QUEENSLAND COMPETITION AUTHORITY

Draft Report for Consultation

Burdekin Haughton Water Supply Scheme: Assessment of Certain Pricing Matters relating to the Burdekin River Irrigation Area

September 2002

SUBMISSIONS

Public involvement is an important element in the decision-making processes of the Queensland Competition Authority (the Authority). It therefore invites submissions from interested parties concerning this draft report.

Submissions should be sent to the address below. While the Authority does not necessarily require submissions in any particular format, it would be appreciated if two printed copies could be provided together with an electronic version on disk (Microsoft Word format) or by e-mail. Submissions, comments or inquiries regarding this paper should be directed to:

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The **closing date** for submissions is **Monday, 8 November 2002.**

Confidentiality

In the interests of transparency and to promote informed discussion, the Authority would prefer submissions to be made publicly available. However, if a person making a submission does not want that submission to be public, that person should claim confidentiality in respect of the document (or any part of the document). Claims for confidentiality should be clearly noted on the front page of the submission and the relevant sections of the submission should be marked as confidential, so that the remainder of the document can be made publicly available. It would also be appreciated if two copies of each version of these submissions (ie the complete version and another excising confidential information) could be provided. Again, it would be appreciated if each version could be provided on disk (Microsoft Word format) or by e-mail. Where it is unclear why a submission has been marked confidential, the status of the submission will be discussed with the person making it.

While the Authority will endeavour to protect material claimed as confidential as well as exempt documents (within the meaning of the *Freedom of Information (FOI) Act 1989*), it cannot guarantee that submissions will not be made public. Pursuant to the *Queensland Competition Authority Act 1997* (the *QCA Act*), the Authority must take all reasonable steps to ensure that confidential information is not disclosed without the provider's consent, provided the Authority is satisfied that the disclosure is likely to damage the provider's commercial activities and that the disclosure of the information would not be in the public interest. In addition, there is a possibility that the Authority may be required to reveal confidential information as a result of an FOI request.

Public access to submissions

Subject to any confidentiality constraints, submissions will be available for public inspection at the Brisbane office of the Authority, or on its website at www.qca.org.au. If you experience any difficulty gaining access to documents please contact the office (07) 3222 0555.

Information about the role and current activities of the Authority, including copies of reports, papers and submissions can also be found on the Authority's website.

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GLOSSARY

ABARE	Australian Bureau of Agricultural and Resource Economics
ACCC	Australian Competition and Consumer Commission
ACTEW	Australian Capital Territory Electricity and Water
AHD	Australian Height Datum
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
ASX	Australian Stock Exchange
BRIA	Burdekin River Irrigation Area
BRIAC	Burdekin River Irrigation Area Committee
CAPM	Capital Asset Pricing Model
COAG	Council of Australian Governments
CPI	Consumer Price Index
CSO	Community Service Obligation
DAC	Depreciated Actual Cost
DNRM	Department of Natural Resources and Mines
DORC	Depreciated Optimised Replacement Cost
EV	Economic Value
FSL	Full Supply Level
GAWB	Gladstone Area Water Board
GOC	Government Owned Corporation
GPOC	Government Prices Oversight Commission (Tasmania)
IC	Industry Commission
ICRC	Independent Competition and Regulatory Commission (formerly IPARC)
IPARC	Independent Pricing and Regulatory Commission - ACT regulatory body
IPART	Independent Pricing and Regulatory Tribunal - NSW regulatory body
IROL	Interim Resource Operations Licence
IWA	Interim Water Allocation

ML	Megalitre
MRP	Market Risk Premium
NCC	National Competition Council
NPV	Net Present Value
NRV	Net Realisable Value
ODV	Optimised Deprival Value
Ofwat	Office of the Water Regulator - UK water industry regulatory body
OffGAR	Office of Gas Regulation, Western Australia
Opex	Operating Expenditure
ORG	Office of the Regulator General - Victorian regulatory body
OTTER	Office of the Tasmanian Energy Regulator
QCA	Queensland Competition Authority
QFF	Queensland Farmers' Federation
RoC	Return on Capital
ROL	Resource Operations Licence
SAIPAR	South Australian Independent Pricing and Access Regulator
SCARM	Standing Committee on Agriculture and Resource Management
SCI	Statement of Corporate Intent
SWP	State Water Projects
WACC	Weighted Average Cost of Capital
WRC	Water Resources Commission (a predecessor of SunWater)
WRP	Water Resource Plan
WRU	Water Reform Unit

1. EXECUTIVE SUMMARY

Introduction

The Authority has been directed to assess a number of matters relating to the gazetted prices for channel and river irrigators in the Burdekin River Irrigation Area (BRIA) within the Burdekin Haughton Water Supply Scheme (the Scheme). In particular, the Authority has been requested to determine the capital contributions made by various parties, identify any capital not accounted for by capital contributions, estimate an appropriate weighted average cost of capital (WACC) for pricing purposes and determine whether current price paths incorporate any excess return on capital. The Authority has also been requested to advise the circumstances under which it would be appropriate for an entity to charge a positive rate of return on scheme assets.

Pricing Arrangements in the Burdekin Haughton Water Supply Scheme

The Burdekin Haughton Water Supply Scheme includes the Burdekin Falls Dam, completed in 1987, a number of weirs on the Burdekin and Haughton Rivers, and three major channel distribution systems (see Figure 1.1). SunWater, the service provider for the Scheme, was corporatised on 1 October 2000 and is required to operate as a commercial entity.

The Scheme supplies the Burdekin River Irrigation Area, the North and South Burdekin Water Boards and NQ Water.

Pricing policies for the Burdekin River Irrigation Area have varied over time and, while prices have increased in nominal terms, the price of water has been almost constant in real terms since 1980. Gazetted prices introduced in October 2000 were set for a five-year period.

Approach to Investigation

The Authority has based its assessment on prices, asset values and information relevant to when the gazetted prices were established in October 2000. The Authority invited submissions on relevant issues and developed a framework for assessing these issues.

Capital Contributions and Asset Valuations

While there is no generally accepted definition, the Authority has taken the view that capital contributions are capital payments made towards the capital cost of an asset by a third party with the intention of reducing the capital outlay by the owner of the asset and with the expectation that the payment will be recognized for pricing purposes. Capital contributions may be made by prospective users and/or by government.

To assess whether a capital contribution should be recognised, the Authority considered the nature of the payment and reviewed available evidence.

The Authority concluded that the Scheme should be viewed as an integrated development with payments from various sources contributing towards its overall capital cost. Available evidence indicates that irrigators' payments for land, water and cane assignments were intended to provide an offset against the capital costs of the Scheme, and that irrigators expected future prices would be adjusted to reflect these payments.

Accordingly, the Authority recommends that these payments be recognised as capital contributions, and that prices should not include a return on these capital contributions.

Sugar mill levies were considered to be recurrent payments and therefore did not constitute capital contributions.

With respect to the Commonwealth and State funding of the Scheme, available information indicates that the focus of attention of those parties was on funding the Scheme and not pricing. The Authority does not consider that either Commonwealth or State funding was made with the intention of providing pricing benefits into the future. Nevertheless, for the purposes of illustration, comparative figures have been provided to show the outcome which would have occurred had the Commonwealth grant been determined to be a capital contribution.

On the basis of the above considerations, capital contributions are estimated at $63.2 million (October 2000 value).

After considering the alternative asset valuation methods, the Authority considers that depreciated optimised replacement cost (DORC) is the appropriate method for the valuation of assets for the purposes of determining the maximum prices that could be charged. At the same time the Authority notes that it may not be possible to set prices at that level.

In its determination of unaccounted for capital, the Authority first established the DORC of the Scheme as at October 2000. The Authority then optimised the asset base to take account of redundant assets, over-engineering and excess capacity as well as assets not previously included in the asset base but which would typically be found in an asset base for regulatory price setting purposes.

As a result, a number of adjustments were made to the Arthur Andersen valuation used to set the gazetted price paths. The Authority's valuation totalled $420.3 million compared with $393.9 million by Arthur Andersen.

When adjusted for capital contributions, unaccounted for capital amounts to $357.1 million, of which $207.0 million is attributable to the Burdekin River Irrigation Area.

Maximum Rate of Return

The rate of return compensates investors for the risks they face through ownership of the asset. In determining an appropriate rate of return, the Authority has estimated the WACC for the Burdekin River Irrigation Area as at October 2000. Based on a 20-day average of the risk free rate as at 6 October 2000, the Authority has estimated a nominal post-tax WACC of 8.27%.

Excess Rate of Return

The Ministers' Direction required the Authority to determine whether the gazetted price paths for the Burdekin River Irrigation Area incorporate any excess return on capital, based on the Authority's analysis of asset values and the WACC. For this purpose, the Direction specified that the Authority should use the lower bound costs of the Scheme incorporated in the gazetted price paths of the Burdekin River Irrigation Area.

On the basis of its assessment of the DORC valuations, WACC and capital contributions as at October 2000, the Authority considers that the gazetted price paths for the Burdekin River Irrigation Area do not incorporate any excess return on capital in aggregate terms. These conclusions apply whether or not the Commonwealth grant is recognised as a capital contribution.

Appropriateness of Positive Rates of Return on Assets

The Ministers' Direction requires the Authority to advise under what circumstances it would be appropriate for an entity to charge a positive rate of return on scheme assets. While the Authority has sought to address this issue in a generic manner, it has also sought to reflect the submissions of stakeholders which have focussed on the Burdekin Haughton Water Supply Scheme.

Corporatised entities, such as SunWater, are required to operate on a commercial basis and to enhance the value of their business to shareholders. Accordingly, such entities should only invest in new projects when a commercial rate of return is achievable. Matters of a broader public interest nature should be addressed through the payment of transparent community service obligations (CSOs) by Government.

Such entities should always seek to achieve a commercial, and therefore positive, rate of return. Circumstances when it may not be appropriate for an entity to charge a positive rate of return (or a fully commercial rate of return) include:

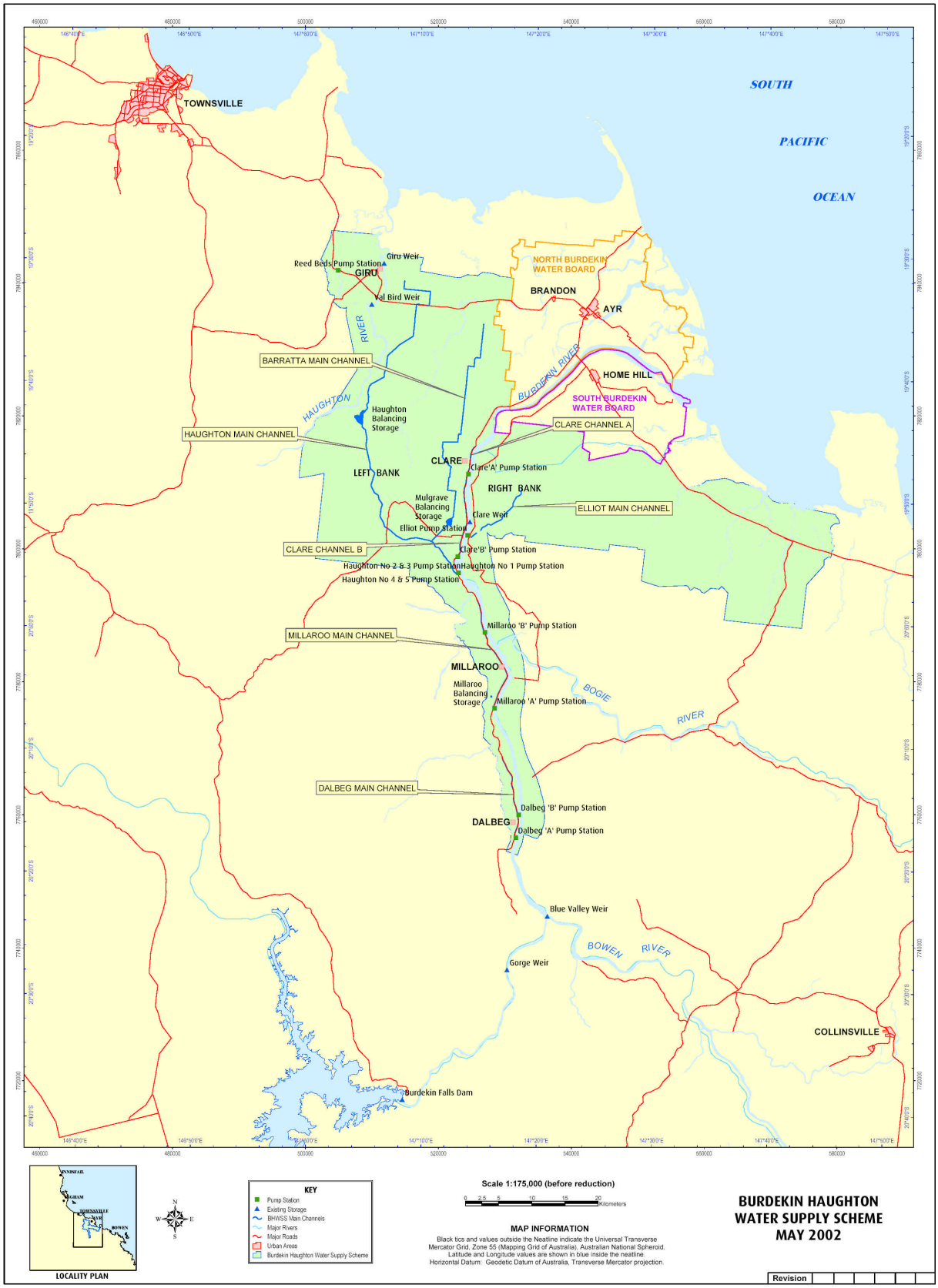
- when transitioning users to more commercial rates of return;
- when contractual or legislative constraints exist;
- during periods of substantial excess supply;
- where redundant or over-engineered assets in the asset base exist;
- where capital contributions should be recognised;
- a number of situations when differential prices would be possible but not appropriate;
- when broader public interest matters determined by government are reflected in CSOs; and
- where market circumstances limit the capacity of users to pay.

