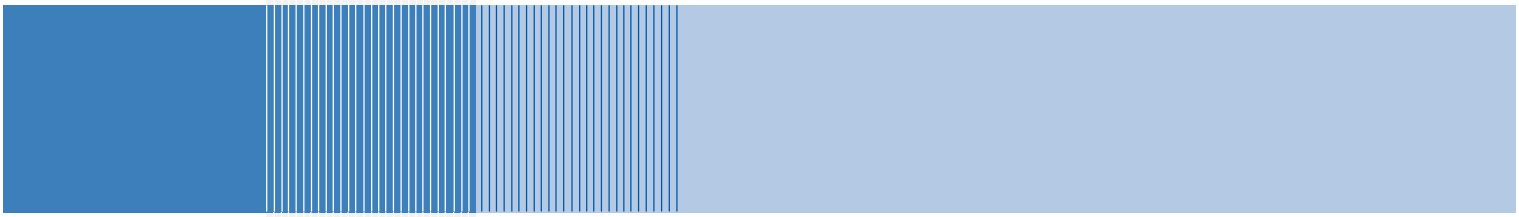
30 August 2010

Single or Multiple Rates of Return: SunWater

A report for the Queensland Competition Authority



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Contents

Glossary

AER	Australian Energy Regulator
β_e	the equity beta
CAPM	capital asset pricing model used to calculate the cost of equity
DM	margin above the risk free rate required by corporate debt
MRP	market risk premium
r_d	the required return on debt
r_e	the required return on equity
r_f	risk free rate
RAB	regulatory asset base
the Act	the *Queensland Competition Act (1997)*
the Authority	the Queensland Competition Authority
WACC	weighted average cost of capital
WAE	water access entitlements
WSS	water supply schemes

1. Executive Summary

NERA Economic Consulting (NERA) has been asked by the Queensland Competition Authority (the Authority) to identify the key issues relating to whether a single rate of return should be applied to all SunWater assets or whether separate rates should apply to different segments of SunWater's business.

SunWater's existing irrigation price path commenced on 1 July 2006 and is due to expire on 30 June 2011. The Premier and the Treasurer (the Ministers) have directed the Authority to develop irrigation prices to apply to the following SunWater water supply schemes (WSS) from 1 July 2011 to 30 June 2016:[1]

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

Appendix A reproduces the gazetted notice.

The Authority in recommending a new irrigation price path is required to include a return on all assets invested after 1 July 2011. Further, a return on assets invested at 1 July 2011 is to be included in the tariffs of those WSS deemed to be able to meet the full costs of providing bulk water supply and channel services.

As part of this process the Authority is considering whether a separate rate of return should be determined for:

- SunWater as a whole; or
- each individual WSS; or
- each consumer group.

Importantly, at this stage this paper does not examine the absolute rate of return required by SunWater as this will be subject to a separate discussion document. Rather the objective of this issues paper is to assess the need for separate WACC estimates for each segment of SunWater's business.

[1] Queensland Government Gazette No. 74, 19 March 2010.

1.1. Findings

The analysis in this paper concludes that a single weighted average cost of capital should be established for all SunWater assets.

This conclusion has been reached following our first principles analysis which suggests that SunWater's asset beta is likely to be indistinguishable across different WSS and customer group. However, to the extent of that any difference could be detected it is likely that the beta:

- of assets providing services to irrigation and urban customers is likely to be lower than that that that provide services to either industrial or "other" customers; and
- of the Bowen Broken Rivers, Boyne River and Tarong, and Macintyre Brook WSS may have a higher than SunWater's other WSS.

While there may be a case to suggest a separate asset beta for these business segments, in practice the lack of financial data means that it is not possible to establish objectively the extent of any differences. Furthermore, the setting of a single asset beta for all regulated assets is consistent with recent regulatory water decisions.

Similarly, credit ratings are established through the consideration of a range of factors many of which will be common to the whole business. Moreover, there is insufficient information to determine the extent, if any, that the credit rating would be influenced by the cash flows for each WSS or customer group.

2. Background

The Ministers direction to the QCA under Section 23 of the *Queensland Competition Act 1997* (the Act) is to provide a revenue stream to SunWater that provides a return on assets, including a return on:

- those assets in existence at 1 July 2011, in all water supply schemes, or segments of schemes (except those schemes or segments identified as unable to meet their full cost[2]); and
- all new prudent capital expenditure.

The most common means of determining the return on assets is by reference to the weighted average cost of capital (WACC). The WACC is calculated by adding the cost of equity funds, weighted by the proportion of equity funds to total assets, to the cost of debt, weighted by the proportion of debt to total assets.

The WACC has the following three key elements:

- the return on equity (r_e);
- the return on debt (r_d); and
- the capital structure.

In assessing each of these components the generally accepted objective is to set a benchmark rate of return which is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing regulated bulk water supply, channel and drainage services. It follows that the WACC need not reflect SunWater's actual cost of capital but should instead reflect the risk adjusted opportunity cost of the equity and debt funds for a benchmark business providing the regulated water storage, channel and drainage services.

The purpose of this issues paper is to consider whether the opportunity cost of funds for investments that provide services to various schemes or customer groups is sufficiently different to justify multiple rates of return. However, it is helpful to first outline how the return on assets is determined and to identify those elements that may change due to the different characteristics of SunWater's water schemes or customer groups.

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[2] The Ministers indentified the following schemes and segments as unable to meet their full costs:

- Redgate Relift in the Barker Barambah WSS;
- Callide Valley WSS;
- Cunnamulla WSS;
- Maranoa River WSS;
- Channel Relift in the Mareeba Dimbulah WSS; and
- Three Moon Creek WSS.

