4.50 In addition to specifying a recovery of expenditure on the renewal and rehabilitation of existing assets, the Ministerial Direction specifically itemises the following for recovery through prices:

- ongoing operating and maintenance costs;
- a return on the initial RAB; and
- a return of, and on, prudent capital expenditure on existing assets or for constructing new assets.

4.51 The implications of a renewals annuity approach for each of these is discussed below.

- First, ongoing operating and maintenance costs could be included in the renewals annuity (much as is the case in the UK with the LRNC). However, this is an unnecessary complication, given that a recovery of this expenditure is directly available.
- Second, whilst a return on the initial RAB could be achieved directly as a separate building block (as provided by the Ministerial Direction), it is noted that both a return of and on the initial RAB could be achieved with the renewals annuity approach by:
  - rolling the initial RAB into the annuity calculation[39]; or
  - increasing the annuity amount to 'synthetically' confer a depreciation outcome (e.g. accumulated depreciation) similar to a potential maintenance annuity outcome (as described in Appendix 1).

4.52 However the rolling of the initial RAB into the annuity calculation or the synthetic allowance for depreciation of the initial RAB is not relevant as the Ministerial Direction does not provide for return of the initial RAB, which is consistent with an assumption that the initial RAB is being maintained on an indefinite basis.

4.53 Finally, in relation to returns of and on capital expenditure related to enhancements of existing assets and for constructing new assets at a date after the initial annuity was established, it is noted that:

- the annuity no longer remains automatically 'smoothed' over time, as it increases for every enhancement project; and
- up-front funding will be required for the 'new' investment[40].

[38] QCA; "Statement of Regulatory Pricing Principles for the Water Sector"; December 2000; p 45

[39] Note that achieving a return of the initial RAB under an annuity is inconsistent with the renewal accounting framework (where assets are assumed to be maintained in perpetuity).

5 Regulatory Depreciation Allowance

5.1 This Section describes the regulatory depreciation allowance approach for the purpose of renewing and rehabilitating assets pursuant to the Ministerial Direction

Accounting for Depreciation

The systematic expensing of an asset, over time, is known as depreciation.

5.2 Assets tend to lose value, or service potential, over time, and are generally replaced once they reach the end of their economic life. Given that assets last for several years, it is generally not appropriate to fully expense an asset in the year of its acquisition, or to eventually record the cost of using the asset in the year it is disposed of. Instead the asset is expensed in a systematic manner over its estimated economic life. The systematic expensing of an asset in accounting is known as depreciation. According to Moritz, depreciation is a basis:

> *"...for recovering, by means of a yearly charge to production during the life-time of the asset, its reduction in value."* [41]

Depreciation is a traditional accounting approach for recognising asset consumption

5.3 Unlike the renewal accounting approach, the regulatory depreciation approach requires all asset replacement expenditure to be capitalised (i.e. added to the value of the relevant asset type) – irrespective of whether it changes the service potential of assets. The cost of individual assets is then spread/returned over their useful or economic life. Under a renewal accounting approach assets are deemed to have an indefinite life because of a process of ongoing renewal.

5.4 However, notwithstanding this, Moritz describes a link between 'repairs' and 'asset life', and therefore expresses a spectrum of asset consumption from depreciation (and assets having finite life) to a repair/renewal charge (and assets having indefinite life). This essentially links depreciation accounting and renewal accounting as a function of asset life:

> *"Aside from obsolescence, the value of an asset could be kept practically intact indefinitely by sufficiently increasing the outlay for repairs. ..."* [42]

5.5 The profile of depreciation may be adapted to reflect, amongst other things, the basis of deterioration of an asset's service potential. The approach to depreciation may therefore be case or asset-specific. There are numerous accounting methods for depreciating an asset over its economic life[43]. For instance, common approaches to depreciation include:

- Straight-line depreciation - provides an equal amount of depreciation on an asset each year over its expected life (but the total depreciation for a portfolio of assets will fluctuate with asset additions and maturities);

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[40] This, and other references to funding/financing in the *Issues Paper*, is not intended to suggest that SunWater will have any problems raising finance.

[41] Moritz R. E.; "A New Theory of Depreciation of Physical Assets"; The Annals of Mathematical Statistics Vol 3, No. 2 (1932); p108

[42] Ibid pp 108-109

[43] It is not normal for land to be depreciated as it has an indefinite/perpetual life.

- Annuity depreciation - provides a depreciation profile that ensures the *return of and on capital* for an asset is constant each year of that asset's life;
- Accelerated depreciation - results in higher depreciation earlier in the asset's life; and
- Economic depreciation - reflects the change in economic value of the asset from one year to the next (meaning negative depreciation in years that the asset appreciates in value).

5.6 From an economic or FCM perspective, any profile of depreciation can be specified provided the present value of capital cost recoveries (including a return on the outstanding RAB) equals the present value of asset expenditure.

5.7 For instance, different profiles for the pattern of depreciation can be specified on the basis of various economic efficiency and/or equity considerations, and where *ex ante* FCM is maintained all profiles will be equivalent in present value terms. The pattern for depreciation does not have to be restricted to represent physical depreciation on a period-by-period basis. Accelerated depreciation might be allowed where asset stranding risk was a key concern, while intertemporal equity considerations might provide a rationale for a pattern that was constant in real (inflation-adjusted) terms.

5.8 Arguably, asset funding should not be regarded as a primary reason for selecting a depreciation methodology. Historically, depreciation was seen in 'reserve accounting' terms where it results in a 'reserve of funds' which accumulates over the asset's life so that the firm can replace the asset when it becomes obsolete and totally depreciated. For instance:

> *"... provision should be made each year for renewing the proportion of original cost equivalent to the estimated life, so that by the end of the term the whole is provided for."* [44]

5.9 As depreciation provides for recovery of the capital invested in an asset, it more appropriately provides an 'assured' cash-flow that can be used to service the funding used to acquire the asset – rather than providing funding for asset replacement. Similarly, under a regulatory depreciation approach, asset refurbishment expenditure and investments in new assets are funded by the regulated business. The recovery of this capital expenditure, via depreciation, then helps to service the funding of the expenditure.

5.10 Thus over the asset's economic life it is intended that typically depreciation should:

- recognise an asset's loss of value over its life as a result of wear and tear, or obsolescence; and/or
- return to the business the amount of capital invested in the asset (less its estimated future residual value).

Regulatory Depreciation Allowance

A Regulatory Depreciation allowance provides for a retrospective return of capital

5.11 A regulatory depreciation allowance typically recovers the expenditure classified as capital in nature, retrospectively over a period of time. The profile in which the capital is returned can reflect the deterioration in the asset's condition and therefore make provision for expenditure necessary for

[44] Dickinson A.L.; "Some Special Points in Accounting Practice"; Business World; May 1905, p 235

renewing and rehabilitating assets. Financing costs (i.e. a return on capital) are typically not recovered in this charge.

A Regulatory Depreciation Allowance is typically applied as part of a RAB approach.

5.12 The regulatory depreciation allowance is typically combined with a separate allowance (i.e. 'building block') for a return on capital in order to ensure that the regulated entity receives appropriate compensation for efficient capital investments approved by the regulator.

5.13 This treatment, referred to as the RAB approach, applies to both the existing asset base and to any future capital expenditure (including capital expenditure defined as part of a renewals program).

5.14 However, the Ministerial Direction is silent in relation to a return **of** the initial RAB (depreciation), and it is understood that the Authority interprets this to mean that only ongoing capital expenditure is to be depreciated. Consequently, this *Issues Paper* assumes that only ongoing capital expenditure is to be depreciated—which is a departure from the traditional regulatory depreciation approach. Depending on the depreciation profile adopted, this may result in an increase in the RAB instead of the RAB being held constant. Any increase in the RAB would reflect that new capital expenditure was only partially depreciated each year.

5.15 Table 4 below presents an hypothetical worked example of the situation where there is a regulatory depreciation allowance for future capital expenditure but the initial RAB is not recovered.

Table 4 – Worked Example of Regulatory Depreciation with NO Recovery of Initial RAB

		Asset	Capital Expenditure									
		Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Opening RAB			$ 100.00	$ 102.00	$ 102.93	$ 111.83	$ 119.43	$ 120.77	$ 130.03	$ 129.97	$ 130.87	$ 131.70
Less Depreciation			$ -	-$ 0.07	-$ 0.10	-$ 0.40	-$ 0.67	-$ 0.73	-$ 1.07	-$ 1.10	-$ 1.17	-$ 1.23
Xfer from Sinking Fund												
Capital Expenditure		$ 100.00	$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
Closing RAB		$ 100.00	$ 102.00	$ 102.93	$ 111.83	$ 119.43	$ 120.77	$ 130.03	$ 129.97	$ 130.87	$ 131.70	$ 132.47
PV Closing RAB	10%	$ 51.07										
Renewal Expenditure (Actual)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewal Expenditure (Forecast)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NPV (Capex/Renewal Actual)		*$24.82*										
NPV (Capex/Renewal Forecast)		*$24.82*										
Revenue												
- Infrastructure Renewal Charge			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Annuity	10%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Depreciation			$ -	$ 0.07	$ 0.10	$ 0.40	$ 0.67	$ 0.73	$ 1.07	$ 1.10	$ 1.17	$ 1.23
- Return on RAB			$ 10.00	$ 10.20	$ 10.29	$ 11.18	$ 11.94	$ 12.08	$ 13.00	$ 13.00	$ 13.09	$ 13.17
			$ 10.00	**$ 10.27**	**$ 10.39**	**$ 11.58**	**$ 12.61**	**$ 12.81**	**$ 14.07**	**$ 14.10**	**$ 14.25**	**$ 14.40**
NPV (Revenue)		$ 73.75										
NPV (Closing RAB)		$ 51.07										
Total NPV		**$ 124.82**										

Note: NPV of IRC / Annuity $0.00

**Assumes capex occurs at end of period.*

Note: Worked Examples in this Issues Paper all use the same cash flows

5.16 From Table 4 above it may be noted:

- the initial RAB is not depreciated and actual capital expenditure is depreciated on a straight line basis over 30 years[45];

[45] So the depreciation figure for Year 2 ($0.07) is derived from straight line depreciation on $2 capex over 30 years (i.e. $2/30yrs = $0.07 per annum).

- it does not follow the traditional RAB approach for the initial RAB (as only a return on capital is provided for) and the RAB is not indexed for inflation as the return is expressed in nominal terms;
- over the time frame highlighted, the RAB increases (due to the initial RAB not being depreciated, and the impact of capex); and
- as a return on capital is provided for the initial RAB and the closing RAB value is undepreciated, the overall PV is the same as in the previous worked examples.

5.17 Changing the depreciation profile (including the asset's expected life) has no overall impact on the PV outcome, as under a RAB approach, higher/lower depreciation results in lower/higher returns on the RAB.

5.18 For instance, Table 5 below depicts the situation where, under a typical regulatory depreciation approach, capital related cost recoveries are smoothed, while ensuring PV equivalence. Thus it is possible to achieve a similar smoothed outcome as a renewals annuity approach when implementing a regulatory depreciation approach. Note also, that in practice where the Authority is required to establish a price path for a particular period, it effectively smooths all expenditure when it determines the relevant price path, so that an irregular pattern of depreciation is effectively irrelevant in terms of its impact on prices.