The Authority notes that, under prevailing expectations of prices for sugar, sugarcane irrigators in the Burdekin River Irrigation Area do not have a capacity to pay a positive rate of return (although other irrigators may). However, the Authority notes that the estimated capacity of sugarcane producers to pay has shown considerable volatility in the past and may do so in the future. The Authority also notes that, given that volatility, point in time estimates of expected capacity to pay based on future prices are necessarily quite problematic and caution needs to be exercised when using them for pricing purposes. As the current price paths do not provide a mechanism by which SunWater can capitalise on past capacities to pay, it would be inappropriate to reduce the level of return when the expected capacity to pay is low. The situation would be different if SunWater had a more market based pricing policy which sought to share in industry highs and lows with other participants in the industry. This is of course an option for future price paths

In addition, the Authority notes any reduction in prices for water services to remove the current excess over lower bound costs will only reduce costs of sugarcane production in the Burdekin River Irrigation Area by 2 to 3%. Such a reduction would obviously be of assistance to sugarcane producers in the current circumstances, but a more comprehensive response to the situation within the industry is required.

The nature and form of any assistance and related adjustment is a matter for the Queensland Government and the industry to determine rather than SunWater in its capacity as a commercial service provider.

Figure 1.1


SOUTH
PACIFIC
OCEAN
TOWNSVILLE
Reed Beds Pump Station
Giru Weir
GIRU
Val Bird Weir
RIVER
NORTH BURDEKIN WATER BOARD
BRANDON
AYR
BARRATTA MAIN CHANNEL
BURDEKIN RIVER
HOME HILL
SOUTH BURDEKIN WATER BOARD
HAUGHTON
Haughton Balancing Storage
HAUGHTON MAIN CHANNEL
CLARE CHANNEL A
CLARE
Clare'A' Pump Station
LEFT BANK
RIGHT BANK
Mulgrave Balancing Storage
Clare Weir
ELLIOT MAIN CHANNEL
Elliot Pump Station
CLARE CHANNEL B
Clare'B' Pump Station
Haughton No 2 & 3 Pump Station
Haughton No 1 Pump Station
Haughton No 4 & 5 Pump Station
Millaroo 'B' Pump Station
MILLAROO MAIN CHANNEL
MILLAROO
Millaroo Balancing Storage
Millaroo 'A' Pump Station
BOGIE
RIVER
DALBEG MAIN CHANNEL
Dalbeg 'B' Pump Station
DALBEG
Dalbeg 'A' Pump Station
Blue Valley Weir
BOWEN
RIVER
Gorge Weir
COLLINSVILLE
Burdekin Falls Dam
LOCALITY PLAN
KEY
Pump Station
Existing Storage
BHWSS Main Channels
Major Rivers
Major Roads
Urban Areas
Burdekin Haughton Water Supply Scheme
Scale 1:175,000 (before reduction)
Kilometers
MAP INFORMATION
Black tics and values outside the Neatline indicate the Universal Transverse Mercator Grid, Zone 55 (Mapping Grid of Australia), Australian National Spheroid.
Latitude and Longitude values are shown in blue inside the neatline.
Horizontal Datum: Geodetic Datum of Australia, Transverse Mercator projection.
BURDEKIN HAUGHTON WATER SUPPLY SCHEME MAY 2002
Revision

2. BACKGROUND

Summary

The Authority has been directed to provide advice on a number of matters in relation to the services provided by SunWater to irrigators in the Burdekin River Irrigation Area within the Burdekin Haughton Supply Scheme. In particular, the Authority has been requested to determine the capital contributions made by various parties, estimate an appropriate weighted average cost of capital for pricing purposes and determine whether current price paths incorporate any excess return on capital. The Authority has also been requested to advise the circumstances under which it would be appropriate for an entity to charge a positive rate of return on scheme assets.

The Burdekin Haughton Water Supply Scheme has supplied water to irrigators and other users in the Burdekin region, south of Townsville, since the 1950s. Scheme infrastructure includes the Burdekin Falls Dam, completed in 1987, a number of weirs on the Burdekin and Haughton Rivers, and three major distribution channel systems including pumping stations and a drainage network.

The Scheme supplies the Burdekin River Irrigation Area, the North and South Burdekin Water Boards and NQ Water.

Pricing policies for the Burdekin River Irrigation Area have varied over time and, while prices have increased in nominal terms, the price of water has been almost constant in real terms since 1980. Gazetted prices introduced in October 2000 generally continued the previous price level.

SunWater, the service provider for the Scheme, was corporatised on 1 October 2000 and is required to operate as a commercial entity. SunWater must also comply with the resource management requirements of the Water Act 2000 and a range of other resource management legislation.

2.1 The Authority's Remit

Ministers' Direction

On 17 January 2002, the Premier and the Treasurer (the Ministers), under section (10)e of the *Queensland Competition Authority Act 1997*, directed the Queensland Competition Authority (the Authority) to assess gazetted prices for channel and river irrigators receiving water infrastructure services (including harvesting, storage, distribution and reticulation) provided by SunWater within the Burdekin Haughton Water Supply Scheme (the Scheme) to:

1. Determine the capital contributions made by each, if any, of the irrigators, the Commonwealth, State governments or other parties. Such an assessment should consider:

   (a) development costs associated with the Scheme;

   (b) payments made for land, sugar cane assignments and water allocations (including consideration of the entitlements received for such payments);

   (c) contributions by sugar mills; and

   (d) any other relevant factors identified by the Authority, including any capital not accounted for by capital contributions.

2. Determine the appropriate weighted average cost of capital (WACC) that could be incorporated in the price of providing those water infrastructure services;

3. Determine whether the current price paths incorporate any excess return on capital based on the above analysis; and

4. Advise under what circumstances it would be appropriate for an entity to charge a positive rate of return on scheme assets.

For these purposes, the Ministers directed that the Authority should use:

- the valuation of assets established by Arthur Andersen in 2000 for the Queensland Government, or other valuation methods if deemed more appropriate, consistent with the sustainable provision of water services; and

- the lower bound costs of the Scheme incorporated in gazetted price paths and the demand forecasts used in the rural water price setting process.

The Ministers stated that the Authority may exercise all the powers under Part 3 and Part 6 of the *Queensland Competition Authority Act 1997*, consult with all parties considered relevant to the investigation and issue public notices of the investigation.

The Ministers initially directed that the Authority's Draft Report should be prepared on a suitable basis for consultation by 30 June 2002. The Ministers have subsequently extended the timeframe for the Draft and Final Reports to 27 September 2002 and 31 December 2002 respectively.

Other Matters

In making their Direction, the Ministers stated that the Authority's assessment was sought in the context of compliance with the pricing principles established by the Council of Australian Governments (COAG).

The Ministers noted that COAG pricing principles involve:

- the adoption of pricing regimes based on the principles of consumption-based pricing, full cost recovery and, desirably, the removal of cross-subsidies which are not consistent with efficient and effective service, use and provision;

- the progressive review of rural water charges and costs to ensure that most irrigation schemes comply with the principle of full cost recovery by no later than 2004; and

- the achievement of a positive real rate of return on the written down replacement cost of assets in rural water supply, where practicable.

The Ministers noted that the Standing Committee on Agriculture and Resource Management (SCARM) has developed cost recovery targets for all water users, to assist in the implementation of full cost recovery under COAG pricing principles. The cost recovery targets were expressed in the form of upper and lower bounds for water prices.

Approach

In undertaking its remit, the Authority has:

- based its assessment on prices, asset values and information relevant to the time at which the gazetted prices were established, that is, October 2000. All references to dollar terms are reported on this basis unless otherwise specified;
- focussed upon water infrastructure services relevant to gazetted prices;
- invited submissions on the issues considered relevant to the Direction;
- established a framework against which the issues were to be considered; and
- assessed submissions and information obtained from a range of agencies and sources against the framework established.

This Draft Report is intended to provide the basis for further comment and consultation. All submissions received will be considered in framing the Final Report to the Ministers.

Structure of the Draft Report

The Draft Report has been structured to respond to the key questions arising out of the Ministerial Direction as follows:

- whether payments made by nominated parties were capital contributions (Chapter 3);
- whether there is any capital unaccounted for by capital contributions (Chapter 4);
- what is the appropriate WACC (Chapter 5);
- whether current price paths incorporate any excess return on capital (Chapter 6); and
- under what circumstances would it be appropriate for an entity to charge a positive rate of return on scheme assets (Chapter 7).

2.2 The Scheme

Geography and Infrastructure

Since its inception in the 1950s, the Burdekin Haughton Water Supply Scheme has supplied water to irrigators and other users in the Burdekin region, south of Townsville (Figure 1.1).

Whilst the bulk of the current Scheme infrastructure was constructed after 1980, some weirs and irrigation channels predate this time. Current Scheme infrastructure includes:

- the Burdekin Falls Dam, with a capacity of 1.86 million ML, completed in 1987;
- weirs on the Burdekin River (the Gorge, Blue Valley and Clare Weirs) and the Haughton River (the Giru and Val Bird Weirs);
- three major distribution channel systems, including pumping stations. These are the Haughton Main Channel, the Barratta Main Channel (both north and west of the Burdekin River) and the Elliot Main Channel (south and east of the Burdekin River);
- a 400 km subsidiary channel system to deliver irrigation water to individual farms in the Scheme; and

- a 350 km drainage network system to drain and remove excess water from individual farms to the natural drainage system.

For a period, water was also obtained from the Eungella Dam on the Broken River. However, this Dam is now allocated to other industrial, urban and agricultural users, and is separately administered under SunWater's Bowen Broken Rivers Water Supply Scheme.

Historical Background

The decision to construct the Burdekin Falls Dam and the bulk of the Scheme distribution infrastructure followed a number of investigations into the possible expansion of irrigation in the area. These investigations culminated in the 1980 *Report on Establishment of Burdekin River Project Undertaking*.[1]

The economic analysis contained within this report indicated that:

- the project was viable from a national economic impact perspective;
- the project was viable from a regional economic impact perspective; and
- farms would be commercially viable under then probable sugar prices and costs of production.

Under the assumption of a constant real price of water, it was expected that a 2.05% real return on the net capital cost of the Scheme would be achieved.

The stated objectives of the Scheme were to:

- provide additional water for existing cane production areas; and
- provide water for further agricultural, urban and industrial development and for likely increases in urban and industrial development to well beyond the year 2000.

It was also noted that the construction of the Burdekin Falls Dam would reduce flood damage in the developed areas below the dam.

Under the Scheme, the Queensland Government was to resume and subdivide farmland, build water infrastructure, sell farms and impose ongoing water charges. Funding sources were to include sales of land, land rents, sugar mill levies and water and drainage charges.

Total capital expenditure on the Scheme was estimated at $580.8 million, with the Burdekin Falls Dam being the major item of expenditure (estimated at $257.1 million). The 1980 report to Parliament estimated that the net capital cost of the Scheme, after accounting for revenues from land sales (which at that time included water entitlements), would be $532.1 million.

In October 2000 dollar terms, actual capital expenditure on the Scheme was approximately $587.0 million, largely in line with the original estimates. Expenditure on the Scheme net of revenues from land (and water entitlements) was $482.7 million (see Tables A.1 and A.2 in Appendix A).

Since Parliament approved the Scheme in 1980, substantial changes to the original layout have occurred. The development of land proximate to the Elliot Channel did not proceed as planned

[1] Queensland Water Resources Commission. 1980. *Report on Establishment of Burdekin River Project Undertaking*. Brisbane: Queensland Government Printer.

due to poor soils and environmental problems while the development along the left bank of the Haughton River was greater than originally planned (Figure 1.1).