2.1. The WACC equation

The standard WACC formula that has been applied by the Authority is a *nominal 'vanilla' post-tax WACC* as shown below:

$$WACC = r_e \frac{E}{D+E} + r_d \frac{D}{D+E}$$

where

r_e is the nominal return on equity, determined by a domestic Sharpe-Lintner capital asset pricing model (CAPM), ie:

$$r_e = r_f + b_e \times (r_m - r_f)$$

where

r_f is the domestic risk free rate;

β_e is the levered equity beta of the asset; and

$(r_m - r_f)$ is the forward looking domestic market risk premium;

r_d is the nominal cost of debt, as observed from the performance of domestic corporate bonds, ie:

$$r_d = r_f + DM$$

where

DM is the nominal debt margin, ie, the difference between the risk free rate and the yield on appropriately rated corporate debt.

$\frac{D}{D+E}$ is the assumed proportion of debt financing of a benchmark efficient business; and

$\frac{E}{D+E}$ is the assumed proportion of equity financing of a benchmark efficient business.

Note that the WACC formula can be specified on either a pre- or post-tax basis in either real or nominal terms. The appropriate WACC formula will depend on how the regulated cash flows are determined. For example, if compensation for company income tax is explicitly included in regulated cash flows then a post-tax WACC would be appropriate. On the other hand, if compensation for company tax is not explicitly included as a separate building block in regulated revenues then a pre-tax WACC should be applied. A nominal WACC would only be appropriate if the expected inflation adjustment to regulatory assets is removed from cash flows.[3]

[3] The removal of expected increase in the regulatory asset base (RAB) due to forecast inflation from regulated revenues is necessary to ensure that inflation compensation is not provided twice, ie, through both the indexation of the RAB and regulated revenues.

2.2. Market v specific parameters

The estimation of the required return on equity and debt contains both company (or asset) specific and market parameters. Market parameters are those elements of the WACC that would be the same for all companies. For example, estimates of the risk free rate (r_f) and the market risk premium (MRP) would be the same for all companies (or assets) where the rates of return are estimated using domestic data. In contrast, company (or asset) specific parameters provide investors with compensation for the risks of investing in a particular company (or asset).

The two company (or asset) specific parameters of the WACC formula are:

- the levered equity beta (β_e), which is a measure of the non-diversifiable asset and financial risk to an investor of holding a particular company (or asset) within a diversified portfolio; and
- the debt margin (DM), which is the difference between the Australian benchmark corporate bond rate and the risk free rate.

Unlike market parameters, the characteristics of each WSS and customer group may justify different values for these parameters, thereby resulting in separate rates of return on assets. This issues paper seeks submissions on characteristics that are likely to result in different rates of return (ie, different equity betas and/or credit ratings) for each WSS or customer group.

3. Undiversifiable Risk - equity beta (β_e)

The capital asset pricing model (CAPM) assumes that investors must be compensated for variability in the expected return on their portfolio of investments (the CAPM treats variability in returns as equivalent to 'risk'). The variability in expected returns on any single firm (or asset) comprises some variability that can be reduced through diversification and residual variability that cannot be reduced through diversification.

Diversifiable variability refers to variations in returns that are largely firm or asset-specific, ie, variations that are not strongly correlated with the change in the return on the other assets in the market portfolio. An individual investor can eliminate such variability by holding a diversified portfolio. As a consequence, the CAPM predicts that investors will not require any compensation above the risk free rate for diversifiable variability.

By contrast, non-diversifiable variability cannot be addressed by an investor through investing in a portfolio of assets, ie, an investor cannot eliminate all variability in returns by holding a large number of different assets. Some variability in returns will be common to all firms within a given market such that a change in the return on one will not 'cancel out' that of another. In the CAPM, the level of a firm's non-diversifiable (systematic) risk is captured by the un-levered asset beta.[4] A firm's asset beta can also be considered the weighted average of the individual asset betas of the firm's investments. However, an investment's asset beta cannot be directly estimated from market data since the individual assets of a firm are not separately traded.

In our opinion, a decision to apply separate asset betas to different schemes or customer groups requires the following two conditions to be satisfied:

- that the non-diversifiable risk (asset beta) of different segments of SunWater's business are likely to be materially different; and
- the ability to objectively establish the extent of any differences in the asset betas of separate segments of SunWater's business.

The remainder of this section considers each of these conditions in turn.

3.1. First principles assessment of difference in undiversifiable risk

In this section we examine factors that are likely to affect a firm's (or asset's) beta. The factors examined below correspond with the list of factors outlined by Associate Professor Martin Lally in his 2004 advice to the Authority regarding general cost of capital issues.[5]

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[4] The un-levered beta removes the increased financial risk to equity associated with higher levels of debt gearing (or leverage). That is, an asset beta assumes that the company (or asset) is 100 per cent financed with equity and represents the underlying non-diversifiable risk of a company (or asset).

[5] Lally, M., *The Cost of Capital for Regulated Entities: A report prepared for the Queensland Competition Authority*, February 2004, pages 80-84.

3.1.1. Nature or product of service

The first characteristic that could lead to different levels of non-diversifiable risk is the nature of the service provided by SunWater and the extent to which it differs for each WSS or customer group. Those services whose demand is relatively more sensitive to changes in economic activity will have greater non-diversifiable risk (ie, a higher asset beta).[6]

SunWater provides bulk water supply, channel and drainage services through a decentralised regime where it is not responsible for managing the supply-demand balance on behalf of customers within each defined geographic location. The features of each of these services can be summarised as:

- **Bulk water services** – SunWater's primary obligation is to store and deliver water to its customers, in accordance with each customer's water entitlements;
- **Channel services** – SunWater's channel network diverts water available to a customer (under their water entitlement) and delivers the water to the customers offtake point; and
- **Drainage services** – SunWater's drainage infrastructure is designed to remove water in the event of substantial rainfall.

We note that the characteristics of the services provided by SunWater to each of its customers are broadly similar. That is, in each WSS and to each customer group SunWater provides water storage, channel and drainage services. Further, all services are provided through SunWater's investments in long lived infrastructure assets. Since SunWater provides the same services to all its customers it strongly suggests that the level of non-diversifiable risk will broadly similar in each WSS and to each customer group.