Table 5 – Worked Example of Deprecation (no Recovery of Initial RAB) with Smoothing

		Asset	Capital Expenditure									
		Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Opening RAB			$ 100.00	$ 100.00	$ 98.99	$ 105.89	$ 112.48	$ 113.72	$ 123.09	$ 124.40	$ 126.84	$ 129.52
Less Depreciation			-$ 2.00	-$ 2.00	-$ 2.10	-$ 1.41	-$ 0.75	-$ 0.63	$ 0.31	$ 0.44	$ 0.68	$ 0.95
Xfer from Sinking Fund												
Capital Expenditure		$ 100.00	$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
Closing RAB		$ 100.00	$ 100.00	$ 98.99	$ 105.89	$ 112.48	$ 113.72	$ 123.09	$ 124.40	$ 126.84	$ 129.52	$ 132.47
PV Closing RAB	10%	$ 51.07										
Renewal Expenditure (Actual)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewal Expenditure (Forecast)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NPV (Capex/Renewal Actual)		$24.82										
NPV (Capex/Renewal Forecast)		$24.82										
Revenue												
- Infrastructure Renewal Charge			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Annuity	10%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Depreciation			$ 2.00	$ 2.00	$ 2.10	$ 1.41	$ 0.75	$ 0.63	-$ 0.31	-$ 0.44	-$ 0.68	-$ 0.95
- Return on RAB			$ 10.00	$ 10.00	$ 9.90	$ 10.59	$ 11.25	$ 11.37	$ 12.31	$ 12.44	$ 12.68	$ 12.95
			$ 12.00	**$ 12.00**	**$ 12.00**	**$ 12.00**	**$ 12.00**	**$ 12.00**	**$ 12.00**	**$ 12.00**	**$ 12.00**	**$ 12.00**
NPV (Revenue)		$ 73.75										
NPV (Closing RAB)		$ 51.07										
Total NPV		**$ 124.82**										

Note: NPV of IRC / Annuity $0.00

**Assumes capex occurs at end of period.*

Note: Worked Examples in this Issues Paper all use the same cash flows

5.19 From Table 5 above it may be noted:

- the initial RAB is not depreciated (although a return on capital is provided for) and actual capital expenditure is depreciated on a straight line basis over 30 years (as with Table 4 above);
- the total depreciation and return on the RAB is annuitised / smoothed over the 10 year horizon provided in the illustration;

- the depreciation component of the total cost recovery decreases over time (in contrast with the previous example provided in Table 4 above), and becomes negative towards the end of the time horizon only as a function of the annuitisation process; and
- the overall PV is the same as in the previous worked examples.

Regulatory Depreciation finances expenditure through debt and equity.

5.20 Under a regulatory depreciation approach asset rehabilitation and renewals expenditure is typically funded by the regulated business through debt or equity and the capital is recovered over time. As noted this contrasts with the typical renewals annuity approach where a distinctive feature is that it provides for the financing of capital and operating expenditure that is defined by the renewals program prior to most of that expenditure being incurred.

In practice regulatory depreciation allowances, a return on capital and allowances for costs are combined and smoothed in setting a price path

5.21 An unadjusted regulatory depreciation allowance profile will typically have an irregular rather than a smooth profile over time. However, as noted above, in the Authority's typical approach, the regulatory depreciation allowance, a return on capital and allowances for other costs are added together and then a separate smooth profile is established that provides the same present value as the original profile. This leads to smoothing of total annual charges for the infrastructure asset and effectively achieves the same smoothing outcome as an annuity approach for capital charges.

Advantages and Disadvantages of the Regulatory Depreciation Approach

5.22 The main advantages of the **typical application** regulatory depreciation approach are identified as including:

- its simplicity and consistency with standard accounting practice in a commercial environment which in turn facilitates understanding of its purpose and effect[46];
- its widespread acceptance by regulators.
- the avoidance of the need for a sinking fund; and
- the financial discipline provided on the utility because it has to provide capital and service the associated financing costs.

5.23 The main disadvantages of the **typical application** of the regulatory depreciation approach are identified as including:

- the relatively short time frame and more limited scrutiny (compared to a typical renewals approach) that tends to be adopted when approving planned capital expenditure for long lived assets;
- the irregular/lumpy cash recovery profile that results from changes in the RAB over time;
- the need to access external finance to fund lumpy capital expenditure; and
- subjectivity, as the quantum of depreciation depends on the veracity of estimates of the useful life of the assets.

[46] Supra, Note 27, p 111

5.24 However, in relation to the last point about the life of the assets, note that if the regulatory depreciation approach is applied with an assumption that the initial RAB is to be preserved indefinitely then the point about subjectivity does not apply to the existing assets. In this case both the regulatory depreciation approach and the renewals annuity approach would assume an indefinite life for the existing RAB. There would still be a need to make an assumption about the appropriate time profile for recovery of refurbishment capital type expenditure but the considerations for this should be the same under both approaches.

Application to the Ministerial Direction

5.25 The Ministerial Direction requires consideration of a regulatory depreciation allowance for enabling the recovery of expenditure on the renewal and rehabilitation of existing assets. This Section has identified a regulatory depreciation allowance as being a mechanism for recovering asset consumption expenditure of this nature. This Section has also identified the general convention that regulatory depreciation is paired with another mechanism to provide a return on capital invested in the RAB.

5.26 This pairing of a return on and of capital expenditure in relation to ongoing renewal and rehabilitation expenditure is relevant when recognising the objective of economic efficiency and also to place the regulatory depreciation approach on a like-for-like basis with the renewals annuity approach. However, it is also consistent with the Ministerial Direction which specifies a requirement for a return of and on capital expenditure related to existing assets or for constructing new assets.

6 Comparison of Renewals Annuity and Regulatory Depreciation Approaches

6.1 In Sections 4 and 5 the traditional renewals annuity and regulatory depreciation approaches were described in detail. These Sections also provided some insights into variations of these traditional approaches. This Section brings together these two approaches, examining areas in which they can be reconciled, and identifying essential differences between the approaches.

In Australia, both the renewals annuity approach and the regulatory depreciation approach are commonly used in infrastructure price regulation, and both approaches can achieve largely the same outcome

6.2 In its own issues paper on water charge rules for charges payable to irrigation infrastructure operators, the ACCC notes:

> *"The water charge rules are primarily concerned with the determination of efficient prices. Both the regulatory asset base approach and the renewals annuity approach may be mechanisms under which this may be achieved."* [47]

6.3 It should be readily apparent that an essential requirement for the approaches to be equivalent is that they provide the same present value of cost recovery charges. Notwithstanding the same present value outcome, the different approaches, if unadjusted, will likely have a different cash recovery profile.

6.4 According to the ACCC:

> *"The renewals annuity approach converts the forward-looking long-term expenditure on renewing and rehabilitating assets into a smoothed path for revenue using an appropriate discount rate. ... Importantly, the renewals annuity figure factored into prices represents an ex ante or up-front contribution from customers to expenditure yet incurred by the operator."* [48]

> *"The regulatory asset base approach also converts the forward-looking expenditure on renewing and rehabilitating assets (as well as other categories of capital expenditure) into a path for revenue, but that path may not be smooth as is the case with the renewals annuity."* [49]

6.5 However, as explained in Section 5, the regulatory depreciation approach is typically implemented in a manner such that the overall charge for cost recovery is highly smoothed, while ensuring the present value condition is met.

The previous Worked Examples for each method (and variations thereof) show different cost recoveries over time. However, the cost recoveries are the same in present value terms.

6.6 The hypothetical Worked Examples provided in Sections 4 and 5 were necessarily simplistic. However, their simplicity is sufficient to allow key inferences to be drawn. A summary of the previous Worked Examples is provided in Table 6 below:

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[47] ACCC: "Issues Paper: Water Charge Rules for Charges Payable to Irrigation Infrastructure Operators"; May 2008; p23

[48] Ibid, p21

[49] Ibid

Table 6 – Summary of Cost Recoveries from Previous Worked Examples

Approach	Example in *Issues Paper*	Full Cost Recovery … (i.e. Revenue Requirement *including* Return on RAB)										Total	Closing RAB (PV)	Total NPV
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10			
Renewal Accounting (Infrastructure Renewal Charge)	*Table 2*	*$ 12.00*	*$ 11.00*	*$ 19.00*	*$ 18.00*	*$ 12.00*	*$ 20.00*	*$ 11.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	***$ 139.00***	***$ 38.55***	**$ 124.82**
Renewal Annuity (Traditional)	*Table 3*	*$ 14.04*	*$ 14.04*	*$ 14.04*	*$ 14.04*	*$ 14.04*	*$ 14.04*	*$ 14.04*	*$ 14.04*	*$ 14.04*	*$ 14.04*	***$ 140.40***	***$ 38.55***	**$ 124.82**
Depreciation Allowance (No Recovery of Initial RAB)	*Table 4*	*$ 10.00*	*$ 10.27*	*$ 10.39*	*$ 11.58*	*$ 12.61*	*$ 12.81*	*$ 14.07*	*$ 14.10*	*$ 14.25*	*$ 14.40*	***$ 124.49***	***$ 51.07***	**$ 124.82**
Depreciation Allowance (Smoothed Dep'n)	*Table 5*	*$ 12.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	*$ 12.00*	***$ 120.03***	***$ 51.07***	**$ 124.82**

Note: Worked Examples in this Issues Paper all use the same cash flows

6.7 From Table 6 above it may be noted:

- the annual cost recoveries vary considerably across the various methods;
- the depreciation approaches have a lower recovery over the 10 year period in the tables but the same recovery (in PV terms) over a 30 year period; and
- consequently all approaches have the same PV outcome.

In general, a different PV outcome would only be expected where no return on capital is provided.

6.8 To show the differences and similarities of the approaches we have illustrated an example with the following assumptions:

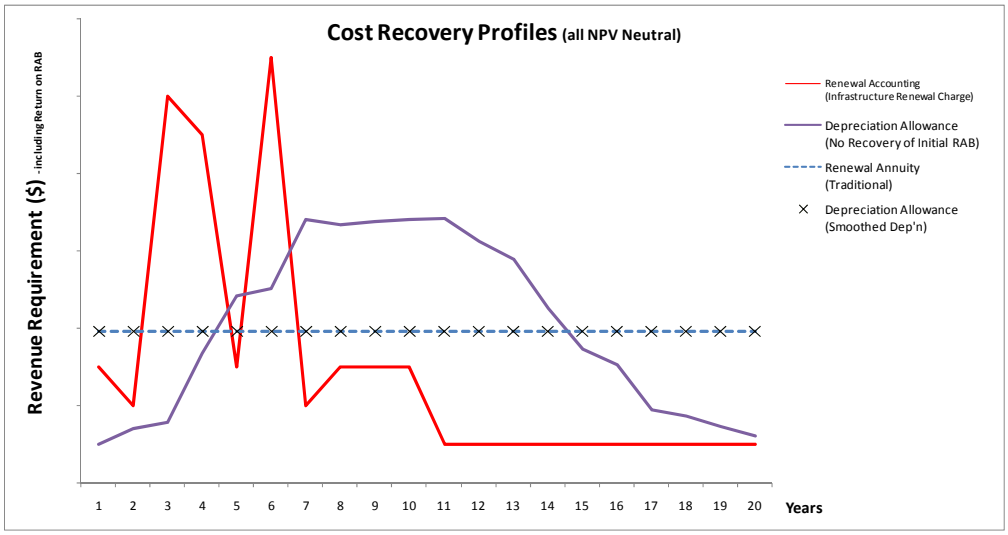
- used the same cash flows as all the other worked examples in this paper but stopped the cash outflows after year 10;
- assumed a 10 year straight line depreciation period;
- assumed a 10% return **on** a notional initial RAB; and
- used a 20 year time frame to allow costs to be fully depreciated within the timeline of the graph

This example of cost recovery profiles of the various approaches is shown in Figure 4 below. Although the present value of each outcome is the same, there is variation in the profile of cost recoveries across some of the options. As noted previously the smoothed profile of the standard annuity approach can also be readily achieved with the smoothing of the regulatory depreciation allowance (when the return **on** the expenditure is included).

The graph, based on a 10 year expenditure profile and a 20 year recovery, shows:

- the volatile Infrastructure Renewal Charge (which includes costs as they incur plus the return on the initial RAB) is unchanged in this example;
- the rise and fall cost recovery profile of the Depreciation Allowance (including a return ON capex) over 20 years; and
- the Renewal Annuity and Smoothed Depreciation (including a return ON capex) are identical.

