QCA review of irrigation prices
Renewals annuity
Background Paper

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1 Introduction

The Queensland Competition Authority (QCA) is to recommend prices for SunWater's irrigation customers. These prices are to include a renewals annuity. SunWater has prepared Network Service Plans (NSPs) that set out the forecast operating and capital expenditure for each water bulk supply scheme and distribution system. These plans include forecasts of renewals expenditure and the proposed renewals annuity.

The purpose of this background paper is to provide a high level description of the approach and methodology adopted for calculating the renewals annuities in those NSPs, and is structured in two sections:.

- Section 2 sets out the accounting approach for renewals balances;
- Section 3 examines the key issues for the calculation of the annuity, and the approach adopted by SunWater; and
- Section 4 provides a conclusion.

2 Renewals accounting

The renewals approach requires ongoing accounting for renewals expenditure and annuity income. SunWater accounts for these transactions and maintains an annual balance through an Asset Restoration Reserve (ARR). This section provides an overview of the accounting practices adopted for the ARR.

2.1 Opening ARR balances at 1 July, 2006

The current price paths were based on an opening balance for the ARR in each scheme, at 1 July, 2006. These same opening balances were adopted as the ARR opening balance for this period for renewals accounting since this time...

Importantly, these opening ARR balances related to the irrigation sector only, and only took into account past revenue from irrigation charges attributable to renewals, as well as past renewals expenditure apportioned to the irrigation sector.

It is also important to note that opening balances were determined in aggregate incorporating all water supply assets related to a scheme – that is, renewals accounting has not, to date separately accounted for renewals income and expenditure for bulk water and distribution. This is discussed further in the next section.

2.2 ARR Inflows

As set out above, the opening balance at 1 July, 2006 for the ARR related to the irrigation sector only. Accordingly, only irrigation sector revenues have been applied to this balance, comprising water supply and drainage revenue and, where applicable, community service obligation (CSO) payments.

A portion of these revenues apply to the renewals annuity, with the balance applied to the recovery of other costs. The renewals annuity component of revenue has been derived by using the same proportion of the renewals annuity to the total revenue requirement set for the current price paths. A percentage of total revenue applicable to renewals is therefore calculated as follows:

Irrigation renewals annuity / total irrigation revenue requirement

This approach accounts for the variability in actual irrigation revenues and adjusts for actual revenues received. This is important given the current tariff structures, which generally rely on water use to recover some fixed costs, including renewals.

The percentages used were sourced from the final model used to determine irrigation prices from 2006. These percentages differ slightly from those published in the Tier 1 report, and also change slightly each year as the annuity changes each year (it is a rolling annuity) as does the irrigation revenue requirement.

In addition, SunWater has received termination fee revenue from customers surrendering their water delivery entitlements in distribution systems. Revenue from

these fees is used to offset costs in the system, and are distributed over a 10-year period.[1] These fees have been applied in two ways:

- a portion has been applied to the renewals annuity income between 1 July, 2006 and 30 June, 2011, using the same percentages used to determine the ARR income as a percentage of total irrigation revenue; and
- the balance will be applied as a revenue offset to operating costs. These amounts are set out in relevant NSPs.

2.3 Annuity outflows

Renewals expenditure needs to be accounted for when determining ARR balances. Given these balances relate to the irrigation sector only, then only a proportion of this renewals expenditure is attributable to the ARR. This proportion has been calculated using the same assumptions used to determine the irrigation sector's share of lower bound costs. For example, if the irrigation sector in a scheme was allocated 88% of lower bound costs (using the cost allocation approach relevant at the time), then 88% of renewals expenditure was then deducted from the ARR.

2.4 Interest on balances

Renewals accounting requires interest to be applied on the annual balances in order for the annuity balances to reflect the actual financial position when re-setting the annuity at the subsequent pricing period. Applying interest is also required to ensure that the renewals annuity income and expenditure balances to $0 over the annuity period. This is also consistent with SunWater's stated approach for the current price paths for calculating the ARR.[2]

In applying interest on positive or negative balances to the ARR over the current price path, SunWater has adopted the same rate (in equivalent pre-tax nominal terms) to that used to calculate the renewals annuity, being 9.689%.

The accounting approach set out above culminates in an opening balance at the commencement of the forthcoming price path period. The next section examines how the renewals annuity is calculated having established these opening balances, focusing on the key parameters required for the calculation.

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1 This accords with the calculation of the termination fee itself, which is the present value of the fixed (part a) charge in the distribution system. Given these charges are 'bundled', the distribution charge is calculated by simply subtracting the relevant bulk water charge (part a) from the distribution charge.