One feature that may distinguish the services provide by SunWater is that customers are responsible for their own water supply management. Water entitlements held by SunWater's customers set out:

- the location for taking water, ie, such as a section of a river system; and
- the priority of their allocation, usually medium or high priority.

The differences in the priority of water entitlements could potentially result in differences in non-diversifiable risk. Where demand for a service is largely dependent on the availability of water, the service is unlikely to be highly sensitive to shocks in economic activity. On the other hand, services to customers with a high level of water security (ie, high priority water entitlements) are likely to be more sensitive to levels of economic activity since demand for the service is more dependent on the goods and service produced by the customer rather than the availability of water.

As a general rule, non-irrigation customers (ie, urban, industrial and other customer groups) hold high priority water entitlements while irrigation customers generally own lower priority water entitlements.

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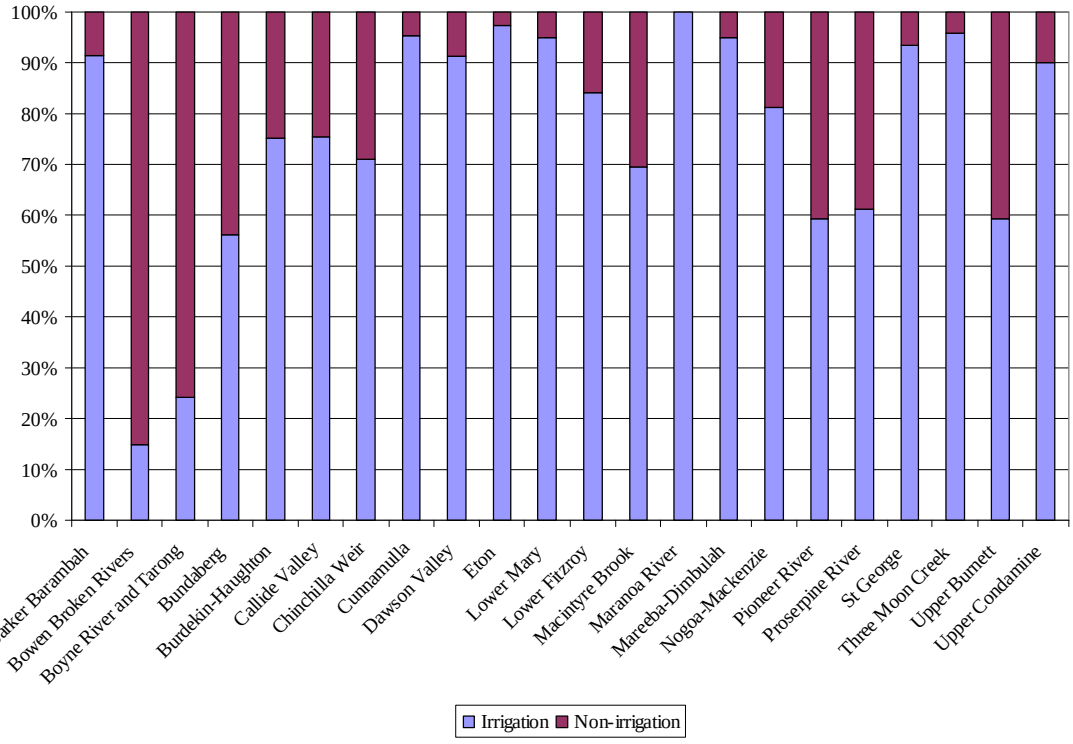
[6] Op. Cit, page 80.

The proportion of irrigation to non irrigation water allocation differs across each of SunWater's WSS, as set out in Figure 3.1, below.

Figure 3.1
Irrigation v Non-irrigation Allocation by WSS



Source: SunWater Annual Report 2008-2009.

The nature of the services provided by SunWater suggest that irrigation customers that generally have low priority water entitlements are likely to have a lower sensitivity to shocks in economic activity since their demand for SunWater services is largely dependent on the availability of water.

On the other hand, the nature of SunWater's services to customers who hold high priority water entitlements (ie, urban, industrial and other customer groups) will be more correlated to the final demand for the goods and services produced by these customer groups. The extent that the demand for the goods and services produced by particular customer groups will affect SunWater's non-diversifiable risk is discussed in greater detail in section 3.1.2 below.

Furthermore, as shown in Figure 3.1, the priority of water allocations within each WSS suggests that the characteristics of the scheme's products may have:

§ below average asset beta (ie, the average WSS operated by SunWater) in the following systems: Barker Barambah, Cunnamulla, Dawson Valley, Eton, Lower Mary, Mareeba-

Dimbulah, St George, Three Moon Creek and Upper Condamine since high priority water allocations represent less than 10 per cent of total water allocations within the WSS;

- an above average asset beta in the following systems: Bundaberg, Macintyre Brook, Pioneer River, Proserpine River and Upper Burnett, since high priority water allocations represent between 30 per cent and 70 per cent of total water allocations within the WSS; and
- the highest asset betas in the following systems: Bowen Broken Rivers and Boyne River and Tarong since high priority water allocations represent over 70 per cent of total water allocations with in the WSS.

3.1.2. Nature of the customer

Lally suggests that services to customers that produce goods and services that have a low income elasticity of demand (necessities) should have lower sensitivities to shocks to economic activity (ie, a lower asset beta) than those services to customers that produce goods and services with high income elasticity of demand (luxury goods). SunWater's annual report identifies the following broad customers segments:

- irrigation customers;
- industrial customers;
- urban customers; and
- other customers.

Irrigation customers use SunWater services as an input into the production of agricultural commodities, such as sugar cane, cereals, lucerne, dairy, cotton, citrus, horticultural produce, and peanuts. Agricultural commodities have historically had characteristics of necessity goods. That is historically demand for agricultural products has not been highly correlated with economic activity. This would normally lead to a conclusion that providers of services to irrigation customers, such as SunWater, would tend to be exposed to below average levels of non-diversifiable risk.