The Scheme was originally intended to service 660 farms over 56,760 hectares in the Burdekin River Irrigation Area (BRIA). However, due to changes in allowable farm sizes and the environmental problems noted above, water is currently provided to only 362 farms over 48,278 hectares in the BRIA. In addition, though, water is provided to the North and South Burdekin Water Boards which service 394 water users on 55,376 hectares.

The balance of the Scheme was to provide water for urban growth in Bowen and Townsville and for potential future projects such as hydroelectric power generation.

2.3 Legislative Framework

Overview

SunWater is the service provider for the Burdekin Haughton Water Supply Scheme. It was corporatised under the *Government Owned Corporations Act 1993* (*GOC Act 1993*) on 1 October 2000.

The provisions of this Act, SunWater's Statement of Corporate Intent (SCI) and legislation relating to resource and operational management requirements specify that:

- SunWater is an autonomous corporatised entity;
- SunWater has its own Board of Directors (the Board);
- the Board is required to ensure that the activities of SunWater are managed in a commercial manner;
- the Board has the major responsibility for key decisions in relation to issues such as capital expenditure, borrowing and contractual arrangements;
- the Board is accountable to the shareholding Ministers, the Treasurer and the Minister for Natural Resources and Mines;
- dividends are negotiated annually between the Board and the shareholding Ministers. Since corporatisation, SunWater has paid no dividends; and
- SunWater must meet the requirements of all resource management and operational management legislative requirements.

However, while SunWater is required to operate as a commercial entity:

- price paths for rural water schemes are set externally by the Queensland Government; and
- where SunWater is required to price services below efficient operating, maintenance and administration costs, the shortfall is funded via an explicit community service obligation (CSO) from the Queensland Government. No CSO is paid in respect of the Burdekin Scheme as the relevant price paths are considered by the Queensland Government to exceed operating, maintenance and administration costs.

Statement of Corporate Intent (SCI)

Under the *GOC Act 1993*, the Board of SunWater is required to submit an annual SCI to shareholding Ministers. The SCI sets out a number of broad corporate governance requirements consistent with the *GOC Act 1993* as well as a number of specific powers and requirements such as:

- the requirement to honour contracts which State Water Projects (SWP) had in place prior to the corporatisation of SunWater;
- the requirement to recognise capital contributions. The SCI also raises the possibility that this may be the subject of a review by the Authority;
- the power for SunWater to sell water entitlements consistent with the terms and conditions set out in the Interim Resource Operations Licence (IROL) and eventually under a Resource Operations Licence (ROL); and
- the requirement to pay tax equivalents and actual local government rates.

Resource Management

The *Water Act 2000* is the key legislation relating to resource management issues for the Scheme. Under this Act, the 'use, flow and control' of all water in Queensland is vested in the State.

The Minister for Natural Resources and Mines is responsible for the allocation and sustainable management of water to meet Queensland's future water requirements, including water for the protection of natural ecosystems and the security of supply to water users.

These responsibilities are to be met through the preparation of a Water Resource Plan (WRP) for each catchment area which provides a framework for the sustainable allocation of water, including defining flows necessary to sustain water dependent ecosystems. The framework will define:

- water availability for the Scheme;
- priorities of water use within the Scheme;
- management strategies and monitoring requirements that will apply over the life of the WRP; and
- the basis for a framework that allows water allocations to be traded separately from land.

The WRP for the Burdekin Basin, a large catchment area that incorporates the Scheme, is currently being developed by the Department of Natural Resources and Mines (DNRM) in consultation with stakeholder groups. The Draft WRP is due for completion in the second half of 2002 and, following appropriate community consultation, the Final WRP should be released in 2003.

Until the WRP is finalised, these functions are governed under an IROL. The current IROL essentially governs the same issues that the WRP being developed will govern.

Each irrigator in the Burdekin holds a water allocation with a stated volume. Under the *Water Act 2000*, the volume of water actually available to the irrigator under their allocation can be

varied by announcement, depending on the volume of water actually available in the Burdekin Falls Dam (ie the irrigator can only receive water if there is sufficient supply).

In the Scheme, water allocations were obtained by individual irrigators through the sale of farms with attached water allocations, or through the explicit purchase of a water allocation when purchasing a farm. Some additional water allocations were granted free or purchased by existing farmers who were able to retain landholdings within the Scheme.

The *Water Act 2000* provides for titles to land and water to be legally separated and any water allocation held by an irrigator is then an economic asset in its own right, which can be subdivided, traded or sold, either temporarily or permanently.

The Queensland Government is currently developing administrative procedures (eg water allocation title registration and trading rules) to better facilitate the trading of water allocations.

In addition to resource management considerations contained in the *Water Act 2000*, the development and operation of the water infrastructure is subject to a variety of other State and Commonwealth legislation. At the State level, this includes the *Environmental Protection Act 1994*, the *Fisheries Act 1994*, the *Litter Act 1971*, the *Native Title Act 1993*, the *Nature Conservation Act 1992*, the *Soil Conservation Act 1986*, the *Queensland Heritage Act 1992* and the *Building Fire Safety Regulation 1991*. Commonwealth legislation includes the *Environmental Protection (Impact of Proposals) Act 1974*, the *Endangered Species Protection Act 1992* and the *Native Title Act 1993*.

Operational Management

In November 2000, SunWater was issued with an IROL which:

- provides a detailed description of all the water infrastructure to which the Licence applies, including the watercourses used for distribution and drainage;
- outlines the operating arrangements for water infrastructure, including arrangements designed to protect natural resources that may be adversely affected by the operation of the infrastructure, and arrangements to ensure safety standards are met;
- defines the terms relating to water management, such as water sharing rules, other water supply responsibilities and the apportionment of IWAs in accordance with the *Water Act 2000*. The IROL outlines the volumes of each allocation held by various users of the Scheme and the respective priority of each allocation, as well as stating that all unallocated water in the Scheme remains the property of SunWater; and
- a number of other general conditions under which irrigation services in the Scheme are licensed.

The *Water Act 2000* also requires providers to comply with other operational requirements such as:

- infrastructure standards. SunWater must have standards for continuity of service, pressure/flow conditions and other service level objectives, and must report on these in the form of a strategic asset management plan;
- customer service standards, including the type of water service, billing procedures and complaints procedures;

- dam safety standards, specifying dam operation and maintenance conditions, water release procedures and reporting and inspection requirements; and

- other requirements such as flood mitigation operations and planning.

2.4 Pricing

Since the inception of the Scheme, the relevant Minister has been responsible for setting prices and conditions for irrigation services in accordance with the relevant legislation.

Although comprehensive details of pricing policies are not available for the period prior to 1980, some information is available on earlier pricing practices:

- revenues from water charges were first reported in the Burdekin region after World War II. Water charges were set under the *Water Act 1926*, which stated that water charges should defray the cost of maintenance, repair, management, control and administration of works. However, the Act also stated that rates could be levied upon irrigation land in order to defray, in part or whole, 'principal monies and interest or rent or other payment' in respect of capital expenditure upon works. The basis for setting prices was not detailed;

- the levels of channel water charges for the Burdekin Irrigation Area were first reported in 1966-67 (Figure 2.1). In 1967-68, river water charges were also reported. Since their introduction, prices have steadily risen in nominal terms; and

- in real terms, channel and river water charges have varied over time, until the early 1980s when changes in prices became smoother (Figure 2.2). It appears that an estimate of the consumer price index (CPI) has been applied to prices on an annual basis since then.

After the development of the Burdekin Falls Dam and further irrigation channels, a variety of new charges were introduced. These charges reflected the expansion of irrigation services into new areas such as Giru and Horseshoe Lagoon, and policy decisions to charge for the use of groundwater and water diverted from drains.

From the time of their introduction, water charges were comprised of a two-part tariff, with a fixed 'take or pay' component that was payable regardless of the amount used. From the inception of the charges until 1997-98, the take or pay component was progressively increased from 50 to 75% of a farm's water allocation. Additional water used was charged at the same per megalitre (ML) rate as the take or pay component.

In 1997-98, a fixed charge was applied to the full amount of water allocated to a particular farm, and a different variable charge applied to the actual water used by that farm. The fixed charge was payable regardless of the amount used. The impact of the tariff restructure on individual users depended upon their nominal allocation and usage patterns.

Gazetted prices introduced in October 2000 retained this two-part structure, although the fixed charge was increased and the variable component lowered. The new prices were designed to be revenue neutral initially and to decrease slightly over time to reflect the impact of envisaged additional demand on fixed costs.

Figures 2.1 and 2.2 below reflect the average delivery price of channel and river water in the Burdekin River Irrigation Area based on historic usage patterns.

Figure 2.1: Burdekin River Irrigation Area - Nominal Channel and River Prices

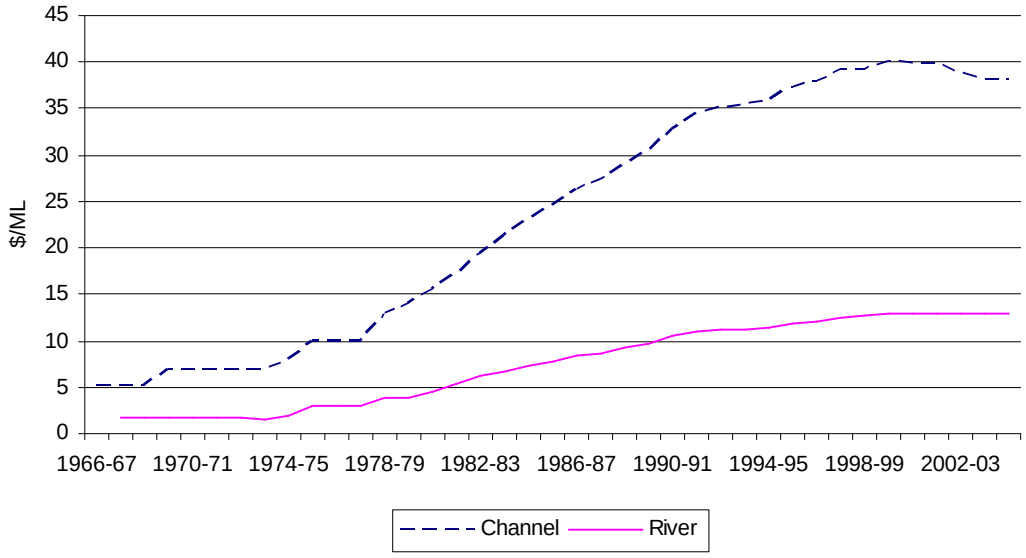
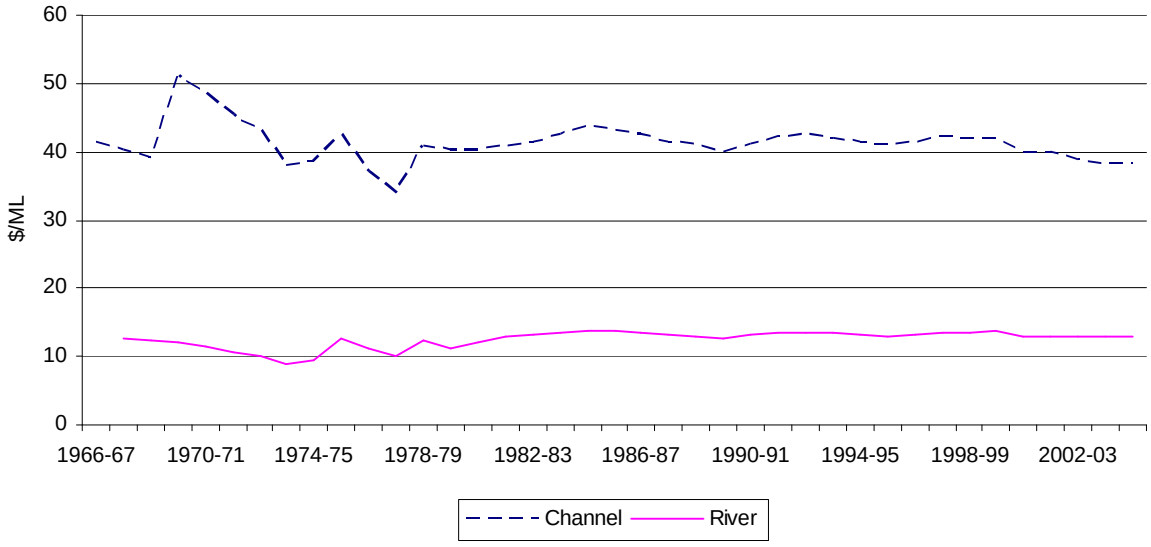


Figure 2.2: Burdekin River Irrigation Area – Real Channel and River Prices



3. CAPITAL CONTRIBUTIONS

Summary

The Ministers directed the Authority to determine the capital contributions made by each, if any, of the irrigators, the Commonwealth, State governments or other parties.