Figure 4 – Cost Recovery Profiles Illustrating Different Approaches



Reconciling the Renewals Annuity and Regulatory Depreciation Approaches

6.9 The renewals annuity approach and the regulatory depreciation approach, as typically implemented, are based on different assumptions regarding capital expenditure. In particular, the key differences are:

- the renewals annuity charge typically provides an *ex ante* full or partial recovery of expected future capital expenditure; and
- the depreciation charge typically provides an *ex post* recovery of all capital expenditure that has occurred (or is reasonably expected in the regulatory period in question).

6.10 The key difference is that a renewals annuity charge does not typically provide a recovery of the initial RAB—in part because it is not future capital expenditure, but primarily because the underlying assumption is that the initial RAB is to be maintained in perpetuity. The application of a regulatory approach to a situation where recovery of the initial RAB was precluded would be unusual but technically possible.

6.11 Another difference is that the annuity process implicitly calculates a return on capital on any occasion where too much or too little funding has been provided by consumers (via the annuity charge) to meet actual renewal expenditure requirements. Traditional depreciation does not automatically include a return on capital component—typically this is calculated separately.

6.12 Ostensibly, both approaches can be reconciled by ensuring a return on capital is provided on any RAB balance (net of accumulated depreciation) and on additional capital expenditure (again net of accumulated depreciation). For instance, where the initial RAB is maintained in perpetuity, a return of capital is not necessary—providing a return on capital is provided on the value of the initial RAB. This is specifically allowed for by the Ministerial Direction.

6.13 Similarly, whilst traditional depreciation does not include a return on capital, this issue is generally avoided under a Building Blocks Method where returns of and on capital are usually paired under a RAB approach.

6.14 Whilst unconventional, if the initial RAB is to be maintained in perpetuity while applying a regulatory depreciation approach, then a return of and on new capital expenditure required to maintain the service potential for the RAB could be readily calculated. The return of and return on new capital expenditure could then be smoothed while still ensuring present value equivalence with the unadjusted return of and return on capital charges. [50]

The present value of the payment streams from the renewals annuity approach and the depreciation approach can be specified to be the same

6.15 It may be shown that the outcome of either approach, in present value (PV) terms, is the same. For example, the ACCC[51] in its Issues Paper on water charge rules for irrigation infrastructure operators provides a comparison (and reconciliation) of the annuity approach and the regulatory asset base approach to establishing a revenue requirement in relation to financing of capital expenditure.

6.16 The technical proof for this has been demonstrated by the ACCC—and a condensed version of this is set out in the adjacent box:

The Renewals Annuity (RA) is determined by the ACCC (2008) to be:

$$RA = \frac{r}{1-(1+r)^{-T}} \times \left(\sum_{t=1}^{T} \frac{CAPEX_t}{(1+r)^t} + RAB_0\right)$$

... with rearranging this is the same as:

$$\underbrace{RAB_0}_{\text{Initial RAB}} + \underbrace{\sum_{t=1}^{T} \frac{CAPEX_t}{(1+r)^t}}_{\text{PV of future capex}} = \underbrace{\left(\frac{RA}{1+r} + \frac{RA}{(1+r)^2} + \ldots + \frac{RA}{(1+r)^T}\right)}_{\text{PV of renewals annuity}}$$

In other words, the PV of the RA, is the same as the Initial RAB together with the PV of future capital expenditure.

6.17 The ACCC[52] notes that the two approaches will (only) be equivalent in ensuring consistency in pricing policies when the following conditions apply:

- the quantum of capital expenditure is the same under both approaches;
- the period over which capital expenditure is recovered is the same under both approaches;
- the discount rate is the same under both approaches; and
- the initial (RAB) is valued at zero at the time of regulation. [53]

6.18 It should be readily apparent that the present value of both approaches can only be the same where the quantum of capital that is to be recovered and the discount rate are the same under both approaches. However, the condition that the period over which the capital expenditure to be recovered

[50] Note that under the typical regulatory depreciation approach, as implemented by the Authority, all costs are combined and adjusted to provide a smoothed profile while maintaining the present value equivalence condition.

[51] Supra, Note 16, pp. 20-23 and Appendix D.

[52] Ibid, pp. 22-23.

[53] Ibid

is the same under both approaches, is not a necessary condition for present value equivalence. If there are different recovery periods for the two approaches, it would imply a different average annual level of charges as between the approaches, over the time period of recovery.

6.19 As to the condition that the RAB needs to be valued at zero at the time of regulation, the ACCC[54] provides the qualification that "*[t]his is consistent with an operator that finances all of its capital expenditure under a renewals annuity*" and that "*[w]here capital has been financed outside the renewals annuity ... the opening value of the asset base may be greater than zero*". This is an important qualification which has also been adopted in the renewals annuity approach set out in this *Issues Paper*.

6.20 The same PV outcome would arise under a regulatory depreciation approach if the initial RAB is not depreciated (and not set to a zero value), but separately a return is provided on the initial RAB (as provided by the Ministerial Direction). This is another way of expressing a depreciation outcome consistent with the RAB approach.

6.21 As noted previously, where an asset is being maintained in perpetuity a return of capital on the initial RAB is unnecessary. However, if the asset is not being maintained in perpetuity, a return of the initial RAB could be achieved through a maintenance annuity type approach where the over-recovery of actual renewals expenditure results in a sinking fund balance that can be applied against the RAB (in a manner similar to accumulated depreciation). This is described in Appendix 1.

Differences between the Renewals Annuity and Regulatory Depreciation Approaches

6.22 In summary, the key differences between the two approaches are identified in Table 7 below.

Table 7 – Key Differences Between Renewals Annuity and Regulatory Depreciation Approaches

Factor	Renewals Annuity	Regulatory Depreciation	Comment
Return of Initial RAB	There is no need for a return of the initial RAB if the service potential of the asset is being maintained indefinitely.	There is no need for a return of the initial RAB if the service potential of the constituent assets is being maintained indefinitely. However, this is not a standard application of the regulatory depreciation approach.	If the RAB is being maintained indefinitely this accords with the standard annuity approach, but the regulatory depreciation approach would have to be adjusted if necessary to ensure the RAB was not depreciated.
Estimated asset life	Existing asset base has an indefinite life (requiring the forecasting of renewals expenditure well into the future for calculation of the annuity).	Existing asset base assumed to have an indefinite life, but need to determine the life of new capital expenditure for the regulatory period for calculation of the depreciation allowance.	The same information is needed for both approaches when the existing asset base has an indefinite life, except that the typically longer time horizon for the annuity approach means that estimates of asset lives are needed well in advance of most expenditure.
Ongoing Capex Forecasts	Long-term forecasts critical to annuity calculation.	Forecasts of capex are required for the regulatory period (i.e. the period over which prices are being set).	Typically the time profile for capex forecasts is longer under the annuity approach. The difference can in practice undermine the ex ante PV equivalence of the two approaches.

[54] Ibid, p 23

Factor	Renewals Annuity	Regulatory Depreciation	Comment
Sinking Fund	Sinking fund required due to differences between expenditure and annuity.	No sinking fund normally required.	The sinking fund facilitates finance but may reduce capital market pressures for efficient investment.
Asset Management Planning	A longer term perspective and detailed scrutiny are a necessary discipline for setting the annuity.	Typically does not adopt the same level of discipline associated with the renewals annuity approach, given the shorter time profile for review of capital expenditure.	Greater scrutiny of longer term asset management planning can help to improve economic efficiency. It would be possible to adopt similar asset management planning disciplines under both approaches.

The regulatory depreciation approach is not typically applied in a situation where the asset base is being maintained indefinitely but can be adjusted to address this requirement

6.23 If the asset base is being maintained indefinitely this accords with the standard annuity approach but the regulatory depreciation approach would have to be adjusted to ensure the RAB was not depreciated.

A regulatory depreciation allowance approach typically relates to a shorter period than a renewals annuity approach

6.24 A key difference with the typical regulatory depreciation allowance, compared to a typical renewals annuity allowance, is that the time frame for the consideration of capital expenditure is typically much shorter (say 5 years compared with 30 or more years). However, the depreciation allowance could be specified to apply over a longer time period.

6.25 That is, a separate decision can be made about the optimal time profile of the depreciation allowance which could entail determining whether the regulatory depreciation allowance profile should match the physical depreciation profile or should be tilted to allow for various other economic efficiency (including finance and stranded risk) and equity considerations.

6.26 It is also possible to adjust the time profile of an annuity as well. However, in both cases it would be necessary to ensure that the expected present value of depreciation and return on capital allowances, or the annuity payments, fully recovered any 'capital' expenditure that was made, to ensure adequate financial compensation for that expenditure.

Forecasting renewal expenditure may generate PV differences between the two approaches

6.27 A renewals annuity that is constant in real terms over time, requires long-term forecasts of renewals expenditure. If these forecasts are inaccurate, then imbalances will form in the sinking fund. Whilst, in theory, excess sinking fund balances should be returned, or additional compensation sought for sinking fund shortfalls, this can be difficult to implement in practice. The full reasons for imbalances (e.g. whether they represent timing differences, permanent differences, or errors) can be difficult to identify. As a result, the *ex ante* PV equivalence between the approaches can be undermined.

6.28 SunWater's approach to calculating the renewals annuity uses a rolling 30 year forecast of renewals expenditure. This approach reduces the 'consequence' of forecasts errors by re-calculating the annuity on a periodic basis. Any differences/forecast errors are included in the re-calculation of the annuity—

obviating the need to 'return' surpluses, or seek additional compensation for shortfalls. However, whilst reducing the impact of forecasting error, this approach means that the annuity will no longer be constant in real terms over time, although this may not be a significant issue.

A sinking fund is required for the annuity approach but not the regulatory depreciation approach

6.29 Since the renewals annuity approach typically recovers considerable monies in advance of expenditure but may at times be short of funds, a sinking fund is required for its implementation. In contrast under a regulatory depreciation approach typically capital expenditure is financed through debt and equity. Thus, depending on the profile of future renewal/rehabilitation expenditure, the sinking fund may:

- facilitate the financing of such expenditure; but may
- reduce capital market pressures for efficient investment.

There is typically greater scrutiny by customers of asset management planning for a renewals annuity approach

6.30 Greater scrutiny of longer term asset management planning is typically a feature of the renewals annuity approach. This can help improve economic efficiency. But it would be possible to adopt similar asset management planning disciplines under both approaches.

7 Evaluation Criteria

7.1 The following factors are relevant to the Authority's consideration of whether a renewals annuity approach or a regulatory depreciation allowance is more appropriate for the recovery of expenditure in renewing and rehabilitating assets:

- Government policies;
- Generally accepted regulatory principles; and
- Characteristics of the water (irrigation) sector and SunWater.

Government Policies

A policy framework has been established by the National Water Initiative

7.2 The NWI[55] represents a shared commitment by governments to increase the efficiency of water use, leading to greater certainty for investment and productivity, for rural and urban communities, and for the environment. The pricing and institutional arrangements under the NWI will:

- promote economically efficient and sustainable use of water resources, water infrastructure assets and government resources devoted to the management of water;
- ensure sufficient revenue streams to allow efficient delivery of the required services;
- facilitate the efficient functioning of water markets in both rural and urban settings;
- give effect to the principle of 'user-pays' and achieve pricing transparency in respect of water storage and delivery in irrigation systems and cost recovery for water planning and management; and
- avoid perverse or unintended pricing outcomes.

7.3 These objectives have been incorporated in Schedule 2 of the *Water Act 2007*.

7.4 In particular, the high-level outcomes that are sought by government policy makers include efficiency, user pays, and no perverse price outcomes. The implications of these requirements as evaluation criteria are considered below (as part of the discussion on regulatory principles).