However, recent events suggest that the international demand for agricultural commodities have been closely linked to growth in incomes, especially in Asia and the subcontinent. This suggests that the demand characteristics of agricultural commodities more closely resemble luxury goods, rather than necessities.

Note that the importance of this factor is unlikely to material. The premise of this factor is that demand for SunWater's services will be correlated with the demand for its customers' goods and services. However, the low priority of irrigation customer's water allocations means that their demand for SunWater's services is largely determined by the availability of water. It follows that demand for the goods produced by irrigation customer is unlikely to affect their demand for SunWater's services.

SunWater's industrial customers are predominately electricity generators, such as the Tarong and Callide power stations. The industrial customers generally hold high priority water entitlements and so demand for SunWater is likely to be correlated with the demand for goods and services provided by industrial customers. Electricity generation is an input into

almost all goods produced in a modern economy – both luxuries and necessities. Other things being equal, we would expect that providers of services to the electricity generation industry would tend to be exposed to average levels of non-diversifiable risk.

Urban water customers also hold high priority water entitlements which suggest a high correlation between demand for urban water and demand for SunWater's services. There are two broad categories of end users of urban water:

- residential users – whose demand for water is not sensitivity to the level of economic activity and so has the characterises of a necessity good; and
- commercial users – whose demand for water is likely to be more sensitive to the level of economic activity than residential customers, however, their demand is also likely to have the characteristics of a necessity good.

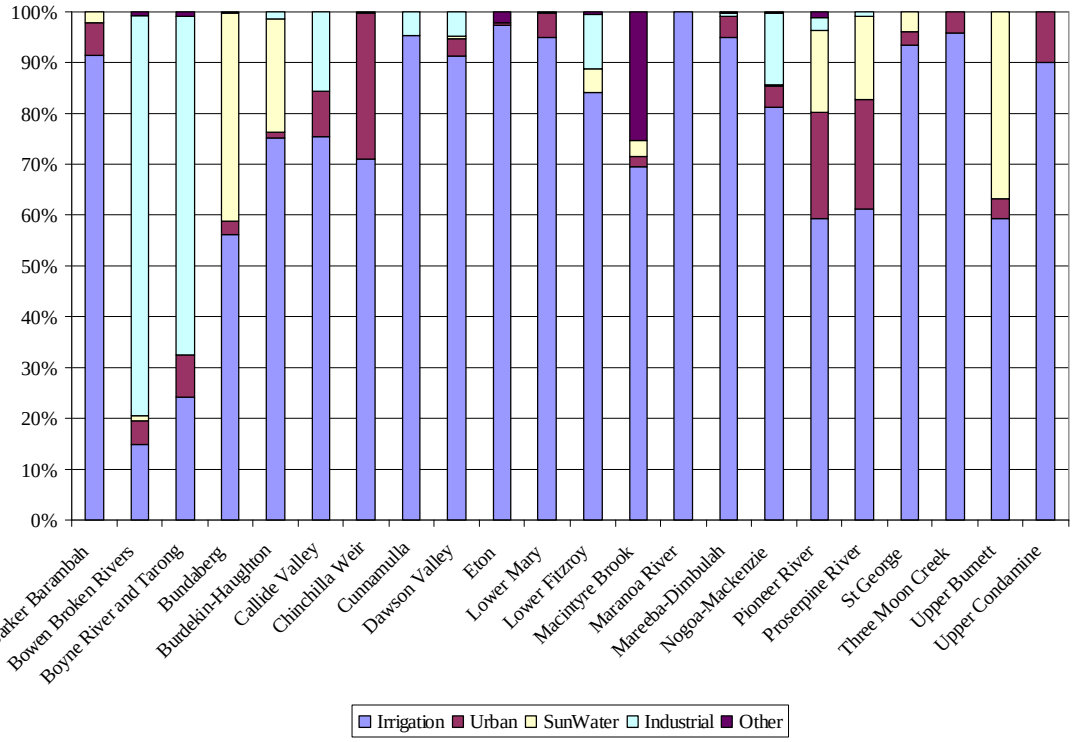
Other things being equal, we would expect that providers of services to urban centres would on average tend to be exposed to below average levels of non-diversifiable risk.

To the extent that SunWater owns water entitlements to deliver water storage or channel services to other customers within that scheme, then its entitlements will have the same characteristics as the average of the customers within that scheme.

SunWater groups all remaining customers into the "Other" customer group. However, as this category contains a diversified customer group it is reasonable to assume that the goods and services produced by this group will have average levels of non-diversifiable risk.

The proportion of different customers in each WSS is set out in Figure 3.2.

Figure 3.2
Sectoral Split by Customer Segments
in each WSS



Source: SunWater Annual Report 2008-2009.

Figure 3.2, shows that as a general rule the majority of 2008-09 water allocations in each WSS are to irrigation customers which have low exposure to shocks in economic activity as demand for SunWater's services is, by and large, driven by the availability of water.

In the group of schemes that are expected to have above-average exposure to customer characteristics, the breakdown of water entitlements within each scheme is as follows:

- Bundaberg – 56.1% irrigation, 2.6% urban, 41.0% SunWater and 0.3% industrial;
- Macintyre Brook – 69.6% irrigation, 1.8% urban, 3.1% SunWater and 25.0% other;
- Pioneer River – 59.3% irrigation, 21.1% urban, 16.1% SunWater, 2.4% industrial and 1.1 other;
- Proserpine River – 61.3% irrigation, 21.4% urban, 16.4% SunWater and 0.9% industrial; and
- Upper Burnett – 59.3% irrigation, 3.9% urban and 36.8% SunWater.

Within the above group of schemes, most non-irrigation water entitlements are held by either urban customers or by SunWater itself. As discussed above, the nature of these customers

suggest that this group of schemes would likely have low exposure to changes in real economic activity and therefore low levels of non-diversifiable risk.