Payments towards the capital cost of the Scheme were generally recognised as capital contributions where it was evident that the payment was made with the intention of obtaining future price benefits. Recognition was subject to the consideration of a number of other factors such as whether the contribution was a prepayment for future services or whether the asset had been replaced.

The Authority notes that there is no legal requirement for the Queensland Government to recognise any payments as capital contributions. However, the Authority concluded that the Scheme should be viewed as an integrated development with payments from many sources contributing towards its overall capital cost. Furthermore, available evidence indicates that there was an understanding within the Queensland Government and an expectation on behalf of irrigators that irrigators' payments for land, water and cane assignments were intended as an offset against the capital costs of the Scheme and that this would be taken into account in future price setting.

Accordingly, the Authority considers that payments for the land, water and cane assignments should be recognised as capital contributions. Prices should not include a return on these capital contributions as this would represent an unwarranted impost on growers.

With respect to the Commonwealth and State funding of the Scheme, available information indicates that the focus of these parties was on funding the Scheme, not providing future pricing benefits to water recipients. The Authority does not consider that either Commonwealth or State funding was made with the intention of providing pricing benefits into the future.

For information purposes only, the Authority has assessed the impact of both including and excluding the Commonwealth grant as a capital contribution.

The total value of capital contributions towards the Scheme is estimated at $63.2 million.

3.1 Approach Adopted

In order to determine the capital contributions made in respect of the Burdekin River Irrigation Area, the Authority first considered the Scheme as a whole and the capital contributions made to it. This is the focus of this chapter. In chapter 4, these contributions are allocated as appropriate to the Burdekin River Irrigation Area, including an appropriate allocation of contributions to common assets.

3.2 General Principles

While there is no generally accepted definition, the Authority has taken the view that capital contributions are capital payments made towards the capital cost of an asset by a third party with the intention of reducing the capital outlay by the owner of the asset and with the expectation that the payment will be recognized for pricing purposes. Capital contributions may be made by prospective users and/or government.

Recognition of capital payments for pricing purposes has been proposed by stakeholders on the basis of:

- equity, in that users should not be required to pay a price that includes a return on capital for assets that have already been funded by them or by the government on their behalf; and

- economic efficiency, in that future investment could be discouraged if users who are required to make capital payments do not receive a benefit proportionate to their payments.

Once a payment has been determined to be a capital contribution, an approach to its recognition in pricing is required. In general, the options for doing so are:

- to exclude the capital contribution from the regulated asset base of the entity for the purposes of calculating prices; or

- to include the capital contribution in the regulated asset base, but adjust prices by a rebate to the user(s). The rebate would be equal to the return on capital for the capital contribution.

The COAG guidelines for water pricing require that the treatment of capital contributions in pricing is transparent.

Other Jurisdictions

The general principle that 'double-charging' should be avoided is recognised in the National Electricity Code (NEC) and the National Gas Code. It is also recognised in the Local Government Guidelines for Full Cost Pricing in Queensland.

In NSW, the Independent Pricing and Regulatory Tribunal (IPART) valued all bulk water assets existing prior to 1997 at zero and thus the treatment of past capital contributions was not an issue. Only those capital contributions made after this time were recognised.

In Tasmania, the Government Prices Oversight Commission (GPOC) has stated that capital contributions should be recognised in setting ongoing prices, and should be excluded from the relevant asset base for pricing purposes (GPOC 2001, p. 52).

Stakeholder Comment

The Burdekin River Irrigation Area Committee (BRIAC), the South Burdekin Water Board, the North Burdekin Water Board and Davco Farming separately submitted that a rate of return should not be charged on capital contributions.

SunWater stated that capital contributions should be recognised in lower prices where there is a legally binding and documented intent between the parties to provide future price benefits as a result of these payments.

QCA Analysis

As a general principle, capital payments should be regarded as capital contributions (and thus reflected in the prices paid by users of the asset) if it was the expectation of the relevant parties at the time that the capital payment would be recognized for pricing purposes. However, in a

pricing review or determination, recognition of past capital contributions in future prices would not be appropriate if:

- past price reductions have fully compensated the contributor for the contribution; or
- the asset towards which the contribution was made has been consumed.

In addition, not all payments made by users are of a capital nature. For example, payments made as a prepayment for future services are not capital contributions.

Therefore, consideration must be given to the particular circumstances surrounding any payments made by users and/or government.

In some instances, a formal agreement will be in place which outlines the manner in which a payment is to be treated.

However, in other instances, formal agreements attesting to the quantum of a payment, its nature or its purpose are not available or there may be a lack of clarity regarding any arrangements. In these circumstances, a judgement must be made on the basis of all available evidence.

In summary, the Authority considers that a capital payment should be regarded as a capital contribution if the intention of the relevant parties at the time was that the capital payment would be recognized for pricing purposes. Furthermore, a capital contribution should be recognized for pricing purposes unless past price reductions have fully compensated the contributor for the contribution or the asset towards which the contribution was made has been consumed.

The Authority also recommends that, once recognised, capital contributions should be included in the capital base for the purpose of determining prices, with rebates incorporated in the prices for relevant user(s) equivalent to the return on capital.

3.3 The Burdekin Haughton Water Supply Scheme

The Burdekin Haughton Water Supply Scheme involved the development of both land and water infrastructure. Farms were resumed, subdivided and redeveloped, and road and water infrastructure built.

A variety of payments were received, including:

- headworks contributions from existing farmers who chose to retain land in the Scheme;
- auction payments for land and water allocations (which incorporated payments for dry land and improvements such as clearing and fencing, water allocations, stamp duty, electricity connection, sugar cane assignments and access to Scheme infrastructure);
- payments by irrigators for meters and a portion of the costs of an upgrade of the Barratta Main Channel; and
- sugar mill levies.

Both Commonwealth and State Government funding was also provided.

In determining which payments are relevant to the assessment of capital contributions for gazetted pricing purposes, it is particularly necessary to consider whether the Scheme:

- was intended to be an integrated land and water development project, with revenue from all sources offsetting the capital costs of the Scheme; or

- should be viewed as a series of discrete but complementary activities where each revenue source should be considered only in relation to its capital expenditure (for example, the land revenues would only relate to land development expenditures).

Stakeholder Comment

BRIAC contended that the Scheme should be viewed as an integrated land and water development project, in which all economic returns from the Scheme should be taken into account, including land and water allocation sales.

SunWater submitted that the land and water developments should be viewed separately as revenues from the sale of land accrued to the Lands Department and did not flow to the predecessors of SunWater.

SunWater also submitted that the cost of the general access road network servicing farms was essentially part of the land development and subdivision of farms, and should be viewed as an expense in that context to be offset against proceeds from the sale of land in the Scheme.

Furthermore, SunWater submitted that the 1980 report to Parliament should not be used in determining future water charges, stating that the report:

> … was prepared solely for the purposes of providing the necessary information required by the Irrigation Act to be considered by the Parliament in establishing the irrigation undertaking. The 1980 report was not prepared for any other purpose. It has no force of law and does not purport to determine the basis for the future charging of water services.

QCA Analysis

The 1980 report to Parliament was prepared for the purpose of providing the necessary information required by the Irrigation Act to be considered by the Parliament in establishing the irrigation undertaking. It contains the detailed proposals for the development of the Burdekin Scheme, which Parliament approved on 18 March 1980.

The Authority notes that, whilst the 1980 report may not be legally binding on Government, it does give an insight into the manner in which the Government proposed to fund the Scheme.

In this report, revenues from the sale of land (which at that time included a water entitlement) were offset against the total estimated capital costs of the overall Scheme. That is, the Burdekin Scheme was treated as an integrated Government land and water development project.

Furthermore, it is noted that the Water Resources Commission (WRC) (a predecessor of SunWater and the Department of Natural Resources and Mines) had the responsibility for the development of both the land and water infrastructure. In this role, the Commission:

- advised irrigators of the arrangements affecting both land and water;

- kept combined accounts for land and water development purposes (and recorded this in its annual reports), which included land resumption costs as well as water infrastructure development costs;

- entered into contracts with the local Councils regarding the construction and upgrading of roads; and

- organised the subsequent auctions of farms and the sale of water allocations.

It is also noted that revenues from the sale of land were included in an analysis of the further development of the Scheme, which stated that 'The full repayment for land sold is included in the analysis as an input to the State, although all repayments after the initial deposit are collected by the Department of Lands. This is an important point to note when considering any annual balance sheet for the WRC's activities in the project.'[2]

Furthermore, the auction value of land represented the total value that irrigators placed upon all entitlements associated with it.

The Authority also notes that general access roads which were specifically constructed for the purposes of the Scheme would not have been developed without it and the Authority accepts these as a specific cost to the Scheme. These costs also featured in the 1980 report to Parliament.

3.4 Retention Farms (Headworks Contribution)

Land in the Burdekin basin was resumed and subdivided into smaller holdings as part of the development accompanying the construction of the Burdekin Dam. The resumption value of the land reflected its previous use - grazing land, dry arable land or irrigable land.

Prior landholders were allowed to retain up to a 100 hectare parcel and up to seven additional farms at resumption value. All farms were granted a water allocation of eight ML per hectare, where this was not already available. SunWater has advised that, under the prevailing arrangements at that time, the licences which provided for the water entitlement or nominal allocation always remained subject to cancellation or suspension in accordance with the provisions of the legislation. Further, the licences were issued for a specific period.

Prior to December 1989, a headworks contribution charge was payable in relation to the additional farms purchased by existing landholders (it did not apply to the initial 100 hectare farm held). For channel irrigators, the headworks contribution was $1,800 per hectare for additional farms that were intended for sugar production and $1,100 per hectare for those intended for rice production. For riparian (river) irrigators who wished to develop their own land by private diversion, the headworks contribution was $100 per ML of water allocation above 800 ML (or pre-existing allocation, if larger).

From December 1989, the fixed headworks contributions charge for channel irrigators was abolished. Additional channel farms could be purchased at market values, recognising the value added by the development works.

No records exist which indicate the revenues received through the headworks contribution charge prior to 1989. However, SunWater has estimated that $9.4 million was received by the Queensland Government from retention farms after 1989.

Stakeholder Comment

BRIAC submitted that the headworks contribution charge was a capital contribution, on the basis of the representations made to BRIA irrigators by Queensland Government

[2] Queensland Department of Primary Industries, 1990, p. 32.

representatives.[3] BRIAC submitted that these representations are legally binding and require SunWater to now recognise these payments as capital contributions.

SunWater submitted that the headworks contribution should not be viewed as a capital contribution as there was no documented or implied intent to provide future price benefits from this payment. SunWater also submitted that, if the Government had intended to provide future price benefits as a result of these payments, then lower annual water prices would apply to those people who had paid for water allocations, and higher prices would apply to those who had water allocations granted free of charge. SunWater noted that current prices do not differentiate between users on this basis.

SunWater further submitted that the headworks contribution charge was a payment for water allocations and this asset has value in its own right and that to provide future price benefits in water delivery charges would represent a form of 'double dipping' with irrigators receiving an asset and lower delivered water prices.

SunWater also submitted that there is no legal constraint on future water charges arising from any documentation provided to the irrigators. In particular, SunWater submitted that the setting of water charges was, and is, not bound by any statements passing between the employees of the State and irrigators which indicated that payments were intended to be recognised as a capital contribution.

QCA Analysis

The Authority notes that various documents stated that the headworks contribution charge:

- was based on 'recognition of the works provided' and that the future level of the charges 'will be reconsidered in light of then current Project costs';[4]
- was a mechanism for 'capital cost recovery from retention farm holders' that would influence 'the cash requirements for the project in the short term';[5]
- was based on 'recovering as much as possible of the huge capital cost of the project from those who will benefit directly from it';[6] and
- was a 'once-off capital contribution'.[7]

These statements indicate that the headworks contribution was intended as an offset against the capital costs of the Scheme.

BRIAC's contention that there is a legally binding obligation for the payments to be recognised as capital contributions is not supportable. Available legal advice is that such representations do not legally bind future water prices and, in particular, do not legally require that the payments be recognised as capital contributions to the Scheme. At the same time, they do not prohibit the recognition of these representations.

[3] Correspondence from the Secretary of the Queensland Water Resources Commission, to Burdekin landholders in 1982; and correspondence from the Commissioner of Water Resources to an irrigator, dated 26 March 1987.
[4] Correspondence from the Secretary of the Queensland Water Resources Commission to Burdekin landholders in 1982.
[5] Memorandum from the Water Resources Commissioner to the Minister for Water Resources and Maritime Services, 3 May 1984.
[6] Press Release from Senator P. Walsh, Commonwealth Minister for Resources and Energy, Canberra, 26 April 1984.
[7] Correspondence from the Commissioner of Water Resources to Burdekin landholders, December 1989.