7.5 Key elements of the NWI have been absorbed into the Ministerial Direction. In particular, Clause 1.1 of the Direction requires that bulk water supply and channel prices/tariff structures are set so as to provide a revenue stream that allows SunWater to recover:

(a) *its efficient operational, maintenance and administrative costs;*
(b) *its expenditure on renewing and rehabilitating existing assets, whether through a renewals annuity or a regulatory depreciation allowance;*
(c) *a rate of return on assets valued at 1 July 2011 (the initial regulated asset base (RAB)); and*
(d) *after 1 July 2011, a return of, and on, prudent capital expenditure on existing assets or for constructing new assets.*

[55] Supra, Note 14

All of the requirements of the Ministerial Direction can be met by applying either a renewals annuity or regulatory depreciation allowance approach

7.6 Both approaches can meet all of the requirements of the Ministerial Direction. However, it is important to recognise that to ensure a like-for-like comparison the regulatory depreciation allowance needs to be paired with a return on capital component as part of an application of the RAB or building blocks type approach for renewal/rehabilitation expenditure (or for expenditure on the construction of new assets).

7.7 It is also important to recognise that the Ministerial Direction does not specify a return **of** capital for assets valued at 1 July 2011. This is consistent with the interpretation that assets are being maintained on an indefinite basis through a renewals type expenditure program. This can be accommodated under both the renewals annuity and regulatory depreciation allowance approaches, although it does not reflect a typical application of the regulatory depreciation approach (where capital expenditure is rolled into the existing RAB which is depreciated each year).

7.8 Although not relevant given the Ministerial Direction, it is noted that both approaches can be adjusted if it is necessary for some assets in the initial RAB to be treated as having definite rather than indefinite lives.

Generally Accepted Regulatory Principles

7.9 Regulators tend to seek outcomes consistent with generally accepted regulatory principles. The two approaches may in practice have different impacts on stakeholders but the preferred approach should support the highest benefit to stakeholders from an overall public benefit perspective.

7.10 The advantages and disadvantages of either approach provide the basis for respondents to assess the relative merits of either approach. Some suggested evaluation criteria that are based on government policies for water reform and well accepted public policy and regulatory principles include:

- Economic efficiency;
- Equity;
- Transparency and administrative simplicity;
- Flexibility to take account of specific circumstances.

7.11 Economic efficiency relates to obtaining the greatest net benefits to the community as a whole from the use and allocation of resources and, as such, encompasses a broad range of objectives. For instance, economic efficiency takes account of: the efficient allocation of risk; externalities; public good characteristics; aspects of regional development; and, most matters of a public interest nature.

7.12 Equity is concerned with the implications of alternative pricing arrangements on different customer groups and includes: horizontal equity (consistency between the treatment of similar users); vertical equity (recognising income differentials or 'ability to pay' of different users); and, inter-temporal equity (fairness between different users over time).

7.13 Administrative simplicity and transparency relates to ensuring that administrative systems are as simple as possible given the objectives to be achieved and ensuring that water users and others can readily understand prices and how they were determined.

7.14 Flexibility relates to the ability of pricing arrangements to respond to the specific circumstances of SunWater and its customers. There may be a need for flexibility to accommodate transitioning provisions or new provisions to meet specific circumstances as they arise.

7.15 As the following table illustrates there are only minor differences between how the two approaches measure up against the regulatory evaluation criteria.

Table 8 – Regulatory Principles Compared for the Renewals Annuity and Regulatory Depreciation Approaches

Regulatory Principle	Renewals Annuity	Regulatory Depreciation
Economic Efficiency	Ranks well in terms of most economic efficiency criteria. By itself it is unable to signal the costs of incremental consumption but it does signal the costs of longer term supply. As the approach typically involves more customer scrutiny of longer term investment plans it can facilitate better investment decisions. However, irrigators effectively bear greater financing risk because they provide funding in advance, irrespective of changes in their circumstances.	Ranks well in terms of most economic efficiency criteria. By itself it is unable to signal the costs of incremental consumption and also the costs of longer term supply Typically tends to entail less customer involvement in scrutiny of longer term investment decisions which can curtail efficient investment decisions. As capital expenditure is typically recovered on an ex post basis there is less transfer of risk to customers.
Equity	Capacity to pay considerations can be incorporated in either approach. The main equity issue that arises relates to determining a desired time profile of capital charges over time. The decision about the desired time profile of capital charges is really a separate decision that can be accommodated by either approach. However, there may be more constraints on the extent to which the a renewals annuity profile can be adjusted as typically the renewals annuity approach requires a sinking fund with a sufficient balance to finance expenditure as it occurs.	Capacity to pay considerations can be incorporated in either approach. The main equity issue that arises relates to determining a desired time profile of capital charges over time. The decision about the desired time profile of capital charges is really a separate decision that can be accommodated by either approach. The regulatory depreciation approach is less constrained if the profile of capital charges is tilted so that there is sufficiently greater cost recovery at a later date.
Administrative Simplicity and Transparency	On-going management of sinking fund and facilitating customer scrutiny of longer term investment proposals are potentially onerous administrative requirements. However, customer (and economic regulator) scrutiny of sinking fund and investment proposals contributes to transparency.	This approach is based on more widely used and understood accounting methods which helps to achieve transparency. However, in typical applications, there is less effort in documenting long-term investment proposals and subjecting these proposals to customer scrutiny.
Flexibility	Both approaches can be applied in a flexible manner. The renewals annuity approach is typically applied in a situation where the assets have an indefinite life but this situation applies in the case of SunWater's assets, based on the Ministerial Direction.	Both approaches can be applied in a flexible manner.

Characteristics of the Water (Irrigation) Sector and SunWater

7.16 In evaluating the two approaches, it is relevant to consider how the choice fits with:

- the nature of SunWater's business;
- the nature of SunWater's assets;
- funding issues for SunWater; and
- the ability of SunWater to develop the long-term, forward-looking plans to maintain its assets' service potential at a steady state.

Nature of SunWater's Business

7.17 The "perpetual" interposed position of SunWater between the resource and the customer with resource rights warrants consideration. In particular it suggests that much of SunWater's capital expenditure program may be characterised as renewing or refurbishing long lived assets.

7.18 This naturally raises questions of whether a renewals annuity approach is most appropriate. At the very least the choice of approach should not adversely impact SunWater's ability to develop the long-term, forward-looking plans to maintain its assets' service potential at a steady state.

Different asset consumption approaches have been used by different water businesses in Queensland. SunWater has applied a renewals annuity approach whilst the Gladstone Area Water Board has used regulatory depreciation

7.19 As noted previously, SunWater owns and operates bulk water supply and distribution infrastructure, supplying about 40% of the water used commercially in the State via its WSSs. SunWater has over 5,500 customers – mostly irrigators, but also including water boards, local governments, power stations and mining, industrial and manufacturing companies.

7.20 SunWater has adopted a renewals annuity approach to the recovery of its WSS capital costs. The Authority has endorsed this in its *Statement of Regulatory Pricing Principles for the Water Sector*, and in its *Investigation of Pricing Practices for the Gladstone Area Water Board*. For example:

> *"Provision for asset consumption for all SunWater water supply schemes also will be based on condition-based depreciation in the form of a renewals annuity charge".* [56]
>
> *"The renewals annuity approach is well suited to the water industry, which comprises network assets that are renewable rather than replaceable".* [57]

7.21 The Gladstone Area Water Board (GAWB) is a commercialised statutory authority which has responsibility for providing water storage and delivery services to industrial, electricity generation and local government customers throughout the Gladstone area. The nature of GAWB's business, being largely industrial supply, is quite different to that of SunWater with its irrigation dominated supply. It is noted that GAWB's business is affected by the 'boom and bust' cycles that occur in the region. Arguably, its supply characteristics are less predictable and stable than SunWater's, and as a consequence, the long-term, forward-looking plans to maintain a set level of service potential—required for determining a renewals annuity—would be harder to develop.

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[56] Supra, Note 38, p 46

[57] Supra, Note 35, p 135

7.22 The Authority has recommended a regulatory depreciation approach for GAWB. However, whilst the nature of the GAWB's business differs from SunWater, there is nothing in the Authority's investigation(s) to suggest that this was a factor that led to in its recommendations. In fact, as detailed in Section 8 of this *Issues Paper*, the Authority suggests that a renewals annuity approach might have been preferable—except that GAWB had not developed an Asset Management Plan suitable for the application of a renewals annuity approach.

7.23 In rationalising its recommendation on grounds that robust AMP information was unavailable, and a different outcome may have resulted had the information been available, the Authority is potentially acknowledging that for some businesses it is difficult to provide sufficient robust information to support the derivation of renewals annuities.

7.24 In relation to the Authority's suggestion that a renewals annuity might be more appropriate, GAWB suggested that:

> *"... the [annuity] approach may not be valid for much of GAWB's asset base because sea water technologies and alternatives to fresh water cooling processes have the potential to significantly reduce the remaining economic life of GAWB assets below their technical life".* [58]

GAWB's arguments relate as much to the nature of their business as to the nature of the assets—although it is acknowledged that there is an obvious overlap in an asset intensive business.

SunWater's Assets

7.25 SunWater's assets are infrastructure assets which tend to have the following attributes:

- large networks constructed over several generations;
- very long useful economic lives;
- high initial cost;
- the assets are not usually capable of subdivision for ready disposal, because of legal or other restrictions, and consequently are not readily disposable within the commercial marketplace; and
- the assets are not normally depleted as their service capability is fully maintained in perpetuity, i.e. they are expected to have an indefinite life if adequately maintained although portions of the network will be replaced from time to time.

7.26 Where the cost of replacing an infrastructure asset exceeds the cost of renewing it, then a renewals annuity may better reflect the underlying nature of the assets. For instance, irrigation channel assets do not need to be replaced in their entirety—just the bed and banks. The renewal/refurbishment of an irrigation channel would likely cost less than the cost of constructing the equivalent new channel. In this regard, the QCA notes:

> *"For the water industry, cost based depreciation may result in a depreciation charge which exceeds the actual revenue requirement for the maintenance of the service potential of the asset, particularly because of the inability to accurately determine the lives of some water assets (for which the useful life may extend beyond 100 years). Under this approach, there is a tendency to under-estimate the useful lives of long-lived water supply assets such as dams and pipelines. Where depreciation is applied, it is important to ensure that it extinguishes the asset value over the remaining productive life of the asset."* [59]

[58] Ibid, pp 136-137

[59] Ibid, pp 133-134

"... GAWB indicated that a renewals annuity may have advantages over other forms of depreciation allowance for some utility assets (particularly if the expected asset life is greater than that of its components)." [60]

7.27 As noted previously, water entitlements held by customers are valuable and perpetual in nature. There is a correlation between water storages, and water entitlements. The renewals annuity approach generally assumes perpetual service but there may be some schemes where this is not appropriate for SunWater.

7.28 The typical renewals annuity approach is based on assets being maintained at a similar service standard as currently exists and this feature is predominant with respect to SunWater's assets. Although the typical renewals annuity approach can be adjusted to accommodate growing or declining demand, it is simpler to understand, gain support for and implement when the asset base is in a 'steady state' form.

7.29 The issues for SunWater are therefore:

- How steady-state are SunWater's WSSs?
- Are there WSSs which are being 'run to failure' rather than being maintained for indefinite life?
- How could the renewals annuity approach be adjusted to take account of assets that are not being maintained for an indefinite life and is this desirable?

7.30 This latter point is relevant in the case of 'maintenance annuities' (rather than renewals annuities). Maintenance annuities are intended to recover the costs of keeping an asset going over its remaining life – rather than extending the asset's life indefinitely.

7.31 If maintenance annuities are specified for some assets and it is clear that those assets are going to physically depreciate over a definite life, then from an economic efficiency perspective there is a need for recognition of the decline in value of the existing RAB for those assets which in turn has implications for the capital charge associated with the return on existing assets as at 1 July 2011. Note, that as discussed earlier in this paper, the Ministerial Direction does not specify recovery of assets valued at that date.

Funding Issues for SunWater

The renewals annuity approach makes certain assumptions regarding the financing of assets that may not be appropriate for SunWater

7.32 Assumptions regarding the financing of assets differ as between the renewals annuity approach and regulatory depreciation approach. It is generally regarded as being the case that:

- the renewals accounting paradigm intends that prices provide the funds for undertaking renewals expenditure; and
- the depreciation paradigm assumes that assets are funded by the business, and that future prices provide the cash-flow to service this funding.