It follows that these schemes are unlikely to result in non-diversifiable risk that is substantially different from those that provide services to irrigation customers. The only possible exception is the Macintyre Brook scheme where 25 per cent of scheme's water allocation is to customer classified as "other". This diversified customer group are assumed to have average levels of non-diversifiable risk and so the asset beta of the Macintyre Brook scheme may be marginally above the average for SunWater's other WSS.

Figure 3.2, also shows that water allocations within Bowen Broken Rivers and Boyne River and Tarong schemes are predominately to industrial customers (large coal powered electricity generators). These customers hold high priority water rights that mean that demand for their underlying services (ie, electricity generation) will be highly correlated with demand for SunWater's services.

It follows that the characteristics of electricity generation will influence the asset beta within these two schemes. Since electricity is an input into almost all goods produced in a modern economy – both luxuries and necessities - one would expect that demand for water service by electricity generators would tend to expose SunWater to average levels of non-diversifiable risk. Therefore, it is arguable that Bowen Broken Rivers and Boyne River and Tarong schemes may have a higher level of non-diversifiable risk compared to SunWater's other WSSs.

3.1.3. Regulatory framework

Over the period staring 1 July 2006 and ending 30 June 2011, three of the WSS operated by SunWater were subject to a revenue cap,[7] with the remaining 18 WSS regulated through a cap on prices. Revenue regulation establishes the maximum annual revenue that the firm is able to receive from the provision of regulated services. While price regulation establishes a set of maximum prices that can be charged for regulated services by the firm in each year of the regulatory period.

Under both a revenue and price cap the regulated firm has an incentive to reduce its actual costs, since it will increase the profitability of the regulated firm. The principle difference between these two forms of regulation is that under a price cap the regulated firm also bears volume risk. That is, if demand is lower (greater) than expected then the firm's regulated revenues will be less (more) than expected. Where demand is correlated with shocks in economic activity then price cap regulation, other things being equal, will lead to higher non-diversifiable risk than revenue regulation.

The Australian Energy Regulator (AER) recently considered the impact that different forms of regulation potentially have on the level of non-diversifiable risk. The AER concluded that:[8]

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[7] The three WSS subject to a revenue cap were Bowen Broken Rivers, Cunnamulla Weir and Macintyre Brook.

[8] AER, *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters: Final decision*, May 2009, page 243.

> The AER did not consider that there was compelling evidence to suggest that the equity beta should differ based on the form of control (revenue cap vs. price cap).

The AER noted that the form of regulatory control can affect the sensitivity of returns to market wide factors. One of the points[9] it made in support of its conclusion on the equity beta was that the relevant volatility is volatility in returns rather than volatility in revenue and to the extent that demand and cost are related a price cap would lead to lower or at least equivalent exposure to non-diversifiable risk.

It should be noted that the AER analysis of the implications of a price v revenue cap was in the context of its review of the electricity lines industry and may not necessarily have wider implications. We note that there is also some international evidence which would imply that there are identifiable differences in the return to such non-diversifiable risks although this is an issue of current controversy.

The distinction between revenue and price cap regulation is not always clear cut. Whereas a revenue cap removes the risk of unexpected changes in volumes, a regulated business, under a price cap, can minimise the risk of volume volatility by generating a large proportion of revenues through fixed charges. In other words, if a regulated water business's revenues were primarily derived from fixed capacity charges then unforeseen changes to annual water volumes would have a minimal impact on revenues.

As set out in Table 3.1 below, SunWater target was to generate, on average, 64 per cent of its revenues from fixed capacity charges. As a result, a decision to apply a revenue or a price cap on a WSS is unlikely to result in a substantially different level of non-diversifiable risk.

9 Ibid, p. 251.

Table 3.1 - Fixed v Variable Revenue Target by WSS

Scheme	Tariff Group	Fixed Revenue Target	Variable Revenue Target
Barker Barambah	Redgate Relift	54%	46%
Barker Barambah	Regulated	70%	30%
Bowen Broken Rivers	River	81%	19%
Boyne River and Tarong	Boyne River	70%	30%
Bundaberg	River	52%	48%
Bundaberg	Channel or Watercourse	70%	30%
Burdekin-Haughton	Burdekin River	17%	83%
Burdekin-Haughton	Burdekin Channel	61%	39%
Burdekin-Haughton	Giru Groundwater Area	61%	39%
Callide Valley	Surface Water (Callide and Kroombit Creek)	32%	68%
Callide Valley	Callide Benenfited Groundwater Area	32%	68%
Central Lockyer	Central Lockyer	37%	63%
Central Lockyer	Morton Vale	70%	30%
Chinchilla Weir	River	65%	35%
Cunnamulla Weir	River	70%	30%
Dawson Valley	Dawson River	62%	38%
Dawson Valley	Dawson Channel (Theodore and Gibber Gunyah)	74%	26%
Dawson Valley	Dawson River at Glebe Weir	62%	38%
Eton	Channel	80%	20%
Logan River	River (incl. regulated section of Burnett Creek)	53%	47%
Lower Fitzroy	River	100%	0%
Lower Lockyer Valley	River	70%	30%
Macintyre Brook	Macintyre Brook	80%	20%
Maranoa River	River	100%	0%
Mareeba	River (Supplemented streams & Walsh River)	67%	33%
Mareeba	River (Tinaroo/ Barron)	28%	72%
Mareeba	Channel (Outside a re-lift up to 100ML)	65%	35%
Mareeba	Channel (Outside a re-lift 100-500ML)	70%	30%
Mareeba	Channel (re-lift more than 500ML)	70%	30%
Mareeba	Channel (re-lift)	70%	30%
Mary River	Lower Mary River (Tinana Barrage & Teddington Weir)	70%	30%
Mary River	Lower Mary River (Mary Barrage)	66%	34%
Mary River	Lower Mary Channel	70%	30%
Mary River	Mary Valley	80%	20%
Mary River	Pie Creek	70%	30%
Mary River	Mary River Cedar Pocket Dam	70%	30%
Nogoa Mackenzie	River	47%	53%
Nogoa Mackenzie	Channel	63%	37%
Pioneer River	Pioneer Valley Water Board	70%	30%
Prosperine River	River	59%	41%
Prosperine River	Kelsey Creek Water Board	66%	34%
St George	Channel	70%	30%
St George	Beardmore Dam or Balone River	85%	15%
St George	Thuraggi Watercourse	85%	15%
Three Moon Creek	River	70%	30%
Three Moon Creek	Groundwater	70%	30%
Upper Burnett	Upper Burnett (Nogo/ Burnett River)	70%	30%
Upper Burnett	John Goleby Weir	51%	49%
Upper Condamine	North Branch	70%	30%
Upper Condamine	Sandy Creek or Condamine River	67%	33%
Upper Condamine	North Branch- Risk A	0%	100%
Warrill Valley	Combined Supplemented Regulated Section	61%	39%
Average		*64%*	*36%*