In respect of the SunWater submissions, it is considered that:

- the absence of differentiated prices does not provide a basis for concluding that contributions were not to be regarded as an offset to future prices. Individual users are often not compensated for their specific contributions due to administrative and compliance costs and recognition can involve averaging of contributions across more easily identifiable user groups; and

- the receipt of a lower price of water (as a result of the recognition of the headworks contribution) and an asset (the water allocation) does not constitute double dipping in benefits by irrigators. While the Authority accepts SunWater's view that the water entitlement is an asset, as it represents a right to use water, it is noted that there are many instances where capital assets are sold as a means of financing a development. Having paid for the water entitlement, irrigators (like any other asset holder) are entitled to future gains or losses according to the terms on which the asset is held and outcomes in the market.

Having regard to the available documentation and representations made in the past to irrigators, the Authority considers that relevant agencies intended, and irrigators had a reasonable expectation to believe, that the headworks contributions were to be regarded as a capital contribution.

3.5 Auction Sales

Land purchased at auction incorporated a composite set of entitlements, including dry land and improvements such as clearing and fencing, sugar cane assignment, water allocations, stamp duty (on land sales), electricity connection and access to Scheme infrastructure. Separate payments to the WRC were required for improvements and water allocation. Stamp duty was due to the Queensland Government and electricity connection payments were due to NORQEB.

A sugar cane assignment incorporated the right to sell cane to the local sugar mill at regulated prices. Cane assignments were provided with many blocks sold at auction and, where not attached, were made available at no extra cost, upon application, usually within a twelve month period.

Water entitlements were attached to the land purchased at auction prior to March 1993. After March 1993, a separate payment related to the water allocations. This payment, at $250 per ML for channel irrigators and $100 per ML for river irrigators, has been in place without variation since that time.

Most auction sales achieved above the reserve price set by the Queensland Government. Some earlier farm auctions only achieved around the reserve price because of concerns regarding their viability. This also occurred in later auctions as a result of declining sugar prices and also because of rising reserve prices based on previous sales.

The Queensland Government also provided preferential finance arrangements to irrigators for land and for water allocations. Land was financed over ten years with payments made in ten annual instalments. The first payment was capitalized over the balance of the term. Payments in each subsequent year were equal to the principal then due (total outstanding divided by the balance of the term) plus the interest for the amount due in that year (but not on the balance of funds outstanding). In other words, a benefit was derived equal to the interest that would normally accrue on the balance outstanding. A similar arrangement was applied to water allocations although they were calculated on a quarterly basis.

Stakeholder Comment

BRIAC submitted that land and water allocation revenues were capital contributions to the Scheme, on the basis of Government statements.[8] BRIAC submitted that nothing was paid for sugar cane assignments as these were freely available at the time from the Queensland Sugar Corporation on recommendation by the representative CANEGROWER bodies. Submissions were also received stating that cane assignments issued after the auction resulted in lower payments for cane as:

- a $1 per tonne infrastructure levy was payable to the mill;
- no continuous crushing allowance was available, worth up to 47 cents per tonne; and
- no season extension allowance was available, worth 60 cents per tonne.

The South Burdekin Water Board submitted that water allocation payments were a capital contribution on the basis of prior written statements made by representatives of the Queensland Government.[9]

The Burdekin Shire Council noted that the Government made a substantial net return on the sale of land in the Scheme, estimating that realised prices totalled $67 million above upset prices of $25.2 million at auction, and argued that these should be taken into account in establishing appropriate cost levels.

Davco Farming submitted that irrigators had paid a total of $143.5 million in nominal terms in capital contributions towards the Scheme, comprised of:

- net returns to Government on the sale of land and water allocations of $75.3 million, encompassing total payments made by irrigators for land and water allocations less the resumption costs to Government and the costs involved in selling the land (including legals and selling agents fees);
- interest paid on Government loans of $29.1 million; and
- annual water infrastructure charges in excess of local management operation and management costs of $3.9 million.

SunWater submitted that payments for land and water allocations are not capital contributions as there was no documented or implied intent for any particular set of water charges to apply beyond the year in which the farms were purchased. As noted above, SunWater also submitted that:

- if the Government had intended to provide future prices benefits as a result of these payments, then differential water charging arrangements would apply. SunWater noted that current prices do not differentiate between users; and
- payments for land as well as water allocations represented a commercial purchase of tradeable assets. To provide future price benefits to users as a result of this payment

[8] Queensland Government supplementary submission to the Industry Commission Inquiry into Water Resources and Waste Water Disposal, January 1992, pp. 5, 7.

[9] Department of Primary Industries (Water Resources) 1993, *Purchasing water allocation*, Brochure; Department of Primary Industries 1993, *Draft Interim Policy Document Burdekin River Irrigation Area Future Water Management*, Discussion Paper for Public Consultation; and correspondence from the Area Manager, State Water Projects, Ayr to the Manager, South Burdekin Water Board, 7 July 1997.

would result in an additional benefit to irrigators that was not intended at the time of the initial transaction.

Similarly, DNRM stated that it did not view revenues from the sale of land and water allocations as capital contributions but as payments for assets which have value and can be sold by the purchaser.

QCA Analysis

Land Revenue

As noted above, the Authority considers that, given the integrated nature of the Scheme, any surplus received from the auction of land represents a capital contribution to the Scheme.

This view is supported by:

- the treatment of revenues from land sales in the 1980 report to Parliament, in which revenues from land sales were offset against the estimated capital cost of the Scheme;
- the Queensland Government's submission to the Industry Commission Inquiry into Water Resources and Waste Water disposal in 1991 which noted that 'the sale of those farms sold at auction raised some funds towards the capital cost of the schemes where such a system operated. Current policy in the BRIA, and other areas under development, is to dispose of all farms by auction';[10] and
- a 1993 water pricing policy options paper which noted that, in general, 'Those users who have paid a capital charge for their water allocation, either directly or through the purchase of a land and water package, can claim to have paid a proportion of the capital cost of the assets already'.[11]

In respect of the SunWater and DNRM submissions, the Authority does not consider that differential payments are relevant nor that irrigators would receive a double benefit as a result of recognition of the payments as capital contributions, for reasons identified in an earlier section.

The Authority has estimated that the Queensland Government made a net return from the sale of land at auction of $21.0 million in October 2000 terms, after accounting for the costs of resumption, the costs of providing roads and preferential finance to growers. This is lower than the Davco Farming estimate of net returns as the Authority has not included revenues from interest paid to Government in respect of land and water allocation sales, has dealt with water allocation payments separately (see below), has been required to accept lower bound costs and thus has not introduced any adjustment to operating and management costs as suggested by Davco Farming, and has included the costs of providing roads in the costs of the Scheme.

Sugar Cane Assignments

The sugar cane assignment system operated in Queensland from 1915 to 1997, when it was replaced by the current Cane Production Area system. The assignment system regulated who grew cane, how much was grown and the location of production.

[10] Queensland Government submission to the Industry Commission Inquiry into Water Resources and Waste Water Disposal, September 1991, p. 55.
[11] Department of Primary Industries 1993, *What Price Water?* Discussion Paper, p. 36.

Under the assignment scheme, prices were paid to growers under two separate pools. A mill's entitlement to receive the Pool 1 price is called the 'mill peak' and is specified in tonnes of raw sugar. Raw sugar produced in excess of the mill peak receives the Pool 2 price and reflects the spot price for sugar. As from 1997, only one average price has applied. Sugar produced from cane grown on unassigned land was classified as penalty sugar and, if delivered, would generally receive a penalty price.

Cane assignment had the effect of assuring the grower that the local mill would buy the complete harvest from the land with assignment, and it also assured the local mill that it would have a secure supply of sugar cane.

During the period of the Scheme development and the sale of land at auction, a number of significant changes were made to the assignment system including:

- the introduction of 'roaming' which allowed a grower to use up to 15% of their granted assignment on any land within the mill area. This in effect removed part of the restriction of tying assignment to a specific parcel of land; and

- the introduction of the *Sugar Industry Act 1991*, which made it possible to transfer 100% of assignment within a mill area.

To the extent that there was a constraint on the availability of assignment, this would be reflected in the price paid for land.

The key restriction in the availability of cane assignments was the capacity constraint of the local mills to process the sugar cane. As milling capacity increases, a corresponding increase in cane assignment also occurs. BRIA is served by the Invicta, Pioneer and Inkerman Mill areas, with the majority of the farms supplying the Invicta Mill.

Concurrently with the development and sale of land in the BRIA, there was a significant and continuous increase in the availability of cane assignment due to:

- a substantial effective increase in the milling capacity in the region as mills moved from crushing five to seven days a week. The Invicta Mill shifted to continuous crushing in 1988, while the Pioneer and Inkerman Mills moved to continuous crushing in the 1990s; and

- actual augmentation of the milling infrastructure. During the period of the Scheme's development, approximately $200 million has been invested in a significant expansion of the Invicta Mill, with the result that the mill has moved from being one of the smallest in the State to being one of the largest.

In the Invicta Mill area, the mill processing the bulk of BRIA sugar, production increased 2.9 times and cane assignments increased 3.1 times over the same period.

The data indicates that surplus mill capacity and cane assignments are a feature of the Scheme, although the Authority understands that some short term shortages did exist for some period in its development.

In 1991, Davco Farming, in a submission to the Industry Commission, estimated that cane assignments in the Burdekin were worth about $1000 per hectare (IC 1992, p. 49). Applying this value across all of the land sold to that time, and assuming that all of this land was granted assignment, this factor accounts for $6.3 million of the total auction returns to that date of $16.2 million. However, the basis for this claim by Davco Farming was never examined by the

Industry Commission. By 1992, assignment was estimated at between $100 and $400 per hectare due to increased availability in assignment and continuing low sugar prices.

Based on the evidence available, any value for the assignment is likely to be low and will be captured in the price bid for land in the Scheme. As such, separate consideration of the treatment of cane assignments is not required.

Water Allocations

A water allocation was described in the auction literature as 'the farm's entitlement to a volume of water and represents the share in the water available from Burdekin Falls Dam or groundwater supplies. It secures the farm's water supply so it can be irrigated.'

The following material has been identified which is supportive of the contention that revenues from the sale of water allocations were to be recognised as capital contributions:

- the treatment of revenues from land sales (which at that time included water entitlements) in the 1980 report to Parliament, in which revenues from land sales were offset against the estimated capital cost of the Scheme;

- a media release from the Minister for Primary Industries in April 1990 which, in announcing the introduction of water allocation charges, referred to these as a 'capital charge' which 'should represent a substantial contribution to the cost of providing supply from the storage and distribution system';[12]

- correspondence from the WRC in 1990 to an individual irrigator which referred to water allocation payments as 'contributions that would be required to the capital cost of water supply and other works provided … by the State';[13]

- the Queensland Government's submissions to the Industry Commission Inquiry into Water Resources and Waste Water disposal in 1992, which referred to the '$100 per ML capital contribution for riparian irrigators'[14] as a 'once-off capital contribution of $100/megalitre'. The $100 per ML charge was for the purchase of water allocations from the river;

- statements in a brochure published by the Department of Primary Industries in 1993 that the capital charge for water allocations 'allows part of the capital cost of the scheme to be repaid to the taxpayer';[15]

- a 1993 discussion paper which stated that allocation charges were 'capital charges' structured to reflect, amongst other things, 'the cost of developing on-farm systems and capital cost of supply';[16]

- correspondence from SWP in 1997 to the South Burdekin Water Board, relating to the potential purchase of water by the Board, which refers to the purchase of allocation as 'A

[12] Media Release from the Office of the Minister for Primary Industries, *Sale of Water Allocations*, 3 April 1990.
[13] Correspondence dated 10 January 1990, from the Regional Engineer, Northern Region, Water Resources Commission, to an irrigator.
[14] Queensland Government supplementary submission to the Industry Commission Inquiry into Water Resources and Waste Water Disposal, January 1992, pp. 5, 7.
[15] Department of Primary Industries (Water Resources) 1993, *Purchasing water allocation*, Brochure.
[16] Department of Primary Industries 1993, *Burdekin River Irrigation Area Future Water Management*, Discussion Paper for Public Consultation.

once all payment at the Capital Charge rate at the time of purchase. The rate for the water from the river at this present time is $100/ML.'[17]; and

- a Queensland Government letter to the National Competition Council (NCC) in 1999 which indicates that revenues from the sale of water allocations in another Scheme - the Bedford Weir Stage II project - were used to offset the capital costs of the project in order to prove economic viability.[18]

The Authority has responded to the issues of differentiated prices and double dipping in a previous section.

The Queensland Government received $26.3 million from the sale of water allocations with auctioned land. After taking into account the cost of providing preferential finance to growers, the net return to Government at auction was $17.4 million. An additional $13.3 million was received through sales of water allocations outside of the auction process.