7.33 In this regard, in an appendix to its Issues Paper on Water Charge Rules entitled "Appendix D—Comparing Capital Financing Approaches" the ACCC notes:

- first, in relation to regulatory depreciation:

[60] Ibid, p136

"the regulator decides on a path of regulatory depreciation that ensures that all capital costs are returned to investors by the time the associated assets come to the end of their economic life." [61]

"the revenue figure factored into prices represents a recovery of expenditure through prices once investment is undertaken by the operator. The operator must arrange for debt and/or equity financing prior to the recovery of revenue through prices." [62]

- and secondly, in relation to a renewals annuity:

"Under the annuity approach, the regulated firm eschews debt finance in favour of directly accumulating contributions from customers." [63]

"the renewals annuity figure factored into prices represents the an ex ante or up-front contribution from customers to expenditure yet to be incurred by the operator." [64]

7.34 Further, the Tier 1 Report notes that:

*"[t]he annuity **that funds** the program makes up a significant share of the irrigation tariff so it was acknowledged that the refurbishment and annuity was an important issue for both Tiers 1 and 2."* [65] *[Emphasis added]*

7.35 SunWater, in responding to the ACCC, note that:

- *"the renewals annuity is not a financing tool, but rather a pricing approach set to reflect the future cost of asset consumption (in place of depreciation); and*
- *pricing relates to an asset, not its ownership nor how costs are financed."* [66]

7.36 From SunWater's perspective, a renewals annuity (unlike the more general infrastructure renewals charge) may not be sufficient to finance lumpy renewal expenditure as it occurs. On occasions, under the renewals annuity approach, SunWater may have to resort to other sources of funding. It is potentially problematic to 'finance' the Initial RAB using annuities[67].

7.37 The regulatory depreciation approach, however, would require SunWater to have greater recourse/reliance on debt funding in the future.

[61] Supra, Note 16, p 52

[62] Ibid, p 21

[63] Ibid, p 54

[64] Ibid, p 21

[65] Supra, Note 11, p 66

[66] SunWater; "Public Submission to bulk water charge rules issues paper"; 18 August 2008, p 14

[67] Balchin, J.; "Re: Technical input to the ACCC submission – relationship between the regulatory asset base and the renewals annuity"; Memorandum prepared by The Allen Consulting Group; 4 July 2008; p5 (Attached as Appendix to SunWater Submission on ACCC Issues Paper – May 2008)

8 Previous Regulatory Perspectives

8.1 The COAG (1998) pricing principles have, until recently, played a role in the rural irrigation pricing policies of most States. The COAG guidelines state:

> *"an annuity approach should be used to determine the medium to long term cash requirements for asset replacement/refurbishment where it is desired that the service delivery capacity be maintained".* [68]

8.2 In its Issues Paper on Water Charge Rules (May 2008), the ACCC noted that the Water Act 2007, whilst expressing that rural water sector charges should transition toward Upper Bound pricing, did not prescribe a method for financing capital investments[69].

The ACCC has assessed the renewals annuity approach and the regulatory depreciation approach

8.3 The ACCC noted that, for a given path of capital expenditure, a given discount rate, and a given life of the firm, both the regulatory depreciation approach and the renewals annuity approach would result in a firm earning a revenue stream with exactly the same PV. The ACCC suggested that *"... an assessment of the approaches used to finance capital investments needs to be made in developing the revenue requirement*".[70]

8.4 In its Position Paper on Water Charge Rules (September 2008), the ACCC proposed the following approach to capital financing:

> ***Approach to capital financing***
>
> *Under the proposed pricing principles, operators may recover the cost of financing existing and new investments through:*
>
> - *earning a return on the value of the RAB (i.e. the weighted average cost of capital multiplied by the RAB)*
> - *a return of the value of the RAB (i.e. regulatory depreciation)*
>
> *Some operators may also choose to finance renewal of current assets through a renewals annuity. Under this approach the annualised value of forecast long term renewals expenditure is calculated and recovered through prices each year.* [71]

8.5 The ACCC propose to 'use the building block approach in assessing an application for....approval of a regulated water charge'. This suggests a more consistent position with other regulated sectors (such as electricity and gas transmission) which apply a regulatory depreciation approach.

8.6 To the extent that there is a difference, the ACCC has realigned the issue to focus on the term 'capital financing' rather than 'asset consumption'.

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[68] National Water Initiative Pricing Principles; Appendix A; p18

[69] Supra, Note 16, p 21

[70] Ibid, p22

[71] ACCC; Water Charge Rules: Position Paper"; September 2008; p36

QCA Decisions on Asset Consumption

i) Water Sector

The QCA has not had a direct role in the setting of SunWater's prices to date. However, for the current price review the QCA will make recommendations to the Minister.

8.7 SunWater's prices are endorsed by the Queensland Government to meet policy objectives.

8.8 In 2000, the government set 5 to 7 year price paths to achieve minimum cost recovery targets for 25 of SunWater's irrigation WSSs. Most WSS price paths expired on 30 June 2006 (some after being rolled over for a year).

8.9 Government endorsed SunWater setting its prices from 1 July 2006 in consultation with its customers (as proposed in the joint submission). Negotiations were required to operate within the bounds of Government policy – including: the requirement that most SunWater WSS achieve Lower Bound pricing (recovery of operating, maintenance, administration and asset refurbishment costs) by the end of the price path; and to not permit the reduction of any current irrigation tariffs due to the current tariff being above the Lower Bound costs over the price path.

8.10 Under Government's rural irrigation water pricing policy for the forthcoming reset of irrigation prices, QCA has the role of independently assessing SunWater's proposed 2011/12 to 2015/16 price path, and making recommendations to the Minister.

The QCA has been involved in making recommendations over the approach for determining asset depreciation allowances for Queensland water businesses

8.11 Whilst not being directly involved in the setting of SunWater's previous tariffs, the QCA has made recommendations and conducted investigations in relation to:

- regulatory pricing principles for the Water Sector (December 2000); and
- the pricing practices of the Gladstone Area Water Board (GAWB).

8.12 In its regulatory pricing principles, the Authority took the view that "an asset consumption charge seeks to measure the decline in service potential from the use of an asset" and that "*a range of methods may ensure that cash flow sufficient to maintain service potential is achieved*".[72]

QCA's Statement of Regulatory Pricing Principles for the Water Sector

8.13 QCA's previous position regarding SunWater's pricing arrangements was that[73:]

- The provision for asset consumption for all SunWater WSSs will be based on condition based depreciation in the form of a renewals annuity charge;
  - Advantages include: regulatory certainty, smoothed prices, better information on asset management, and the relevance of future costs to planning decisions;
  - Disadvantages include the difficulty of developing long term asset management plans.

[72] Supra, Note 38, pp 43, 46

[73] Ibid pp 43-46

8.14 The renewals annuity charge has been used for setting SunWater's price paths in 2006/07-2010/11 (and previously). Anecdotally, this approach has been used by a number of local government councils in Queensland for their water / sewerage services.

8.15 In its 2005 investigation of the pricing practices of GAWB, the Authority opined that a renewals annuity would be a suitable alternative to depreciation for longer life assets that are renewable rather than replaceable.[74]

For the Gladstone Area Water Board, the QCA recommended using a regulatory depreciation approach – in part as forward looking information on asset renewals (needed to determine an annuity) was not available

8.16 The Authority has (in 2002, 2005, and 2010) recommended a regulatory depreciation approach for GAWB as it reflected the average pattern of deterioration of GAWB's assets. However, the Authority suggests that a renewals annuity approach might have been preferable. For instance:

> *"In its previous investigation of GAWB's pricing practices (2002), the Authority stated that in principle it would prefer to apply a renewals annuity approach to long-lived infrastructure. However, as GAWB had yet to finalise its strategic asset management plan, which is essential for the effective application of a renewals annuity, this was not possible. Consequently, the Authority recommended that straight-line depreciation be used for all of GAWB's assets".* [75]

8.17 The Authority (in 2005) also noted that "*the renewals annuity approach is well suited to the water industry, which comprises network assets that are renewable rather than replaceable*". However, the QCA's 2005 investigation noted that whilst GAWB has completed its AMP, it does not provide sufficient information to establish a renewals annuity. As part of its recommendation, the Authority suggested reviewing the potential use of a renewals annuity approach when GAWB develops the relevant data.[76]

8.18 QCA conducted a further investigation of GAWB's prices in 2010[77]. In relation to this investigation it should be noted:

- GAWB proposed to retain the straight-line depreciation method; and
- QCA agreed to continue with a straight line depreciation approach, and proposed that depreciation should be determined on the basis of the design lives of the assets.

8.19 The Authority restated, and arguably clarified/narrowed its view that a renewals annuity approach has some merit in regard to long-lived assets such as dams. Overall its recommendations were consistent with its 2005 investigation, and in line with most other water industry regulatory decisions (see below).

8.20 It is noted that choice of approach may be affected by the ability of the business to develop long-term, forward looking plans to maintain its assets' service potential at a steady state.

ii) Other Sectors

8.21 In other sectors, for instance electricity and gas distribution, the Authority has applied a regulatory depreciation approach. However, it should be noted that these sectors are subject to Code[78] requirements that prescribe the use of a specific regulatory depreciation approach by regulators.

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[74] Supra, Note 35, p 135

[75] Ibid

[76] Ibid, pp 135, 138, 139

[77] QCA; "Gladstone Area Water Board: Investigation of Pricing Practices (Draft Report)"; March 2010; p 89

8.22 For instance, in relation to *gas distribution* the Authority has determined that straight line depreciation on an indexed asset base is appropriate.

> *"Straight-line depreciation determines the capital consumption charge for any given period by dividing the net value of the asset (actual cost less the estimated salvage value) by its expected life. The straight-line method therefore allocates an equal amount of depreciation each year until the asset has been written down to its estimated scrap value at the end of its useful life.*
>
> *This approach is simple, well understood and transparent. Where the consumption of the service potential of assets is similar through time, or where the deterioration of assets is time related, this approach is a reasonable method for allocating depreciation. However, where consumption is not consistent between years, or where the deterioration of the asset is due to circumstances other than time, alternative methods may be more appropriate."* [79]

8.23 Similarly, for *electricity distribution*, the Authority has determined that straight line depreciation on an DORC asset base is appropriate.

> *"The Authority has adopted a DORC method to value the DNSPs' regulated asset bases. While the Authority recognises that the depreciation method adopted should closely reflect the characteristics of the underlying assets, the Authority also recognises that no single depreciation profile is consistently the most appropriate for all assets.*
>
> *The Authority has adopted a straight-line approach to calculate depreciation due to its wide application, ease of understanding and consistency with the previous regulatory approach. Depreciation will be calculated using the effective lives of individual asset categories rather than cost weighted average age profile of the regulated asset base used in the 2001 Final Determination."* [80]

8.24 In relation to rail networks the Authority in 1999 examined both the renewals annuity approach and the regulatory depreciation approach for determining asset consumption. The depreciation option was selected. In relation to the use of annuities, the Authority commented:

> *"Water supply is typical of the service for which a renewals annuity approach has been suggested. So far as QR's below rail coal and minerals infrastructure is concerned, it is unlikely to have an infinite life, as the mines it currently serves and is likely to serve are unlikely to have an infinite life."* [81]

Decisions of Other Regulators on Renewals Annuity Approach

8.25 In 2005 the Authority noted that use of the renewals annuity approach by regulators in Australia was declining. It commented:

> *"Recent regulatory decisions have been virtually unanimous in their choice of straight line depreciation for valuing return of capital ... The only exception was IPART's decision on bulk water prices for the Department of Land and Water Conservation (DLWC) which was based on a renewals annuity. This renewals annuity included major periodic maintenance and replacement expenditure expected over a rolling 30-year period."* [82]

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[78] For example, National Third Party Access Code for Natural Gas Pipeline Systems (as changed from time to time in accordance with the Gas Pipelines Access Law)

[79] QCA; "Revised Access Arrangement for Gas Distribution Networks: Allgas Energy"; May 2006; pp 58-59

[80] QCA; "Regulation of Electricity Distribution: Final Determination"; April 2005; p130

[81] QCA; "Queensland Rail – Draft Undertaking: Asset Valuation, Depreciation and Rate of Return"; May 1999; p12

[82] Supra, Note 35, p136

8.26 For example, the following water businesses have transitioned from a renewals annuity to straight line regulatory depreciation:

Regulator (Date of Review)	**Water Business**
IPART (NSW) 2006	DLWC / State Water[83]
GPOC (TAS) 2004	Hobart Regional Water Authority[84]
ESC (VIC) 2006	Goulburn-Murray Water [85]

8.27 Further to this, in 2008, it was noted by Victoria's Essential Services Commission (ESC) that:

> *"... both Lower Murray Water and FMIT had proposed to adopt the RAB approach for the next regulatory period rather than continuing with the renewals annuity approach. This left Southern Rural Water as the only rural water business operating with the renewals annuity approach."* [86]

8.28 In NSW, a regulatory depreciation approach has been used for many years in setting prices for the Hunter and Sydney Water Corporations, and for the Gosford and Wyong Councils. For instance, in its 2003, 2008, and 2009 reviews of metropolitan water businesses, IPART used straight line depreciation to determine the maximum prices these businesses can charge for water supply, wastewater and stormwater services. Similarly, in the ACT, the ICRC has adopted a regulatory depreciation approach in 1997, 2004, and 2008 for pricing ACTEW's water and waste water services.