Source: SunWater Irrigation Price Path 2006/07 – 2010/11: Final Report, September 2006, Table 3.2.

3.1.4. Other factors

Associate Professor Lally also postulated that the following factors could potentially also affect the asset beta of a firm (or asset):

- real options;
- market weight;

- duration of contracts; and
- degree of monopoly power.

While these factors might have a substantial bearing on the non-diversifiable risk of SunWater's services, for the following reasons each of these factors is unlikely to differentiate the asset beta of each WSS or customer group.

3.1.4.1. Real options

The relative size of the potential growth options available to a firm is expected to be positively correlated to shocks in economic activity, since growth options should be more sensitive to shocks in economic activity than a firm without real options. However, the scope for SunWater to undertake substantial investment in new products is limited.

3.1.4.2. Market weight

Lally suggests that firms that have a large weight in the market portfolio will draw its beta close to one. However, the small size of SunWater means that its market weight would, even if it were publicly listed, not be a significant factor.[10] It follows that market weight would also have a trivial impact on the beta of any component of SunWater's regulated network.

3.1.4.3. Duration of contracts

It is also suggested that long term contacts with customers reduce the firm's ability to raise prices in the event of an upturn in economic conditions. As a result, firms with long term contracts are less sensitive to changes in economic conditions and therefore more likely to have a lower asset beta.

As a regulated asset the length of SunWater's contracts with customers will not affect its non-diversifiable risk terms. This is because SunWater's prices are determined through the regulatory process and are set at the beginning of the regulatory period, ie, 1 July 2011 to 30 June 2016. Consequently, regardless of the term of its contracts, SunWater does not have the ability to raise prices when the economic conditions are strong.

Further, given that the demand for water is also likely to be highly inelastic SunWater also has no incentive to lower prices when economic conditions are weak.

3.1.4.4. Degree of monopoly power

The influence of the degree of monopoly power held by the firm, or price elasticity of demand, on the asset beta is an open question, with various studies showing mixed results. However, since all services are regulated there is unlikely to be significant variation in the level of monopoly power across different WSS or customer groups.

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[10] SunWater is owned by the Queensland government and is therefore not publicly listed.

3.1.5. Conclusion

Our first principles analysis suggests that the following three factors might result in different levels of non-diversifiable risk (asset betas) across different segments of SunWater's business:

- differences in the nature of services provided by SunWater, in particular differences in the priority of water entitlements held in each scheme or by different customer groups, since lower priority entitlements mean that demand for SunWater's services are primarily driven by the availability of water;
- differences in the characteristics of the customers, since demand for SunWater's services by customers with high priority water entitlements will depend on the demand for the goods and services provided by these customers;
- the extent to which different schemes or tariff groups have relatively higher fixed revenue targets relative to variable revenue targets; and
- the regulatory arrangements, specifically the potential for each scheme to adopt either a price or revenue cap.

Considering these factors across each of the four identified customer groups we conclude that irrigation and urban customers may have lower exposure to changes in economic activity than either industrial or other customers. This is primarily due to:

- irrigation customers having lower priority water entitlements which means that their demand for SunWater services is largely dependent on the availability of water rather than on the level of business activity;
- characteristics of urban water as a necessity good and so demand by urban customers is likely to have a lower than average sensitivity to shocks in economic activity; while
- both electricity generation and other customers predominately hold high priority water entitlements in combination with the characteristics of demand for their final output suggests that they have average sensitivity to changes in economic activity.

Considering these three factors across SunWater's 22 water supply schemes suggest that there is little difference in the systemic risk of the schemes. The possible exceptions are the following three schemes:

- Bowen Broken Rivers where the high priority water entitlements held by industrial customers represent 78 per cent of the total entitlements;
- Boyne River and Tarong where the high priority water entitlements held by industrial customers represent 67 per cent of the total entitlements; and
- Macintyre Brook where the high priority water entitlements held by "other" customers represent 25 per cent of the total entitlements.

The characteristics of these customers suggest that the provision of water storage, channel and drainage services to these customers might have higher non-diversifiable risk than the average SunWater's customer.

Notwithstanding these differences, in our opinion any differences in the non-diversifiable risk of suppling different WSS or customer groups is not likely to be material. Reasons for suggesting that the level of non-diversifiable risk would be common to all segments of SunWater's business include:

- a similar service provided by SunWater to all customers, ie, water storage, channel and drainage services;
- the structure and type of costs incurred to service each WSS and all customers groups are comparable with SunWater service provided primarily through infrastructure assets that have significant economic lives; and
- a common regulatory regime dictated by the *Queensland Competition Act 1997*, with prices determined by the Queensland Competition Authority.

3.2. Practicality of deriving different estimates

Notwithstanding a conclusion, based on first principles, that different segments of SunWater's business may have characteristics that justify different asset (and therefore equity) betas, it may not be possible to establish objectively the extent of any differences.