After consideration of all the issues, the Authority considers that these amounts represent capital contributions to the Scheme.

3.6 Meters and Barratta Main Channel Upgrade

SunWater has advised the Authority that irrigators have contributed $2.1 million to the Scheme to fund the upgrade of the Barratta Main Channel and for metered outlets.

BRIAC has argued that these funds form a capital contribution to the Scheme.

The Authority accepts that these payments represent capital contributions to the Scheme.

3.7 Sugar Mill Levies

From 1982-83 to 1998-99, sugar mills were charged an annual levy towards the Scheme in recognition of the benefits received by the mills as a result of the increased supply of water to sugar cane irrigators. The levy was charged on the basis of the amount of sugar cane produced under the Pool 1 pricing arrangements.

Sugar mills in the Burdekin region paid the levy on a relatively small proportion of sugar cane under production, as most of the sugar in the Burdekin was grown under the Pool 2 pricing arrangements.

Sugar mill levies were abolished in 1998-99. The price of water in the Burdekin Scheme was increased in the following year to recover a portion of the lost revenues.

The sugar mills paid approximately $10.7 million in levies towards the Scheme over the period since 1982-83.

Stakeholder Comment

BRIAC argued that revenues received through sugar mill levies were a capital contribution to the Scheme.

[17] Correspondence from the Area Manager, State Water Projects, Ayr to the Manager, South Burdekin Water Board, 7 July 1997.
[18] Letter from the Queensland Government to the NCC, 14 September 1999 (referenced in BRIA sub. 1., p.100).

SunWater has submitted that, in paying the levies, sugar mills were not given any expectation that they would receive lower water prices. No price offset was incorporated into prices for mills that paid the levy.

Furthermore, SunWater submitted that there is no evidence of any commitment to set lower charges for landholders producing cane under the Pool 1 arrangement. SunWater stated that, if the levy had been intended as a capital contribution, a differential pricing regime would have been established between:

- landholders growing cane under the Pool 1 pricing arrangement;
- landholders growing cane under other pricing arrangements; and
- landholders growing crops other than cane.

QCA Analysis

As noted previously, the Authority does not consider that the absence of differentiated prices provides a basis for concluding that contributions were not to be regarded as an offset to future prices. However:

- the 1980 Parliamentary report did not envisage sugar mill levies as a capital contribution. Unlike revenues from land sales, the report did not offset sugar mill levy revenues against the capital costs of the Burdekin Scheme. The revenues from sugar mill levies were treated similarly to revenues accrued from water prices, which were set against operating and maintenance costs in order to determine the likely return on capital;
- the legislation under which the sugar mill levy was imposed does not indicate that the levy was to be offset against future prices. The *Sugar Mill Assessment Regulation 1977* stated that the levy was 'a payment towards the operation maintenance or administration costs with respect to such supply of water.' The *Water Resources Act 1989*, which became the relevant legislative authority in 1991, stated that the levy 'must be applied towards the cost of operation, maintenance or administration and as a contribution towards capital costs with respect to the supply of water to or the drainage of land'; and
- the nature of a particular sugar mill levy in the Haughton River region of the Burdekin was considered by the Federal Court of Australia, which concluded that the levy was properly accounted for under 'revenue rather than capital account'.[19] In that case, levies were used to fund the interest paid on borrowings for construction of a weir. The Court stated that that the levies 'form part of the ordinary or constant demands which must be answered out of the returns of the trade of a cane grower, just like rates, water levies and the like and are rather of the character of recurrent expenditure than expenditure made once and for all for the purpose of obtaining an advantage of an enduring nature.'

Having regard to the recurrent nature of the levy, the Authority concurs with the Federal Court's interpretation and considers that sugar mill levies did not represent capital contributions towards the Scheme.

3.8 Commonwealth Government Funding

From 1982-83 to 1992-93, the Commonwealth Government provided $197.4 million towards expenditure on the Burdekin Falls Dam and associated infrastructure, under the *National Water Resources (Financial Assistance) Act 1978*.

[19] Hill J in McLennan v Federal Commissioner of Taxation, 22 December 1989.

Commonwealth funding was provided by way of annual non-repayable grants that reimbursed the Queensland Government's expenditure on the Burdekin Falls Dam and associated infrastructure.

Stakeholder Comment

BRIAC submitted that the Commonwealth grant had been written off by the Commonwealth Government.

BRIAC submitted that the Commonwealth funding was a 'gift' from the Commonwealth Government and stated that the clear intention of the Commonwealth funding was to promote regional development and to provide assistance to the sugar industry. The BRIAC referred to the following statement made in the Commonwealth Parliament in 1987 as evidence:

> The 1987-88 Federal Budget [in which funding was provided to the Burdekin Falls Dam] demonstrates, I believe, the Government's commitment to non-metropolitan Australians and the development of their industries, such as the sugar industry.

The South Burdekin Water Board and the North Burdekin Water Board submitted that the Commonwealth Government contribution towards the Burdekin Falls Dam was a capital contribution, citing the 1992 Industry Commission report on Water Resources and Waste Water Disposal which had referred to the funding as being 'written off'.

Davco Farming submitted that:

> The Federal Government has never expected or desired a capital return on its investment and has been most vocal in its opposition to the State Government claiming and receiving capital payments for funds allocated under the Federal Governments policy to promote and maintain regional and rural development.

SunWater submitted that the Commonwealth grant was not a capital contribution to the Scheme, as it was not tied to any particular purpose apart from the funding of the Burdekin Falls Dam and associated infrastructure. SunWater also submitted that there was no evidence that Commonwealth funding was intended to affect ongoing water charges and, if the Commonwealth had intended to confer a benefit to particular groups, it would have chosen a different vehicle to that of reimbursement of State funding.

Furthermore, SunWater submitted that the Commonwealth grant should be viewed as part of the State's overall funding base. SunWater noted that, under the Australian system of public finance, there is a vertical fiscal imbalance between the Commonwealth and State and, in this context, the specific purpose of the grant was to fund the Burdekin Falls Dam without impacting on other State programs.

QCA Analysis

With respect to financing arrangements, if the State was able to finance the development of the Burdekin Scheme without Commonwealth assistance, the provision of Commonwealth assistance could represent risk sharing by the Queensland Government or an intention by the Commonwealth to provide lower prices for users.

Queensland Treasury advised that the Queensland Government could not fund the Burdekin Scheme without Commonwealth assistance. An extract of a letter discussing the Scheme development from the (then) Premier to the (then) Prime Minister states 'the costs of a scheme of the magnitude of the one proposed exceeds the capacity of funds available to the State within our normal water development programme, even if augmented by grants under the National

Water Resources Programme.' While this indicates that funding was a key concern, it does not provide any insight into the issue of whether any pricing benefits were intended.

The Authority sought advice from the Commonwealth Department of Agriculture, Fisheries and Forestry - Australia on the intention behind Commonwealth funds provided to the Burdekin Scheme under the *National Water Resources (Financial Assistance) Act 1978*. The Department has advised that the general intention of Commonwealth funding was to provide financial assistance for water resource projects and that, while the Commonwealth Government Water Policy of the time noted that 'water prices need to be set at a level to cover the full cost of water supply including adequate depreciation', pricing policies were a matter for the Queensland Government.

The following statements on this matter have been identified:

- the Prime Minister stated in the Commonwealth House of Representatives in 1983 that 'The Federal Government's decision to build the dam reflects our commitment to integrated forward-looking development of our natural resources. It will provide an enormous boost to north Queensland in terms of construction, irrigation, jobs, new contracts, new demand, and new confidence';[20] and

- the Member for Herbert (the Queensland electorate containing Townsville) stated in the Commonwealth House of Representatives in 1984 that the Commonwealth Government's 'decision to proceed with the construction of the Burdekin Dam is probably the most significant boost to the north Queensland economy since the establishment of the sugar and mining industries', is of 'national significance', and will provide 'an enormous boost to the construction industry, irrigation works and job opportunities in north Queensland'.[21]

In the light of the Queensland Government's inability to fund the entire Scheme, these statements do not assist in the interpretation of the nature of and intention behind Commonwealth support, insofar as it relates to water prices.

With respect to the reference in an Industry Commission report that the Commonwealth Government capital contribution was 'regarded as written off', the Authority notes that the reference related to a financial analysis of the Scheme conducted by the WRC and the Department of Primary Industries in 1990 which had excluded the cost of Commonwealth funds from the economic and financial analysis.[22] The Industry Commission was commenting on the inappropriateness of not including the Commonwealth contribution for the purposes of a benefit cost analysis.[23] However, this has no direct implications for water pricing. The Industry Commission did not sanction writing off the Commonwealth contribution or accept that it had been written off.

Where the purpose of the intergovernmental arrangements is not clear, it may be more appropriate to leave its nature to be determined by the receiving entity. However, despite the considerable assistance of the relevant Government agencies, the Authority has been unable to uncover any evidence, one way or the other, regarding the Queensland Government's view at that time. The Authority is, however, aware of a press report quoting the Deputy Premier of Queensland in 1987 to the effect that the Queensland Government viewed Commonwealth funding of the Dam as a capital contribution to be recognised in ongoing price benefits to

[20] Statement by the Prime Minister, House of Representatives, 6 September 1983.
[21] Statement by the Member for Herbert, House of Representatives, 6 September 1984.
[22] Queensland Department of Primary Industry, 1990.
[23] Industry Commission 1992, pp. 211-224.

users.[24] There is, however, no guarantee that the report was accurate or that it was an official Queensland Government view.

It is also noted that the 1980 report to Parliament stated that an approach had been made to the Commonwealth for funding assistance. However, the nature and extent of the Commonwealth contribution was unknown at this time and was thus not included in the report. The report stated an expected return on total capital of 2.05%. The Authority notes that the inclusion of Commonwealth funding as a capital contribution raises the expected rate of return indicated in the 1980 report to a more commercial level. This could imply that the Commonwealth grant was intended as a capital contribution, although this is not the only possible interpretation.

The lack of any formal consideration of the pricing implications of the Commonwealth grant is not surprising as the grant was made in an era when there was not the focus on commercial returns that is the case following the implementation of national competition policy. In this regard, it is noted that the pricing arrangements for BRIA irrigators did not change following the development of the Scheme, despite the substantial capital expenditure involved.

As will be discussed in the context of State funding, the focus was on funding the Scheme not pricing, with a variety of State and Commonwealth funding sources being used depending on their availability.

In this regard, the Authority finds it difficult to ascribe different purposes to the different forms of State and Commonwealth funding used to finance the Scheme. Furthermore, to treat Commonwealth grants differently to State funding may result in inappropriate resource allocation between competing rural water supply schemes depending on their funding mix.

Pricing was a separate issue determined more on the basis of capacity to pay rather than commercial pricing principles. This is the case for most, if not all, rural water schemes in Queensland.

Therefore, despite the comments attributed to the then Deputy Premier, on balance the Authority considers that Commonwealth grants were not capital contributions towards the Scheme. Nevertheless, for information purposes, the Authority has undertaken its subsequent analysis on both bases (that is, including and excluding the Commonwealth grant as a capital contribution).

3.9 State Funding

The Queensland Government's $389.6 million expenditure on the Scheme was provided from a mix of funding sources, including debenture loans and Consolidated Fund budget allocations. All funds were deposited in the Queensland WRC Construction Trust Fund (subsequently the Burdekin Water Supply Construction Fund), from which expenditures on the Scheme were made.

Stakeholder Comment

BRIAC submitted that funding provided from State Consolidated Revenue should effectively be considered a capital contribution. It submitted that it was arbitrary to seek to recover money from Consolidated Revenue on irrigation schemes, while declining to seek to do so in the case of the construction of schools or hospitals or from welfare recipients.

[24] Statement by the Deputy Premier of Queensland, *Townsville Daily Bulletin*, 31 May 1987.

BRIAC submitted that only the component of State funding provided through earmarked loans should comprise the regulatory asset base of the Scheme. As debt was cancelled upon corporatisation, this approach effectively reduces the asset base to zero.

SunWater did not distinguish between the sources of State Government funding and proposed that this funding be considered as part of the relevant asset base for pricing purposes.

QCA Analysis

It is important to consider the treatment of State funding towards the cost of the Scheme in the context of overall water resources funding at the relevant times. In this regard, sources of funding included State Loan Fund allocations, debenture borrowing allocations, including special debenture borrowing allocations approved by Loan Council for specific projects, Consolidated Revenue funding provided via the Special Project Fund and, of course, Commonwealth grants.

A review of State budget papers reveals that the mix of funding for water resource projects was determined by the relative availability of the various sources of funding rather than by any conscious decision about debt versus equity or about repayable versus non repayable. The mix varied annually and different projects were funded by different mixes annually. The focus was on funding a substantial capital program for employment and economic development purposes.