2 The balances described in SunWater's annual reports did not include interest on the balances, as this reporting was essentially performed for financial reporting purposes rather than pricing purposes.

3 Annuity calculation

SunWater has presented a rolling annuity, set over a 20 year period, in its NSPs.

The steps in calculating the annuity were as follows:

- Determine the present value (PV) of the renewals expenditure forecast;
- Subtract from the PV the closing ARR balance to determine the amount to be annuitised;
- Calculate a real annuity over a period (20 years is proposed), using a real discount rate.

This generates a renewals annuity in real terms, which is then indexed in each subsequent year of the price path.

These steps are followed for each year of the regulatory period, to derive a renewals annuity for each year.

This calculation requires an opening ARR balance, as set out in the preceding section, as well as a forecast of renewals expenditure over 20 years (summarised in each NSP).

.While the methodology itself is reasonably straightforward, there are a number of key parameters to be determined, and also implications from broader pricing decisions such as tariff groups and capital cost allocation. This is discussed below.

3.1 Tariffs and unbundling the ARR balance

The QCA is required to recommend price paths for bulk water and distribution services. SunWater has nominated tariffs on the basis they are 'unbundled' between bulk water and distribution.

Unbundled tariffs would result in two sets of charges:

- a bulk water charge, payable by the owners of water access entitlements (WAE); and
- a distribution charge, payable by the holders of water delivery entitlements (WDE).

However, the pricing reforms implemented from 2000 (and continued in 2006) had not evolved to this point, and instead customers taking water in a distribution system currently pay a single, 'bundled' price. Renewals annuities have therefore been accounted for on this basis, with a single 'bundled' balance maintained across bulk water and distribution assets.

Unbundled tariff groups require separate renewals annuities to be calculated for bulk water and distribution. In order to do this, opening ARR balances must be unbundled and separate balances established for each bulk water and distribution system. The

table below sets out the various renewals annuities and opening ARR balances that are required:

Table 1. Unbundling required

Current renewals annuity groupings	Separate renewals annuity required	
	Bulk Water	Distribution
Barker Barambah	✓	
Bowen Broken Rivers	✓	
Boyne River and Tarong	✓	
Bundaberg	✓	✓
Burdekin-Haughton	✓	✓
Callide Valley	✓	
Chinchilla Weir	✓	
Cunnamulla	✓	
Dawson Valley	✓	✓
Eton	✓	✓
Lower Fitzroy	✓	
Lower Mary	✓	✓
Macintyre Brook	✓	
Maranoa River	✓	
Mareeba Dimbulah	✓	✓
Nogoa Mackenzie	✓	✓
Pioneer River	✓	
Proserpine River	✓	
St George	✓	✓
Three Moon Creek	✓	
Upper Burnett	✓	
Upper Condamine	✓	

Ideally, renewals balances would be unbundled by re-creating the transactions at a disaggregated level from the commencement of the renewals annuities in 2000. However, SunWater does not have the data spanning back to 2000 that would enable it to do this.

However, SunWater was able to separately account for renewals balances on an unbundled basis from 2006 onwards. Hence the opening balance at 2006 (being the start of the current price path) has been split between bulk water and distribution.

There are a number of options for splitting these balances between bulk water and distribution. Importantly, SunWater is financially indifferent to the approach adopted in so far as the aggregate balance remains the same. However, it is important that the unbundling mimics, to the extent possible, what would have been the actual opening balance for each.

One option is to apportioning balances proportional to the future renewals annuity. T his would require a forecast of the future annuity itself. Of course, this is not possible given circularity problems – the calculation of a future annuity relies upon an

'unbundled' opening balance. A number of other options were considered such as proportional to water use, water access entitlements, asset values and lower bound costs. However, these did not closely relate to the renewals expenditure nor reflect the differences in renewals costs between bulk water and distribution.

Instead, SunWater adopted unbundled the ARR balances proportional to renewals expenditure in bulk water and distribution. This approach involved determining the PV of the actual renewals expenditure from 1 July, 2006 to 30 June, 2010, and the forecast renewals expenditure from 1 July 2010 to 2035 in each bulk water and distribution system. The ARR balances at 1 July, 2006 were then split proportional to the PV of the expenditure in each. The results are presented below.