The practice of estimating an equity beta for the CAPM involves calculating the historical covariance of a firm (or a portfolio of comparable firms) with the market. However, the calculation of an equity beta for a regulated water business such as SunWater is subject to a significant degree of uncertainty. The primary source of uncertainty is the necessary step of identifying a group of comparable firms from which an asset beta for SunWater can be calculated.

In Australia there is currently no regulated water businesses currently traded on the Australian Stock Exchange. As a consequence, there is no comparable group of Australian firms with which to estimate the asset beta of SunWater as a whole. Instead jurisdictional regulators infer the asset beta of Australian regulated water businesses from a variety of sources including:

- the equity beta of Australian regulated electricity and gas businesses;
- the equity beta of international water businesses primarily those traded in the US and UK; and
- the regulatory precedent of the equity beta of regulated water businesses determined by Australian jurisdictional regulators.

In Appendix B to this report, we set out recent decisions by the NSW and Victorian regulators on the equity beta for water service providers. In their most recent decisions both the Independent Pricing and Regulatory Tribunal of NSW (IPART) and the Essential Services Commission of Victoria (ESC) set an equity beta of 0.8-1.0 and 0.65, respectively.

Neither regulator distinguishes between the non-diversifiable risks associated with the provision of rural or urban water services. That is, while each regulator has a different view on the non-diversifiable risk associated they have applied the same equity beta all regulated water businesses within their jurisdiction.

This suggests that these regulators have concluded that a different mix of customers does not justify separate betas. This may be due to them reaching a view, on first principles, that differences in customer characteristics is not a sufficient reason to set separate asset betas or an implicit acknowledgment of the difficulties of objectively setting different rates of return to different segments of a business.

The materiality, if any, of differences in the non-diversifiable risk of providing water services to different segments of SunWater's business, combined with the difficulty of objectively quantifying the extent of differences in beta suggests that a common beta should be applied to all segments of SunWater's business.

4. Corporate Credit Ratings

The debt margin is primarily determined by the term structure of the corporate bond and the credit rating of a benchmark business. However, it is generally accepted that the term structure of the corporate bond should match the maturity of the risk free rate. Therefore, the focus of this issues paper is the extent that the selection of a credit rating is affected by differences in the characteristics of schemes or customer groups.

As a general rule, the cost of debt is higher (lower) when the credit rating is lower (higher), as lenders require increased (decreased) compensation before committing funds from the debt issuer due to the higher (lower) risk of default.

4.1. Credit rating criteria

Firms are generally required to have a credit rating from one of the three major credit ratings agencies, ie:

- Standard and Poor;
- Fitch Ratings; and
- Moody's.

These agencies assess the riskiness of a firm's debt by considering a range of factors. For example, Standard and Poor's approach to setting corporate credit ratings indicates that it considers both business risk and financial risk. The factors relating to business risk include:[11]

- risk—the risk of doing business in a particular country
- industry factors—the industry prospects, as well as identifying the competitive factors, risks, and challenges affecting industry participants
- competitive position—a strong competitive position supports revenue and cash flow stability
- management evaluation—its role in operational success and risk tolerance, and
- profitability/peer group comparisons—the ability to attract capital due to higher profit performance and comparing profit to peer companies.

The factors relating to financial risk include:[12]

- accounting characteristics and information—analysis of financial statements to check whether ratios and statistics derived from the statements can be relied upon
- corporate governance, risk tolerance and or financial policies—examines management's philosophies and policies involving financial risk
- cash flow adequacy—the ability to service debt

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[11] Standard and Poor's, *Corporate Ratings Criteria*, Report, 15 April 2008, p. 22.

[12] Standard and Poor's, *Corporate Ratings Criteria*, Report, 15 April 2008, p. 21.

- capital structure and or asset protection—the financial flexibility, and how leveraged a business is, and
- liquidity and or short-term factors—sundry considerations and contingencies.

Since the benchmark business provides regulated bulk water supply, channel and drainage services the variation in business risk across different WSS and customer groups is unlikely to be significantly different. Furthermore, a number of the financial risk factors, such as account characteristics, corporate governance and capital structure will also be identical across each WSS's and customer group.

The only factors that could be potentially different across each WSS and/or customer group are the variations in expected cash flows and/or liquidity. However, if the control mechanism is a revenue cap, rather than a price cap, one would expect that the variations in cash flows and liquidity to be minimal. On the other hand, the impact of variations in cash flows under a price cap are muted by SunWater's pricing structure which aims to have on average 64 per cent of all revenues generated from fixed annual charges.

4.2. Estimation of credit ratings

The practice of determining the credit rating of a regulated business has been for regulators to have regard to either:

- the credit ratings determined by regulators in regulatory determinations for firms providing similar services (ie, for SunWater it would be businesses that provide regulated bulk water supply, channel and drainage services); or
- the actual credit ratings of comparable bulk water supply, channel and drainage businesses and to then adjust these observations for differences in gearing and ownership.

The use of benchmarks to determine the credit ratings raises the practical question whether different portfolios can be developed to capture any difference in business and financial risk between different WSS or customer groups.

Appendix B sets out the regulatory credit ratings of 30 water businesses in Queensland, NSW, Victoria, ACT and the NT. Where credit rating information is available regulators have given a credit rating of between BBB and BBB+. Furthermore, regulators appear to set the same credit rating for all water and wastewater businesses. Consequently, in practice there is little information to differentiate the credit rating of different WSS or to the services provided to each of SunWater's customer groups.

The availability of actual credit ratings is also limited since all the regulated water businesses are government owned. Therefore, the debt requirements of these water businesses are generally provided by the State treasuries. As a consequence, these businesses do not have an independent credit rating. It is therefore difficult to observe whether the credit rating of a regulated water business changes depending on the characteristics of the water scheme or the ultimate customers.