8.29 A regulatory depreciation approach has also been adopted by the ERA in Western Australia for setting the prices of Water Corporation. However, in its 2005 inquiry into water pricing, the ERA agreed with Water Corporation that the merits of a renewals annuity approach should be considered in future price reviews. For instance:

> *"The Authority considers the proposed lives to be appropriate for the purposes of determining depreciation allowances in the revenue requirement. The Corporation has indicated that it may consider infrastructure renewals accounting in the future. ... The Authority agrees with the Corporation that this is a matter that needs to be considered for future reviews."* [87]

However, notwithstanding this, it is noted that the ERA continues to apply a regulatory depreciation approach in its latest review of Water Corporation's tariffs.[88]

[83] IPART; "Bulk Water Prices for State Water Corporation and Water Administration Ministerial Corporation from 1 October 2006 to 30 June 2010"; Final Report; September 2006

[84] GPOC; "Investigation into the Pricing Policies of Hobart Regional Water Authority, Esk Water Authority, Cradle Coast Water – Final Report"; July 2004

[85] ESC; "Rural and Urban Water Businesses' Water Plans 2006-07 to 2007-08 – Final Decision – Goulburn-Murray Water"; June 2006; p 23

[86] ESC; "2008 Water Price Review"; June 2008; p75

[87] ERA; "Final Report: Inquiry on Urban Water and Wastewater Pricing"; 4 November 2005; p 89

[88] ERA; "Inquiry into Tariffs of the Water Corporation, Aqwest and Busselton Water"; 18 March 2009

Decisions of Other Regulators on Regulatory Depreciation

8.30 There is considerable consistency across Australian regulators in the use of straight line depreciation. For instance in relation to *electricity distribution*:[89]

- ICRC (2004) adopted the straight-line approach because it was consistent with its previous treatment, transparent and simple. The ICRC also noted that the approach was supported by the Distribution Network Service Providers (DNSPs) and that no contrary views had been expressed in submissions on the topic.
- IPART (2004) decided to continue to use a simple straight-line depreciation method as, in its view, this approach was superior to alternatives in terms of simplicity, consistency and transparency. IPART also noted the DNSPs' support for the continued use of this approach.

  IPART acknowledged that there was no one best approach to calculating depreciation and that under particular circumstances one depreciation profile might be preferred to another.

  However, IPART suggested that, given the complexities inherent in other depreciation methodologies and in the absence of compelling arguments to the contrary, there was little reason to move away from a straight-line approach at this point in time.
- ACCC (2003) noted that, while it had the discretion to adopt an annuity depreciation scheme which could incorporate general price increases and technological change in a manner which mimicked competitive market behaviour, factors such as technological change do not have major impacts in the electricity industry. Therefore, the ACCC preferred the use of a straight-line approach for the electricity industry as this was easier to implement and gave rise to clearer incentives for efficient investment than alternatives such as annuity depreciation.
- ESC (2004) stated that, given the widespread use of straight-line depreciation for utility regulation in Australia, along with the general support for this method during ESC's 2001 price review, this depreciation method should be continued for the 2006 Victorian price review.

  However, the ESC saw merit in establishing a standardised and more transparent approach to the application of the straight-line depreciation method across the distributors. The ESC felt that such transparency and consistency would assist stakeholders to understand how regulated charges had been derived and the extent to which costs had been allocated between current and future users of the regulated services.

  In this regard, the ESC states:

  > *"Capital expenditure is a key component of the revenue requirement. Net capital expenditure is recovered by being added to the regulatory asset base (RAB) and is reflected in prices through a return on the RAB (that is the WACC multiplied by the RAB) and a return of the RAB (through regulatory depreciation).*
  >
  > *The Commission's initial guidance identified that the Water Plans will need to clearly outline a business's forecasts of capital expenditure for each year of the regulatory period, the key drivers of expenditure (including major projects) and information to show that the expected levels of expenditure are prudent and efficient.*
  >
  > *... The Commission's preferred approach is to assess proposed capital expenditure forecasts by using trends in historical expenditure to consider the business as usual level of service, and to consider separately the costs associated with any additional obligations, functions or service levels. The purpose*

[89] Supra, Note 80, p132

of distinguishing between expenditure on new obligations and business as usual expenditure is to identify clearly the extent to which price increases are the result of additional requirements imposed through regulatory obligations and/or customer driven service improvements.

... The focus of the assessment process is to ensure that any significant changes in expenditure levels are linked to clear obligations imposed by regulatory agencies, or that they reflect the need to upgrade or invest in new infrastructure to meet the needs or service expectations of customers." [90]

- ESCOSA (2005) stated that it would use the straight-line depreciation method for the 2005-10 regulatory period, noting that this is the standard approach used by regulators for energy distributors in Australia.
- Whilst acknowledging that there were alternative approaches to straight-line depreciation, OTTER (2003) suggested that there had been little uptake of these alternatives in the regulation of electricity network services. OTTER decided that, to ensure consistency and the maintenance of price stability between regulatory periods, it would continue to apply the straight-line methodology for Tasmanian electricity distribution services.

Key Lessons from Regulatory Decisions

8.31 Regulatory decisions/approvals for water businesses to transition from the renewals annuity approach to the regulatory depreciation approach were, in part, due to the following considerations:

- difficulties in making long-term accurate forecasts regarding renewal expenditures;
- the changing nature of the businesses. Examples include ESC[91] citing the move from channels to pipelines, and the reconfiguration of rural systems meaning that a like for like replacement of existing assets may never occur, and GAWB citing new technologies and alternatives to their extant fresh water cooling processes as limiting the ongoing renewability of its assets);
- a renewals annuity approach applies best where there is a dominance of renewable long-life assets such as dams and earthen channels and/or where the expected asset life is greater than that of its components;
- that no single asset consumption profile is consistent with the loss of service potential across all assets, and so if a single approach is to be applied then straight line depreciation best reflects the average pattern of deterioration of all types of assets; and
- straight line depreciation provides simplicity, consistency and transparency.

8.32 The regulatory decisions provided little guidance on how the evaluation criteria (especially key regulatory principles) may have contributed to decisions on the choice of asset consumption approach. In fact, where comments have been made, these seem to suggest that regulators use the same set of pricing principles to justify either approach. This is not surprising given the latitude in the policy framework (e.g. the Water Act 2007 and Ministerial Directive) for the transition to efficient Upper Bound pricing to be supported by either a renewals annuity approach or the regulatory depreciation approach.

[90] ESC; "2008 Water Price Review Consultation Paper – Framework and Approach"; December 2006; pp 41-42

[91] ESC; "2008 Water Price Review Consultation Paper: Framework and Approach"; December 2006; p47

9 Practical Considerations Related to Renewals Annuities and Regulatory Depreciation Allowances

9.1 This Section examines some of the practical considerations when implementing both a renewals annuity and a regulatory depreciation approach for the recovery of capital expenditure and setting a price path for SunWater.

Efficiency Improvement

9.2 Australia's water reforms are intended to promote the efficient allocation of water and capital resources. It is considered that the move toward efficient Upper Bound pricing, and not a transition from a renewals annuity to a regulatory depreciation approach92, will be the primary driver of efficient outcomes. For instance, once water customers are exposed to full cost recovery (e.g., through a return on the initial RAB), then irrespective of whether a renewals annuity approach or a regulatory depreciation approach is adopted, customers will be motivated to ensure that more efficient outcomes are achieved from the existing assets as well as from capital expenditure.

9.3 However, the choice of approach for asset cost recovery may affect overall economic efficiency with impacts on investor and consumer choices. In this respect it is important to recognise that ensuring a robust Asset Management Planning process is critical to improving efficiency

9.4 The development of robust AMPs is at the heart of the renewals annuity approach. However, it can also be said that the need for effective planning of maintenance, renewal, and augmentation expenditure represents best practice in asset management. Tools such as asset registers with the useful lives and replacement costs of component assets, and AMPs should not necessarily be regarded as unique to either approach.

9.5 The renewals annuity approach does not by itself discourage investment, but it may result in inefficient investment occurring if customers are not sufficiently engaged or there is not appropriate regulatory oversight.

9.6 As noted previously, the renewals annuity approach, as it is typically applied, leaves customers bearing the risk of poor investment decisions (subject, of course, to normal regulatory oversight of capital expenditure).

9.7 Customers are involved in the process for approving expenditure that is to be pre-funded. Do the existing arrangements for SunWater provide the strong checks and balances to ensure efficient outcomes? For example issues that can arise include:

- it is difficult to be fully informed about investments that will not occur for many years in the future; and
- in some cases, customers may be motivated toward particular investment in the system's service potential. One of the strong drivers for investment is that customers holding valuable water entitlements will seek to benefit from these entitlements through reliable infrastructure. Whilst in a different context, this symbiotic relationship is alluded to by SunWater in their

[92] A transition from a renewals annuity to a regulatory depreciation allowance (RAB approach) does not necessarily reflect a transition from Lower Bound pricing to Upper Bound pricing as a renewals annuity approach also provides a return on capital that is part of the renewals expenditure.

comment that *"where the entitlement value is high, then this is clear evidence of a capacity to pay higher infrastructure charges"*. [93]

Financial Viability

9.8 Financial viability is measured by a firm's ability to pay its bills and service its debt. Regulated businesses tend to face lower risks than their competitive sector counterparts – as they tend to provide essential services, face limited competition, and have regulated prices that allow for the recovery of their efficient operating and capital costs (including the cost of capital).

9.9 However, irrespective of the manner in which asset depreciation and return on capital (i.e. the recovery of capital) are allowed for, businesses subject to a regulated price path face risks that their expenditure exceeds, or demand is below, the level expected when prices were set.

9.10 As allowing for the recovery of capital and the financing of capital works are inextricably linked, the choice of approach to recover renewal expenditure will affect the way in which capital expenditure is funded. Consequently, once SunWater's price path is set, its financial viability risks will depend on the choice of a renewals annuity approach or a regulatory depreciation approach.

9.11 In this regard the Authority notes:

> *"Recent history suggests that renewals annuities have been adopted where a minimum level of viability is the key issue ... In a monopoly pricing context for commercially operated businesses, the tendency has been to adopt a straight line depreciation approach."* [94]

The renewals annuity approach means less external financing is generally required. However, major or unexpected capital spending may still result in financial stress under a renewals annuity approach.