Accordingly, the Authority considers that all State funding should be treated the same, regardless of its source.

The Authority does not accept the submission that payments by the Queensland Government for schools and hospitals are akin to those provided to SunWater.

The Authority has not identified any evidence that State Government funding, through budget funding or otherwise, was intended to provide lower prices to users. In this regard, as discussed in the section on Commonwealth funding, water pricing was considered separately from funding.

The Authority notes that, at the time of corporatisation, the Queensland Government did not require SunWater to assume responsibility for prior debt. However, in return, the Queensland Government received a greater degree of equity in SunWater and placed corporate management requirements on SunWater which are outlined in the SCI. It also placed certain liabilities related to water infrastructure in Queensland on SunWater.

Taking account of all of the above, the Authority considers that Queensland Government funding does not represent a capital contribution to the Scheme.

3.10 Additional Issues Regarding Capital Contributions

Recognition through Historically Low Prices

Where a capital contribution is established, there is an issue of whether irrigators have already received offsetting price benefits through lower than efficient historical prices.

For example, if it could be established that prices for 2000-01 within the price path (for which the Authority has calculated the efficient capital asset base) lay below the efficient cost-based price, then irrigators may have been compensated to some extent through lower than efficient historical prices.

QCA Analysis

Determining whether irrigators have previously received offsetting price benefits, to the extent that no further compensation for the capital contributions is necessary, is difficult to establish as:

- the historical accounting data on Scheme revenues and costs is not available for BRIA specifically, or is not sufficiently detailed, to accurately determine the magnitude of any operating profits or losses. Reliance on historical accounting data is further complicated by the inconsistencies in data reporting standards since the Scheme's development; and

- even if it were found that such a benefit was received by irrigators, it is not clear that the Burdekin Scheme was optimally staged in respect of construction, pace and location of channel and land development, or whether an optimal development of the Scheme could have resulted in different net operating profits or losses.

Accordingly, it has not been possible to ascertain whether irrigators have previously received offsetting price benefits.

Identification of Beneficiaries

Where capital contributions have occurred, an assessment needs to be made as to whether it is feasible to establish individual capital contributions with sufficient precision to enable individual users' prices to be adjusted over time. In doing so, compliance and administration costs need to be considered.

Alternatively, where one particular group of users were the sole contributors, capital contributions may be offset against the relevant regulatory asset base for those particular users.

If individual pricing or pricing for particular groups is not found to be possible, then the sum of the capital contributions should be offset against the total value of the relevant assets. Any benefits will thus be distributed between all users.

An additional issue arises as to whether new users, who have purchased assets from original users, should benefit from historical capital contributions. For example, if an irrigator purchased land at auction, and subsequently sold their farm to a new purchaser, should the new purchaser benefit from the capital contribution made by the Commonwealth Government and/or the original irrigator?

Stakeholder Comment

SunWater submitted that:

- irrigators' payments 'were never linked to any particular Scheme asset and there is no basis for the irrigation farmers to claim any entitlement to any interest in any Scheme asset';

- references to 'once only capital contributions' in the materials referred to by irrigators were made only in respect of the initial grant of water allocations, as opposed to ongoing charges for the supply of water pursuant to the allocations; and

- licences that conferred water entitlements did not confer rights in perpetuity and, although the licensee could apply for renewal of the licence before it expired, the Chief Executive still retained an unfettered discretion as to whether to renew the licence.

QCA Analysis

The Authority has identified a range of capital payments made by a range of parties. Some payments are identifiable on an individual farm basis, such as net returns from auction of land and water allocations. Other payments can be attributed to particular assets, but cannot be individually attributed to any particular user or group of users, such as the Commonwealth's non-repayable grant towards the Burdekin Falls Dam. It is accepted that irrigators' payments were never linked to any particular water infrastructure asset.

Although information on certain individual contributions is available, the Authority considers that the administration and compliance costs of applying differential pricing arrangements on an individual farm basis over time would neither be practical nor cost effective. For example, auction farms represent 181 out of a total of 362 farms in the BRIA and individual farm recognition would require at least as many different pricing arrangements.

On this basis, the Authority has concluded that it is not appropriate to seek to adjust individual's prices for their share of recognised capital contributions. However, it is considered feasible to adjust channel and river irrigators' prices for this purpose. Capital contributions made with the intention of benefiting all users (including BRIA irrigators, the North and South Burdekin Water Boards and NQ Water) should be reflected in pricing benefits for all users.

Where capital contributions are made by customers and the land is then on-sold, the sale of land does not provide a basis for ceasing recognition of capital contributions unless that formed part of the original agreement. No evidence of this intent is available. However, where licences were cancelled or surrendered, it is open to SunWater to establish the basis on which they would be re-issued.

Should upfront charges be applied in the future, the nature and intent of the charge (including whether it forms a capital contribution or a net gain for SunWater) should be specified, as it will affect the expectations and therefore the investment decisions of irrigators. For example, where sales of water entitlements are not intended to constitute a capital contribution to scheme development costs, this would need to be clearly stated. In this event, the revenues from the sale of water entitlements would not be offset against water delivery charges.

Aging of Assets

An issue arises as to whether capital contributions made by a user (or group of users) should take into account the aging of assets over time and, furthermore, if an asset has been substantially replaced, whether the original contributor should continue to receive pricing benefits as a result of the original contribution.

QCA Analysis

Where a capital asset has been fully replaced, there is no case for the original contributor of the capital to continue to receive pricing benefits as the original capital stock is no longer providing any service potential, and its cost is not incorporated in the asset base for pricing purposes.

Where a capital asset has depreciated in value, it is considered that the capital contributions made in respect of assets in the Scheme should also be depreciated.

From October 2000, no significant replacements have been identified as being required although there is a continual process of asset refurbishment and renewal, the cost of which is incorporated into the lower bound cost. Irrigators are in effect paying for the replacement of the

asset in the form of the renewals charge. In such circumstances the capital contribution continues to warrant recognition.

3.11 Summary of Capital Contributions

A summary of the capital contributions made towards assets in the Burdekin Haughton Water Supply Scheme is provided in Table 3.1 below (more detail is provided in Table A.3 in Appendix A). The amount of the Commonwealth grant is also provided. These payments are allocated to user categories in the Scheme in Chapter 4.

Table 3.1: Summary of Capital Contributions

Contributions	***$ million***
Retention Farms (Headworks Contribution)	9.4
Auction Sales of Land	21.0
Water Sales	
Auction	17.4
Non-Auction	13.3
Meters and Barratta Main Channel Upgrade	2.1
Total	**63.2**

For illustrative purposes, the Authority has also considered the impact of including the Commonwealth grant as a capital contribution, although the Authority considers that, on balance, this was not the intention. In this regard, the value of the Commonwealth grant is $197.4 million.

4. UNACCOUNTED FOR CAPITAL

Summary

The Ministers' Direction requires the Authority to establish any capital not accounted for by capital contributions. For this purpose, the Authority was required to consider the use of the asset valuation established by Arthur Andersen unless the Authority considered another valuation was more appropriate.

After considering the alternative asset valuation methods, the Authority considers that depreciated optimised replacement cost (DORC) is the appropriate method for the valuation of assets for the purposes of determining the maximum prices that could be charged. At the same time the Authority notes that it may not be possible to set prices at that level.

In its determination of unaccounted for capital, the Authority first established the depreciated replacement cost of the Scheme as at October 2000. The Authority then optimised the asset base to take account of redundant assets, over-engineering and excess capacity as well as assets not previously included in the asset base but which would typically be found in an asset base for regulatory price setting purposes. The optimised asset base was then allocated across the respective user categories. The Authority then offset against the optimised asset base the capital contributions made in respect of the assets.

The Authority considers that, for BRIA irrigators, the capital not accounted for by capital contributions was $207.0 million as at October 2000.

4.1 Approach Adopted

To determine the capital incurred in respect of the Burdekin River Irrigation Area not accounted for by capital contributions, the Authority first estimated the value of the Burdekin Haughton Water Supply Scheme. The Authority then offset against this value the capital contributions made in respect of the Scheme, as assessed in chapter 3. Using appropriate allocators where necessary, the situation in respect of the BRIA was then determined.

4.2 Approaches to Asset Valuation

Asset Valuation Approaches

There are a variety of asset valuation methods which are used, for different reasons and in differing circumstances, by both the private and public sectors. However, these methods can be characterised under two main approaches, namely, cost-based and value-based approaches.

Cost-based approaches relate the value of an asset to the cost of purchasing the asset or the service potential embodied in the asset, either at original cost or current replacement cost.

Cost-based approaches include:

- *historical* or *actual cost*, which uses the actual dollar cost of acquiring the asset, including the relevant financing cost during construction and installation, as the value of the asset;

- a variant of historical cost, *inflation adjusted actual cost*, which attempts to adjust the asset value for inflation. This can be done by revaluing assets according to some broad indicator of the movements in prices such as the CPI;

- *reproduction cost*, which is the cost required to reproduce the existing plant in substantially its present form using the production technology and specifications of the

original asset. This approach is most relevant where the existing asset still represents significantly unchanged technology;

- the *replacement cost* of an asset, which is an estimate of the current cost of replacing the asset with one which can provide equivalent services and capacity to the asset being valued. It measures what it would cost today to provide an asset to deliver the same service potential, including any existing over-servicing or over-capacity; and

- *optimised replacement cost,* which is an estimate of the current cost of replacing the asset with one which can provide the required service potential in the most efficient way possible. Under this approach, asset values are adjusted if assets exhibit excess capacity, are over-engineered, are sub-optimally designed (having regard to technological advancements) or are poorly located.

Under cost-based approaches, depreciation is typically applied to reflect the service potential of the asset which has expired. In particular, *depreciated actual cost* (DAC) and *depreciated optimised replacement cost* (DORC) have been applied in regulatory decisions in Australia.

Value-based approaches determine the value of an asset by reference to its net cash-generating capacity. The value-based approaches include:

- *Net Present Value* (NPV), which values an asset as the present value of the predicted cash flows generated by the asset; and

- *Net Realisable Value* (NRV), or fair market value, which is the price that the asset would achieve if sold in an open market.

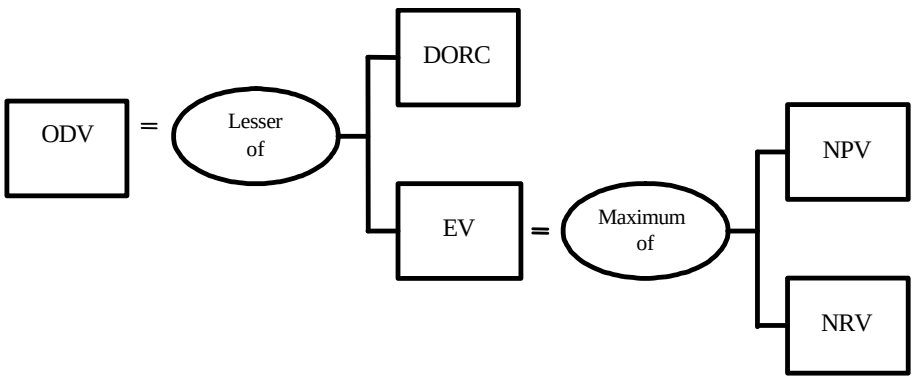
In a regulatory context, value-based approaches are often affected by the problem of circularity as the asset value is determined by (regulated) prices and revenues which, in turn, are based on the asset value.

A hybrid approach, referred to as the optimised deprival value (ODV) method, values an asset as the loss that might be expected if the entity was deprived of the asset.

ODV is the lesser of the DORC and the Economic Value (EV) of an asset, where the latter is the maximum of the asset's NPV or NRV.

If EV is less than DORC, then the asset would not be replaced. On the other hand, if EV is greater than DORC, then the asset would be replaced.

Figure 4.1: Optimised deprival value



ODV has been endorsed by COAG as the preferred approach for valuing network assets for public reporting processes (performance monitoring) and by the Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ) as a basis for water pricing, unless specific circumstances justify another method.

Other Jurisdictions

There appears to be a general move by Australian regulators to adopt DORC as the preferred method for valuing utility assets. However, in recent water sector regulatory decisions, the ODV approach has been preferred.

In New South Wales, all irrigation water assets put in place prior to 1 July 1997 were valued at zero by IPART for pricing purposes. IPART has stated that, as irrigators were originally attracted into agriculture by the provision of heavily subsidised infrastructure, they should not now be expected to pay a rate of return on assets that would not have been put into place if subjected to commercial scrutiny (2001, p. 23). However, water assets put in place after 1 July 1997 are incorporated in the asset base at their DORC value.