Table 2. Split of opening ARR balances (irrigation sector)

	Bulk water		**Distribution**	
	Present value of renewals spend (2007 – 2035) "$ 000's"	**%**	**%**	**Present value of renewals spend (2007 – 2035) "$ 000's"**
Bundaberg	5,379	22%	78%	19,113
Burdekin-Haughton	9181	26%	74%	26820
Dawson Valley	2,124	37%	63%	3,588
Eton	4427	45%	55%	5369
Mareeba Dimbulah	1589	7%	93%	19865
Mary River	344	9%	91%	3,594
Nogoa Mackenzie	7208	50%	50%	7087
St George	6854	65%	35%	3738

It is acknowledged that the unbundling of the ARR opening balance will not precisely reflect the actual, unbundled balances that would have occurred if historic data was available from 2000. Furthermore, this approach may generate outcomes that are clearly erroneous or distort the renewals calculation. Accordingly SunWater performed a high-level 'sanity check' of the split to identify any outlier results, and concluded that, with two exceptions (Mareeba and Dawson), the approach was not generating spurious outcomes. However, adjustments were made to the opening ARR balances for bulk water and distribution in Mareeba and Dawson, although the aggregate balance remained the same. In both cases, the allocation of the ARR balance to the distribution system was clearly overstated using the above approach.

Indeed, the balance was so high it generated a negative annuity for the bulk water scheme, yet a very high annuity for the distribution system. In response, an adjustment was made to the opening balance at 1 July, 2011 by reducing the balance in the bulk water scheme and increasing the balance in the distribution system by the same amount. This adjustment was $800,000 in the Dawson, and $100,000 in Mareeba. Following these adjustments, the renewals annuity for both the distribution system and bulk water scheme were positive.

These percentages were used to calculate separate ARR balances at 1 July, 2006 from which annuity expenditure was deducted and income added over the next five year period

3.2 Sectoral cost allocation

As set out above, the ARR balance relates only the irrigation sector.

In bulk water schemes, SunWater has proposed a new approach to allocating capital costs between medium and high priority WAE in accordance with their proportional share of storage capacity. SunWater has calculated headworks utilisation factors (HUFs) to represent this share, in each bulk water scheme. The HUF methodology is set out in more detail in the issues paper published by the QCA on capital cost allocation. SunWater's rationale for this approach is also set out in its technical report submitted to the QCA and published on the QCA's website.

In order to implement this change, an aggregate 'all sector' renewals annuity must be calculated, and the HUF percentage applied to the bulk water renewals annuity to determine the irrigation sector's share.

An 'all sector' annuity calculation requires an 'all sector' opening ARR balance to be determined. SunWater has calculated this whole-sector ARR balance from the irrigation ARR balance by uplifting the balance by the irrigation sector's share of medium priority equivalent WAE, as calculating using the previous conversion factors. For bulk water schemes, this was the same value used to allocate renewals expenditure to the irrigation ARR.[3]

For distribution systems, no uplift was applied on the basis that these systems almost exclusively supply the irrigation sector, and that the HUF only relates to the allocation of capital costs in bulk water schemes.

[3] It is acknowledged that this is imprecise given as some irrigators hold high priority WAE, and some non-irrigators hold medium priority WAE. However, this calculation is considered reasonable given the relatively minor amounts involved, and in order to reconcile to the underlying assumptions used for the current price paths.

3.3 Renewals period

Since 2000, the renewals annuity has been calculated based on a 30-year rolling annuity. This involved the calculation of an annuity for each year of the five-year price period, capturing renewals expenditures for 30 years from this time. For example, in Year 1 the annuity captured expenditure from Year 1 to 31, in Year 2 from Year 2 to 32 and so on.

SunWater has retained the rolling annuity approach, although it acknowledges that different approaches to price smoothing could also be adopted with the same outcome in present value terms.

SunWater proposes to shorten the term for the renewals annuity period after considering the uncertainties associated with very long-term forecasts of renewals expenditure. A 20-year horizon has been selected to limit the scope for error in the annuity calculation. This time period is also consistent with the planning horizon adopted by the QCA for price setting for the Gladstone Area Water Board.

3.4 Discount rate

SunWater has adopted a discount rate of 11.25% (pre-tax nominal), and an equivalent real rate of 8.54% (based on an inflation assumption of 2.5%) in discounting the renewals expenditure and calculating the annuity.

Accordingly, the renewals annuity is a real annuity and is to be indexed annually.

4 Conclusion

While the calculation of the renewals annuity is normally straightforward, a number of issues need to be dealt with for this price review in order to develop unbundled charges and to allocate the renewals annuity to the irrigation sector. SunWater has set out its proposals for dealing with these issues.

In accounting for ARR balances since 2006, SunWater has sought to remain consistent with allocate costs to the irrigation sector and the discount rate used to calculate the annuity itself. SunWater's approach for determining annuity income is also consistent with the assumptions used for the current price paths.

A number of other parameter values also need to be considered, including the planning horizon and discount rate. SunWater has proposed a shorter planning horizon after considering the scope for forecasting error over longer periods.