9.12 The general implications of a renewals annuity approach are:

- finance is in effect provided directly by customers on an ongoing basis, some of which may be held over in a sinking fund reserve;
- there is a less reliance on debt and/or equity financing;
- debt/equity financing is needed (more as bridging finance) when the cumulative unspent/uncommitted annuities received from customers are insufficient to fund current renewals expenditure;
- over time the receipt of more customer annuities will allow the providers of debt/equity bridging finance to be repaid;
- ... however, without price increases, the receipt of the 'approved level' of customer annuities may be insufficient to finance actual capital expenditure—as a consequence of:
  - forecast errors (which leads to actual expenditure greatly exceeding the annuity)
  - catastrophic asset failure
  - actual returns on the sinking fund being less than that implied by the annuity discount rate

[93] Supra, Note 66, p14

[94] QCA; "Gladstone Area Water Board: Elements of the Pricing Framework – Issues Paper"; April 2001; p63

- ... however, given that customer receipts are not 'committed' to debt repayments but are 'intended' for renewals expenditure, the ability to curtail renewal expenditure in the short term is a mitigating factor;
- the artificial nature of the RAB (i.e. balance sheet assets), and the channelling of investment/sinking fund 'returns' to customers rather than shareholders tends to foster investor uncertainty – and may raise questions as to whether the renewals annuity method is commercially sustainable.

  For instance:

  "Given that State Water had limited access to debt and that its capital program was funded through an annuity, it can be argued that it was necessary for State Water to adjust its planned expenditure to manage its cash position." [95]

The regulatory depreciation approach means more external financing is generally required. This increases the financial risk for the business caused by stranded assets.

9.13 The general implications of a regulatory depreciation approach are:

- debt/equity financing is needed to fund current capital expenditure;
- over time customer receipts enable the providers of debt/equity finance to be repaid;
- ... however, whilst the regulatory depreciation approach—in conjunction with a Building Blocks method for deriving the revenue requirement—is intended to secure a return to shareholders, those same shareholders also bear any financing/refinancing risk associated with funding the assets.
- asset stranding may be a significant risk—depending on the regulatory arrangements and market circumstances—in that the financing of that asset can no longer be serviced out of revenue generated by that asset;
  - accelerated depreciation may need to be considered in these circumstances; or
  - the regulatory compact may need to enable the reopening of the price path in such circumstances.

- Frontier Economics[96] also note that the regulatory depreciation approach, with the attendant requirement to have two sets of accounts, may create risks. For instance:
  - where the regulatory assets are valued lower in the regulatory accounts, then revenues will be set lower, but regulated returns will still be acceptable
  - in the financial accounts (which are viewed by investors), the lower revenues may translate into 'poor' returns unless asset values are written down.
- An alternative perspective is that for many assets that are part of the regulatory asset base significant asset stranding risk is minimal as revenue adequacy is considered to be an important regulatory objective.

[95] IPART; "Bulk Water Prices for State Water Corporation and Water Administration Ministerial Corporation from 1 October 2006 to 30 June 2010"; September 2006; p25

[96] Supra, Note 27, p 132

9.14 The renewals annuity approach assumes the asset service can be maintained with the payments received. However, for large cost items SunWater may not be able to ensure the service potential can be maintained with the defined annuity program.

9.15 However, notwithstanding this, the renewals annuity approach tends to have greater applicability where a firm is uncertain over the ability of its prices to cover its costs (including debt servicing costs) in the future. For example, IPART notes:

> *"The [annuity] approach lends itself to situations where either the business is not able to borrow sufficient funds to undertake the required work, or it is not confident that the prices it could charge would be sufficient to recoup the investment outlay over the service life of the investment in question. It effectively requires potential users to subscribe upfront to the cost of the investment. This means the users of the service are required to bear the risk associated with the investment. These types of arrangements are most likely to be encountered in co-operatives and not-for profit organisations. They may also be appropriate where an organisation cannot, for whatever reason, access debt and equity markets."* [97]

Customer Impacts

The impact of the typical renewals annuity approach may mean customers paying more now and, compared to the regulatory depreciation approach, less later. Would customers prefer this?

9.16 In Sections 4, 5 and 6 of this *Issues Paper*, it was noted that the PV of alternative asset consumption approaches was the same. However, as the year-on-year cash-flows differ there could be intertemporal efficiency and equity concerns that arise from the choice of approach.

9.17 Whilst the link between revenue requirement and prices is indirect, and has not been modelled for the purposes of this *Issues Paper*, the following inferences on customer impacts can nonetheless be drawn:

- prices based on a typical renewals annuity may tend to be higher initially than prices based on regulatory depreciation, but, if so, this will reverse in the future;
- the time frame for this reversal depends on the timing of any significant capital expenditure in the future, but is not anticipated to occur during this or the next price path reset; and if so,
- the total (nominal) cash received from customers over time, whilst having the same PV, is expected to be higher in the case of the regulatory depreciation approach.

9.18 The key customer impact influenced by the choice of either a renewals annuity approach or a regulatory depreciation approach is the asset consumption profile, and the extent to which a dollar in the hand today is worth more than a dollar tomorrow. Frontier Economics suggest:

> *"... customers may prefer not to make upfront payments to provide for future renewals capital expenditure, but to pay a larger amount of money in the future to fund capital expenditure once it has been invested. This pattern may be preferred particularly if there is considerable doubt about the forward capital expenditure projections."* [98]

9.19 Finally, as noted previously in this *Issues Paper*, it is possible to adjust the time profiles of both approaches provided present value equivalence is achieved and there are not funding constraints.

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[97] IPART; "Bulk Water Prices for 2005/06 – Issues Paper"; September 2004; p38

[98] Supra, Note 27, p172

Valuation of the RAB and Avoiding Double Counting

9.20 As noted in Section 2, the Ministerial Direction provides the basis for establishing the value of the initial RAB. However, the valuation of the initial RAB is not a topic addressed in this *Issues Paper.*

9.21 The Ministerial Direction also provides for returns on the initial RAB. As noted in Section 3, where an asset has previously been maintained in perpetuity, care would need to be taken to ensure that only the original 'capital' value of the asset, and not any expenditure financed by the renewals annuity, is included in the value of the initial RAB. Failure to do this will result in any return on the initial RAB recovering the 'funding' costs of assets already (potentially) funded by customers.

9.22 This issue applies irrespective of whether the renewals annuity approach or the regulatory depreciation approach is used in the future.

9.23 Figure 5 below illustrates the concern in setting the value of the initial RAB. In particular, it should be noted:

- the renewals annuity approach commenced, for SunWater, in 2000;
- only the capital expenditure prior to 2000 should be taken into account in setting the initial RAB; and in particular,
- all renewals expenditure (covered by the annuity charge) since 2000 should not be included in the initial RAB.

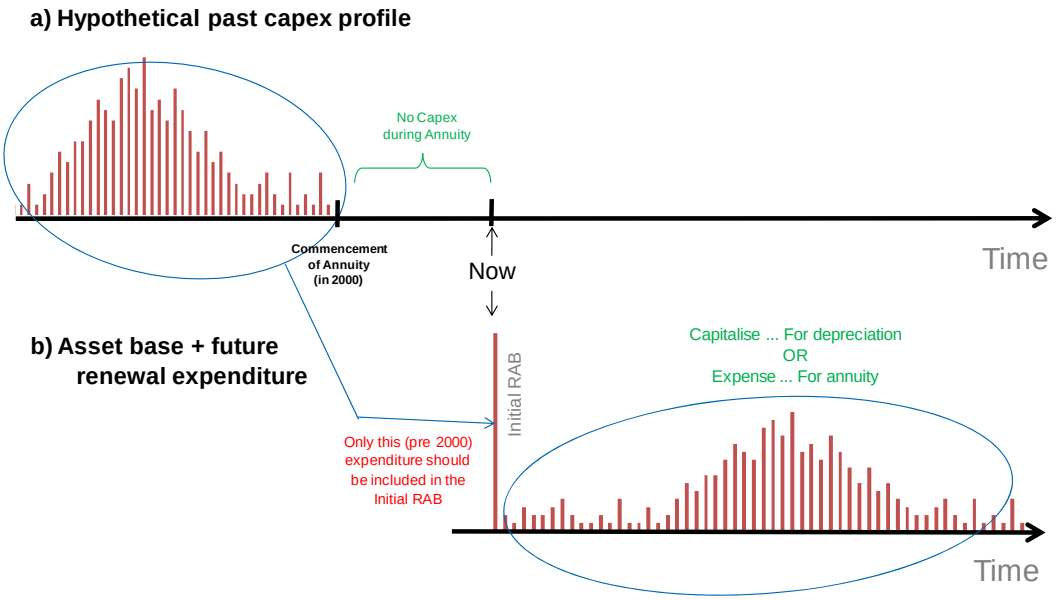

Figure 5 – Avoiding Double Counting in Setting the Initial RAB

9.24 The figure above also illustrates that the treatment of future 'renewal/capital' expenditure depends on the approach adopted in the future. If the renewals annuity approach is retained, then this expenditure will continue to be expensed in the future. However, if a regulatory depreciation approach is adopted, this future expenditure will need to be capitalised, with provisions for a return on and return of capital.

The capital base for the capital expenditure that is part of the renewals program will need to be kept separate from the initial RAB as, based on the Ministerial Direction, there is no provision for depreciation of the initial RAB.

Implications of Changing Approaches

9.25 SunWater currently use a renewals annuity approach for asset consumption. Any change to this approach will therefore require a transition to ensure funds already collected and assets already contributed to are accounted for appropriately. Similar transitions have occurred in Victoria and NSW.

i) Treatment of Reserves

The renewals reserve is managed centrally and has a positive balance but is made up of a mixture of WSS specific positive and negative balances. How should the positive balances be distributed and how should the deficits be funded if the renewals annuity approach was replaced by a regulatory depreciation approach?

9.26 SunWater's Asset Restoration Reserve is recorded at WSS level, with the reserve for most schemes being in 'credit', but with a few having a 'debit' balance (signifying that actual renewal expenditure has exceeded annuity income for that scheme). For these schemes, the overall balance in SunWater's Asset Restoration Reserve, is approximately $7.6m.

9.27 Any approach to transition will therefore require a mechanism to deal with both positive and negative reserve balances.

9.28 If it is decided to transition to a regulatory depreciation approach then various options for treating SunWater's positive accumulated renewals reserve (sinking fund) include:

- Return fund to customers: SunWater may account for the difference in its financial statements so as to lower revenue requirement/prices in the future – by:
  - one-off (i.e. P_0) adjustment;
  - gradual reduction of reserve balance over time (e.g. slow release to revenue requirement or treat as capital contributions / accumulated depreciation on RAB);
- SunWater to retain fund: use extant 'annuity related reserves' as additional revenue;
- Sharing Approach: A hybrid method (e.g. treat the reserve as accumulated depreciation for a certain time or until the fund has been used up, and allow the periodic release of the reserve to revenue as an incentive if SunWater achieves (pre-defined) outcomes of benefit to consumers, for instance, lower actual costs without sacrificing service-levels).

9.29 If there is a negative balance renewals reserve during a transition to a regulatory depreciation approach then the options for treating those funds in deficit are:

- Charge balance to customers through a:
  - One-off (i.e. P_0) adjustment;
  - Spread recovery over time (e.g. the balance is capitalised);
- Continue the renewals scheme until all funds have more or less a zero balance;
- SunWater to top up funds;
- State Government to top up funds;

- Some combination over time (e.g. a mechanism which temporarily increases charges and capitalises any balance into the RAB for future recovery through depreciation).

9.30 Examples of how the reserves were treated in NSW and Victoria, following the transition from a renewals annuity to regulatory depreciation are:

- For State Water (NSW), IPART considered using the reserve balance to lower revenue requirement/prices. However, IPART opted to leave the annuity reserve with State Water (as additional revenue);
- In part this was because IPART did not want to provide the wrong incentives in relation to the efficient management of future renewal expenditure, and the factors that contributed to the reserve balance were not entirely clear;
- In Victoria, balances were held on a 'district' basis. For those districts with a credit balance in the reserve, the balance was released/returned to customers over time (as the reserve balance was treated as a customer contribution to lower the RAB). For districts with a debit balance in the reserve, price increases were recommended;

For instance, in relation to Lower Murray Water, the ESC notes:

"Lower Murray Water has previously used a renewals annuity approach whereby the annuity amount was calculated for each district. Lower Murray Water notes that transitioning to the RAB approach will require it to manage the balances that are left in the renewals reserve of each district at the end of June 2008. It has proposed to return any positive balance in the districts renewals reserve to the customers as customer contributions through the RAB. Negative balances will be recovered through increased prices phased in over a 10-year period discounted by the WACC." [99]

9.31 Clause 1.5 of the Ministerial Direction requires the Authority to also consider:

"... how to treat existing renewals reserves if it considers it appropriate to transition schemes to a depreciation-based RAB pricing approach."