Appendix A. The Direction (19 March 2010)

As the Premier and Treasurer of Queensland, pursuant to Section 23 of the *Queensland Competition Authority Act 1997* (the Act), we hereby direct the Queensland Competition Authority (the Authority) to develop irrigation prices to apply to the following SunWater water supply schemes (WSS) from 1 July 2011 to 30 June 2016:

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

In referring this investigation, the Ministers direct the QCA under section 24 of the Act as follows:

1.1 For water supply schemes, or segments of schemes (except those listed in 1.2 below), bulk water supply and channel prices/tariff structures are to be set 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, as specified in 1.4 (below) (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.

1.2 For the following schemes (schemes or segments of schemes identified as unable to meet the full costs of 1.1 a) and 1.1 b) due to hardship):

a) irrigation prices are to be set to maintain current prices in real terms, and improve the level of cost recovery, where the capacity to do so exists;

b) after 1 July 2011, prices are to include a return of, and on, prudent capital expenditure to augment existing assets or construct new assets.

c) the Authority may recommend whether to set prices through the use of a renewals annuity or depreciation-based RAB pricing approach.

These schemes are:

- Redgate Relift in the Barker Barambah WSS

- Callide Valley WSS
- Cunnamulla WSS
- Maranoa River WSS
- Channel Relift in the Mareeba Dimbulah WSS
- Three Moon Creek WSS

1.3 For 1.1 (d) and 1.2 (b), the Authority is to have regard to the agreed level of service between SunWater and the customers of the water supply scheme, including for capital expenditure on existing assets or for the construction of new assets.

1.4 In recommending an initial RAB (1.1 c) for irrigation supply assets (or that part of an asset used for the supply of water for irrigation purpose), the Authority is to:

a) value the following channel distribution systems assets at zero;

- Bundaberg channel distribution system
- Burdekin channel distribution system
- Dawson Valley channel distribution system
- Eton channel distribution system
- Lower Mary channel distribution assets
- Mareeba Dimbulah channel distribution system
- Emerald channel distribution system
- St George channel distribution system
- Callide Valley channel distribution assets
- Yarramalong Pump Station and associated distribution assets in the Upper Condamine Scheme
- Youlambie channel distribution assets in the Three Moon Creek Scheme
- Redgate Relift distribution assets in the Barker Barambah scheme

b) For other schemes or segments of schemes, apply a 'line in the sand' approach[13] 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 reflecting the irrigators' anticipated capacity to pay;

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[13] The 'line in the sand' approach can be used to set an initial regulated asset base between:

- at the upper end, a value at which customers would be better off if the asset was scrapped and a new asset installed – which is what a depreciated, optimised replacement cost provides an estimate of; and
- at the lower end, the value that the assets would have in their next best use, which for sunk investments maybe very low.

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

The 'line-in-the-sand' approach must not adversely affect the operator's ability to recover full commercial prices from urban and industrial customers.

1.5 In providing pricing recommendations for each scheme, the Authority is to also consider how to treat existing renewals reserves if it considers it appropriate to transition schemes to a depreciation-based RAB pricing approach.

1.6 For relevant schemes, the Authority is to review drainage charges and channel water harvesting charges.

1.7 The Authority is to recommend pricing principles to apply for the inclusion of capital expenditure on dam spillway upgrades.

Appendix B. Comparable Regulatory Decisions

Table B.1
Equity Beta and Debt Margin of Comparable Regulatory Decisions

Regulator	Business	Regulatory Period	Equity Beta	Credit Rating
IPART	Hunter Water Corporation	17 July 2009 - 30 June 2013	0.8 to 1.0	BBB to BBB+
	Sydney Catchment Authority	1 July 2009 - 30 June 2012	0.8 to 1.0	BBB to BBB+
	State Water Corporation	1 July 2010 -30 June 2014	0.8 to 1.0	BBB to BBB+
	Sydney Water Corporation	1 July 2008 - 30 June 2012[14]	0.8 to 1.0	BBB to BBB+
	Water Administration Ministerial Corporation	1 July 2010 - to be determined[15]	n/a	n/a
	Country Energy	1 July 2010 - 30 June 2013	0.8 to 1.0	BBB to BBB+
	Gosford City Council	1 July 2009 - 30 June 2013	0.8 to 1.0	BBB to BBB+
	Wyong Shire Council	1 July 2009 - 30 June 2013	0.8 to 1.0	BBB to BBB+
ESC	City West Water	1 July 2009 - 30 June 2013	0.65	BBB+
	South East Water	1 July 2009 - 30 June 2013	0.65	BBB+
	Yarra Valley Water	1 July 2009 - 30 June 2013	0.65	BBB+

* TVC is the Victorian central finance authority that prides loans to State Government enterprises.

[14] IPART is currently conducting a review of the operating licence for Sydney Water Corporation to take effect on 1 July 2010.

[15] IPART's last determination was in 2006, which resulted in the regulatory period of 1 October to 30 June 2010. IPART released an Issues Paper relating to the 2010 determination in July 2009 and both the Draft Report and Final Report are yet to be released.

Regulator	Business	Regulatory Period	Equity Beta	Credit Rating
	Melbourne Water	1 July 2009 - 30 June 2013	0.65	BBB+
	GWMWater	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Lower Murray Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Westernport Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Central Highlands Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Western Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	East Gippsland Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	First Mildura Irrigation Trust (FMIT)	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Coliban Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Gippsland Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	North East Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Southern Rural Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Goulburn-Murray Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Barwon Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	South Gippsland Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
	Wannon Water	1 July 2008 - 30 June	0.65	TVC

Regulator	Business	Regulatory Period	Equity Beta	Credit Rating
		2013		Estimate*
	Goulburn Valley Water	1 July 2008 - 30 June 2013	0.65	TVC Estimate*
QCA[16]	Gladstone Area Water Board (GAWB)	1 July 2010 - 30 June 2015[17]	0.65	BBB
ICRA	ACTEW Corporation	1 July 2008 - 30 June 2013	0.9	BBB

[16] Note that GAWB draft decision has a gearing ratio of 50 per cent.

[17] The Final Report is due by 30 June 2010.