9.32 SunWater accounts for its renewals annuities on a scheme-by-scheme basis, and an Asset Restoration Reserve is held for each WSS. As noted in Section 2, the reserve balance for some WSSs is positive whereas for others it is negative. Whilst the reserve balances are centrally managed by SunWater, it would appear to be the intention of the Ministerial Direction that reserve balances are addressed at the WSS level. This is consistent with the approach taken by the ESC in relation to Lower Murray Water.

9.33 For example, in the case of SunWater, if there is a positive balance in the reserve for a particular WSS, the positive balance could be returned to the scheme's customers over time. Given that the positive balance typifies customer pre-funding of capital expenditure (i.e. the expenditure has not yet occurred), then it would be appropriate to treat this balance as a 'customer contribution'.

ii) Other Implementation Issues

9.34 Amongst the practical considerations are ensuring there is sufficient information in the (regulatory) fixed asset register to enable regulatory depreciation calculations to be made at the asset level. Data capture/migration is essential to ensure robust outcomes are achieved.

[99] ESC; "2008 Water Price Review: Regional and Rural Businesses Water Plans 2008-13 – Draft Decision"; March 2008; p 92

9.35 Another consideration is the firms' funding requirement—as the changed approach means that the firm and not consumers are responsible for financing capital expenditure. Again, this was a consideration in the transition of Victorian water businesses from a renewals annuity approach to a regulatory depreciation approach.

9.36 The ESC accepted that funding may be an issue in relation to the transition. In relation to the First Mildura Irrigation Trust (FMIT), the ESC allowed accelerated depreciation to provide greater upfront cash-flow. For instance:

> *"In proposing a transition to a RAB approach, FMIT has indicated that early in the process it may be difficult to achieve a level of funding that will cover the debt payments on borrowings and associated interest costs. It has therefore initially applied a 10 year depreciation profile to a 50 year capital works program. For asset projects after 2018, it has advised that it will review the RAB depreciation period. It expects that a depreciation period of 35 years would then be appropriate for new assets, and from 2030 onwards a 50 year period may be appropriate for new assets. The Commission accepts this method of transitioning proposed by FMIT. It notes that as one of the problems with transitioning from the renewals annuities approach to the RAB approach is the business' cash flows, the business' depreciation approach can be a method of controlling its cash flows."* [100]

[100] Ibid, pp 92-93

SAHA

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Appendix 1: Maintenance Annuity Worked Examples

A series of worked examples are provided in this Appendix to explain the principles of a maintenance annuity – in which the service potential of the RAB is not maintained in perpetuity. For ease of illustration only, it uses the same cash flows as the previous worked examples.

Table 9 (below) shows the situation where actual renewal expenditure is 'insufficient' to maintain an asset in a steady state. The maintenance shortfall—which is arguably the deterioration in the RAB—accumulates in the sinking fund.

Table 9 – Worked Example of Maintenance Annuity (Part 1)

		Asset	Capital Expenditure									
		Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Opening RAB			$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
Less Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Xfer from Sinking Fund												
Capital Expenditure		$ 100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closing RAB		$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
PV Closing RAB	10%	$ 38.55										
Renewal Expenditure (Actual)			$ 1.00	$ 2.00	$ 5.00	$ 4.00	$ 3.00	$ 5.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
Renewal Expenditure (Forecast)			$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
NPV (Capex/Renewal Actual)		*$16.80*										
NPV (Capex/Renewal Forecast)		*$24.82*										
Revenue												
- Infrastructure Renewal Charge			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Annuity	10%		$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04
- Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Return on RAB			$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
			$ 14.04	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**
NPV (Revenue)		$ 86.27										
NPV (Closing RAB)		$ 38.55										
Total NPV		**$ 124.82**										

Note: NPV of IRC / Annuity $24.82

**Assumes capex occurs at end of period.*

Note: Worked Examples in this Issues Paper all use the same cash flows

Sinking Fund												
- Opening Balance		$ -	$ -	$ 3.04	$ 5.38	$ 4.96	$ 5.50	$ 7.09	$ 6.84	$ 10.56	$ 13.65	$ 17.06
- IRC/Annuity		$ -	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04
- Interest	10%	$ -	$ -	$ 0.30	$ 0.54	$ 0.50	$ 0.55	$ 0.71	$ 0.68	$ 1.06	$ 1.37	$ 1.71
- Capex			-$ 1.00	-$ 2.00	-$ 5.00	-$ 4.00	-$ 3.00	-$ 5.00	-$ 1.00	-$ 2.00	-$ 2.00	-$ 2.00
- Xfer to RAB		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Closing Balance		**$ -**	**$ 3.04**	**$ 5.38**	**$ 4.96**	**$ 5.50**	**$ 7.09**	**$ 6.84**	**$ 10.56**	**$ 13.65**	**$ 17.06**	**$ 20.81**
Cumulative Cash (Sinking Fund)		*$ -*	*$ 3.04*	*$ 5.08*	*$ 4.12*	*$ 4.16*	*$ 5.20*	*$ 4.24*	*$ 7.28*	*$ 9.32*	*$ 11.36*	*$ 13.40*
Net Interest on Sinking Fund		**-$ 7.41**										
Total Annuity Revenue		$ 40.40										
Capex Payments		-$ 27.00										

From Table 9 above it may be noted:

- actual renewal expenditure is less than that which was forecast as being required to maintain the asset indefinitely;
- the annuity is based on the forecast level of renewals expenditure (to maintain the asset's service potential indefinitely);

- however, because the annuity receipts exceed actual expenditure, a balance in the sinking fund arises (suggesting greater renewal/refurbishment expenditure is needed);
- the RAB is not depreciated, but this is problematic in the circumstances; and
- the overall PV is the same as in the previous worked examples, which again is problematic in the circumstances where the asset has deteriorated in value.

If, however, the balance in the sinking fund were applied to the RAB in a manner similar to accumulated depreciation, a more appropriate result occurs. For instance:

Table 10 – Worked Example of Maintenance Annuity (Part 2)

		Asset	Capital Expenditure									
		Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Opening RAB			$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
Less Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Xfer from Sinking Fund												-$ 20.81
Capital Expenditure		$ 100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closing RAB		$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 79.19
PV Closing RAB	10%	$ 30.53										
Renewal Expenditure (Actual)			$ 1.00	$ 2.00	$ 5.00	$ 4.00	$ 3.00	$ 5.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
Renewal Expenditure (Forecast)			$ 2.00	$ 1.00	$ 9.00	$ 8.00	$ 2.00	$ 10.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
NPV (Capex/Renewal Actual)		*$16.80*										
NPV (Capex/Renewal Forecast)		*$24.82*										
Revenue												
- Infrastructure Renewal Charge			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Annuity	10%		$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04
- Depreciation			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Return on RAB			$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
			$ 14.04	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**	**$ 14.04**
NPV (Revenue)		$ 86.27										
NPV (Closing RAB)		$ 30.53										
Total NPV		**$ 116.80**										

Note: NPV of IRC / Annuity $24.82

**Assumes capex occurs at end of period.*

Note: Worked Examples in this Issues Paper all use the same cash flows

Sinking Fund												
- Opening Balance		$ -	$ -	$ 3.04	$ 5.38	$ 4.96	$ 5.50	$ 7.09	$ 6.84	$ 10.56	$ 13.65	$ 17.06
- IRC/Annuity		$ -	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04	$ 4.04
- Interest	10%	$ -	$ -	$ 0.30	$ 0.54	$ 0.50	$ 0.55	$ 0.71	$ 0.68	$ 1.06	$ 1.37	$ 1.71
- Capex			-$ 1.00	-$ 2.00	-$ 5.00	-$ 4.00	-$ 3.00	-$ 5.00	-$ 1.00	-$ 2.00	-$ 2.00	-$ 2.00
- Xfer to RAB		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-$ 20.81
- Closing Balance		**$ -**	**$ 3.04**	**$ 5.38**	**$ 4.96**	**$ 5.50**	**$ 7.09**	**$ 6.84**	**$ 10.56**	**$ 13.65**	**$ 17.06**	**-$ 0.00**
Cumulative Cash (Sinking Fund)		*$ -*	*$ 3.04*	*$ 5.08*	*$ 4.12*	*$ 4.16*	*$ 5.20*	*$ 4.24*	*$ 7.28*	*$ 9.32*	*$ 11.36*	*$ 13.40*
Net Interest on Sinking Fund		**-$ 7.41**										
Total Annuity Revenue		$ 40.40										
Capex Payments		-$ 27.00										

From Table 10 above it may be noted:

- the RAB is now reduced in value (depreciated) through an offset with the sinking fund;
- the sinking fund no longer has a balance; and
- the overall PV is now less than in previous worked examples (reflecting that the asset has deteriorated in value).

In short, the sinking fund has been applied as a *de facto* depreciation adjustment. The receipt from customers of an annuity that exceeds actual renewals expenditure suggests that the excess recovery is depreciation.

This can be checked against the same circumstances if a 'traditional' depreciation approach had been used. For example:

Table 11 – Worked Example of Depreciation Outcome for Comparison with Maintenance Annuity

		Asset	Capital Expenditure									
		Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Opening RAB			$ 100.00	$ 98.30	$ 97.39	$ 99.09	$ 98.79	$ 96.69	$ 95.98	$ 90.48	$ 86.18	$ 82.48
Less Depreciation			-$ 2.70	-$ 2.90	-$ 3.30	-$ 4.30	-$ 5.10	-$ 5.70	-$ 6.50	-$ 6.30	-$ 5.70	-$ 5.30
Xfer from Sinking Fund												
Capital Expenditure		$ 100.00	$ 1.00	$ 2.00	$ 5.00	$ 4.00	$ 3.00	$ 5.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00
Closing RAB		$ 100.00	$ 98.30	$ 97.39	$ 99.09	$ 98.79	$ 96.69	$ 95.98	$ 90.48	$ 86.18	$ 82.48	$ 79.17
PV Closing RAB	10%	$ 30.52										
Renewal Expenditure (Actual)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewal Expenditure (Forecast)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NPV (Capex/Renewal Actual)		*$16.80*										
NPV (Capex/Renewal Forecast)		*$16.80*										
Revenue												
- Infrastructure Renewal Charge			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Annuity	10%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Depreciation			$ 2.70	$ 2.90	$ 3.30	$ 4.30	$ 5.10	$ 5.70	$ 6.50	$ 6.30	$ 5.70	$ 5.30
- Return on RAB			$ 10.00	$ 9.83	$ 9.74	$ 9.91	$ 9.88	$ 9.67	$ 9.60	$ 9.05	$ 8.62	$ 8.25
			$ 12.70	**$ 12.73**	**$ 13.04**	**$ 14.21**	**$ 14.98**	**$ 15.37**	**$ 16.10**	**$ 15.35**	**$ 14.32**	**$ 13.55**
NPV (Revenue)		$ 86.28										
NPV (Closing RAB)		$ 30.52										
Total NPV		**$ 116.80**										

Note: NPV of IRC / Annuity $0.00

**Assumes capex occurs at end of period.*

Note: Worked Examples in this Issues Paper all use the same cash flows

From Table 11 above it may be noted:

- the RAB is now reduced in value through a regulatory depreciation approach (using a correspondingly higher rate of depreciation than previously used in Table 4 above); and
- the overall PV is the same as in Table 10 (reflecting that the asset has deteriorated in value).