For urban water pricing, IPART (2000a) estimated the EV as the NPV of existing cash flows projected into the future, and included anticipated future capital expenditure at its DORC value. In the ACT, the Independent Pricing and Regulatory Commission (IPARC) adopted a similar approach to IPART for the water assets of the Australian Capital Territory Electricity and Water Corporation (ACTEW), but applied DORC for electricity assets.

In Tasmania, GPOC based the asset values on ODV, using DORC.

Table 4.1: Approaches to the valuation of water assets by other regulators

Regulator/Decision	Approach	Comment
IPART – Department of Land and Water Conservation (2001b)	Line in the Sand approach: pre-1997 assets valued at zero; post-1997 assets valued at DORC	IPART concluded pre-1997 assets were 'sunk', with no opportunity cost, and these assets were valued at zero. Post-1997 assets were incorporated in the asset base at DORC.
IPART – Hunter Water, Sydney Water, Gosford and Wyong Councils (2000a)	ODV (EV)	Asset values for first regulatory decision based on NPV of cash flows.
IPARC (ACTEW) (1999)	ODV	Opening value based on DORC for electricity assets, EV (NPV of cash flows) for water and sewerage assets.
GPOC (2001)	DORC	DORC for Hobart Water, methods used for other authorities based on independent valuations.
Ofwat (1999b)	Modern Equivalent Replacement Cost	Method appears analogous to DORC.

Stakeholder Comment

BRIAC has submitted that:

- there are significant issues related to the adoption of DORC valuations but concluded that the correct basis of computing capital costs should be based on the lower of the DAC or DORC as, if an incumbent supplier can service the market, all that person requires is a

return on DAC but if that results in a price above DORC, the supplier faces the prospect of new entrants attacking his incumbent position;

- the chosen asset valuation method used should exclude past capital invested in water infrastructure as this capital is 'sunk' and has no alternative use. However, BRIAC acknowledged that this approach would not provide the right incentives for future investment 'since future investment would be prejudiced if the expected ex ante returns were seen to be retrospectively expropriated ex post'; and

- DORC is based on subjective assumptions on how the asset would be replaced and is inconsistent with current tax and financial accounting principles for asset values.

SunWater considered that DORC was the appropriate basis for the valuation of the Burdekin Scheme's asset base as it reduces the scope for regulatory risk in respect of sunk assets, provides incentives for optimal future investment, supports operating capability maintenance, and avoids inefficient bypass.

Both SunWater and BRIAC specifically rejected the EV approach citing its circularity. As indicated previously, the circularity occurs as regulated prices determine the value of the assets, which in turn, contribute to setting the price.

SunWater further submitted that a ramification of prices set at below DORC based levels in the long term would be that the service provider would not replace assets when exhausted and would stop providing services to users at that time. In addition, the service provider would not invest further in assets. CSO payments would be required to ensure service delivery. SunWater stated that such a situation would only be likely to arise where substantial assets are dedicated to one or a small number of customers.

The Queensland Farmers' Federation (QFF) did not outline a preferred valuation method, but stated that, if a cost-based approach is selected as the preferred valuation approach, this should include a rigorous optimisation of the asset base.

QCA Analysis

Under the Ministers' Direction, the Authority was required to use the valuation of assets established by Arthur Andersen (based on DORC) in 2000 for the Queensland Government unless the Authority considered another valuation was more appropriate. The Authority was also required to use the demand forecasts used in the rural water price setting process.

In respect of DAC, the Authority considers that historic cost valuation can at times have advantages in terms of the availability of data as to the actual level of expenditure on assets. However, historic cost valuation approaches:

- do not have any relation to market values or replacement costs and therefore do not provide any relevant signals for future investment or consumption of services by users;

- may lead to price shocks when assets are replaced; and

- even where adjusted to reflect inflation, fail to capture the impacts of technological change or over-engineering.

In respect of DORC, the Authority notes that DORC is applied in most regulatory regimes in Australia and, while there is a degree of subjectivity associated with it, it provides a conceptually sound basis for regulatory price setting. It is consistent with the concept of an upper bound under COAG.

DORC represents the value of assets consistent with the maximum price achievable in a competitive market. For any new projects, and indeed for all assets, SunWater as a commercial service provider should seek to achieve a commercial rate of return on DORC. This will ensure that services are provided on a sustainable basis with consumers paying, and investors receiving, prices consistent with the current cost of the delivery of services.

Furthermore, the Authority's optimisation approach provides that only assets appropriate to anticipated demand are included in DORC. Arbitrary exclusion of assets on the grounds that they are sunk fails to provide management with the incentive to enhance shareholder value, and does not provide incentives for the better management of assets or for future investment. DORC ensures that over-capacity, over-engineered and over-designed assets are not included in the asset base and consequently are not paid for by customers. It also allows for technological change.

The Authority accepts the circularity problem associated with the use of the EV method of asset valuation in a regulated environment. At the same time, however, the Authority also accepts that it may not always be possible to achieve prices for services that reflect a full recovery of DORC. In this regard, the price that can be attained for a service once the assets have been put in place will be affected by prevailing market circumstances, including the capacity of users to pay. In those circumstances, the value of the assets will be equal to the NPV of the anticipated cash flows generated by the asset or the NRV of the asset - that is, the EV of the asset. However, the issue of how to estimate the anticipated cash flows remains.

Accordingly, the Authority considers that DORC is the appropriate methodology for the valuation of assets for the purposes of determining the maximum prices that could be charged while at the same time the Authority notes that it may not be possible to set prices at that level.

4.3 Previous and Current Asset Valuations

Arthur Andersen Valuation

As part of the rural water pricing process, Arthur Andersen valued SunWater's Burdekin Scheme assets. Using the asset register and other information provided by SunWater, the DORC value of the Scheme assets at October 2000 was $393.9 million.

The Authority engaged SMEC to assess Arthur Andersen's estimate of DORC. SMEC considered that the approach adopted by Arthur Andersen was relatively sound. However, because it was applied as part of a state-wide review of all SunWater assets, there was limited opportunity to incorporate local factors. Key concerns related to the heavy reliance placed on indexing past costs, the absence of any consideration of the condition of existing assets, the existence of significant excess capacity and some significant changes in technology.

In addition, SMEC noted that the DORC prepared by Arthur Andersen did not include some assets that would typically be included in an asset base for regulatory price setting, such as:

- working capital;
- road access, electricity infrastructure and telephone infrastructure required to build the Burdekin Falls Dam; and
- some other indirect costs associated with the construction of the infrastructure, such as infrastructure design and construction camp costs.

SKM Valuation

As a result of the concerns regarding the DORC prepared by Arthur Andersen, the Authority sought independent advice from Sinclair Knight Merz (SKM) on the appropriate DORC for the Burdekin Scheme using the demand forecasts established for the rural water price setting process. SKM was required to:

- undertake an audit of the existing asset register to confirm its appropriateness for calculating a DORC value;
- determine the optimised value of Scheme assets, as at October 2000, sufficient to meet the service requirements of users; and
- undertake an assessment of potential demand growth beyond the current five year price path/demand forecast.

The approach applied by SKM to validate SunWater's existing asset register included field assessment of Scheme assets, a review of the 1997 SWPs' Bill of Materials and a review of additional costs that should be incorporated in the DORC valuation.

In determining its valuations, Arthur Andersen drew from the earlier 1997 Scheme valuation undertaken by SWP, the former commercialised business unit of the Department of Natural Resources and predecessor of SunWater. This valuation was based on a detailed calculation of the quantities of Scheme assets, applied against unit rates and other factors. Spot auditing of these quantities by SKM suggested that they were consistent with the Scheme infrastructure, with some minor inconsistencies.

SKM also reviewed the unit rates provided for in the SunWater valuation. In SKM's opinion, some of these unit rates were inappropriate, and consequently these were adjusted downwards. All other unit rates were retained, though they were adjusted to account for the time difference between the October 2000 valuation date and the date at which the SunWater valuation was undertaken.

In addition, SKM analysed the indirect cost factors (such as administration and design) provided for in the SunWater/Arthur Andersen valuation against SKM's opinion of appropriate industry benchmarks. For distribution assets, a higher indirect cost factor was used. The net effect of these adjustments is that SKM's valuation is higher than that of Arthur Andersen by $8.6 million.

Finally, an adjustment was made to the capitalisation of interest during construction to reflect the effective WACC rate, as opposed to the assumed rate of interest during construction. This resulted in an upward adjustment of $13.5 million.

The net effect of these adjustments is to increase the depreciated value of Scheme assets by $22.1 million. Consistent with SKM's findings, these have been adopted by the Authority for the purpose of the Draft Report. Further assessment of this difference is proposed to be undertaken for the Final Report.

Taking into account these adjustments, SKM reported a depreciated replacement cost for the Burdekin Scheme of $416.0 million, compared with the Arthur Andersen valuation of $393.9 million. Table 4.2 refers.

Table 4.2: Arthur Andersen DORC adjusted for Unit Rates, Indirect Costs and Interest Capitalisation

		$ million	*$ million*
Arthur Andersen DORC			**393.9**
plus	adjustment for unit rates and indirect costs	8.6	
plus	adjustment for interest capitalisation	13.5	
Arthur Andersen DORC adjusted for unit rates, indirect costs and interest capitalisation			**416.0**

Working Capital

Working capital represents the capital required to provide for timing differences between cash inflows (revenues) and cash outflows (expenses) over the short term operating cycle of the entity. Working capital is typically measured as the excess of current assets over current liabilities.

Other Jurisdictions

Apart from the Authority, the only Australian regulators to report a position with respect to working capital are the Office of the Regulator General (ORG) and IPART. ORG's electricity determination (2000) reported that arguments for including a return on working capital pointed to a mismatch between the timing of revenues and costs over an operating cycle which left the entity with a shortfall in revenues. However, in the absence of an appropriate approach, ORG chose not to provide for working capital.

In contrast, IPART (1999e) considered that any business must maintain an investment in working capital to allow it to manage the lag between payments to suppliers and the receipts from customers. Similarly, many businesses also maintain an investment in inventory. IPART noted that to simply apply working capital as current assets less current liabilities would lead to a number of one-off distortions due to the effects of prepaid expenses and accruals. Instead, IPART adopted a simplifying formula to identify the level of working capital which reflected the billing cycle for receipts and payments and allowed for inventories. This formula was based on the assumption that payments from customers were outstanding for 45 days from the day of service delivery and that suppliers were paid 30 days after service delivery.

Stakeholder Comment

SunWater has proposed that provision for working capital be included in the asset base.

QCA Analysis

The Authority accepts that, consistent with business practice, working capital should be included in the asset base. The Authority's determination for electricity distributors (QCA 2001) and recommendations by the Authority for Gladstone Area Water Board (GAWB)(QCA 2002) included provisions for working capital within the regulatory asset base.

While there is variation in the level of working capital across the industry, SKM's advice to the Authority was that there was an "industry average" for working capital of 5.08% of sales revenue. This is comparable with recent regulatory decisions by the Authority for the electricity industry of around 5.4% and consistent with the level utilised by the Authority in the GAWB assessment.

For the purpose of this assessment, applying the 5.08% ratio, an amount of $0.6 million is suggested as a reasonable level of working capital.

Road from Mingella to Burdekin Falls Dam

The construction of the Burdekin Falls Dam in the 1980s required the construction of a new 130 km road from Mingella to Burdekin Falls Dam. After construction, the road was gifted to Dalrymple Shire, which took responsibility for ongoing maintenance.

Stakeholder Comment

SunWater submitted that the cost of the road from Mingella to Burdekin Falls Dam should be included in the asset base for regulatory pricing purposes as the expenditure was essential for the construction of the Dam. Further, SunWater submitted that the road was required to be constructed of bitumen standard to minimise the risk of delay in critical materials to the site from adverse weather conditions, and for safety reasons for people living at the site. SunWater costed this asset on an indexed replacement cost basis at $38 million.

QCA Analysis

SKM confirmed that the construction of a road from Mingella to Burdekin Falls Dam was essential for the optimal construction of the dam.

Further, SKM identified that it was optimal to construct a bitumen road for construction purposes, as an unsealed road would be unpassable and would require reconstruction after each wet season, resulting in delays and an overall increase in construction costs. In addition, a bitumen road would satisfy relevant safety requirements for those people required to service the Dam on an ongoing basis.

However, SKM noted that the road was built to an excessively high standard as it was of two lane width. SKM stated that a single lane bitumen seal as is common practice in the less populous areas of Queensland would be more appropriate.

The Authority has accepted the advice of SKM, and considers that the cost of a single lane bitumen road from Mingella to Burdekin Falls Dam should be included within the regulatory asset base. SKM valued the bitumen road from Mingella to Burdekin Falls Dam at a DORC value of $16.1 million.

General Access Roads

In developing farmland for sale within the Scheme, a general access road network servicing farms was constructed. These roads have since been gifted to the relevant Councils.

Stakeholder Comment

SunWater proposed that this expenditure should not be viewed as part of the DORC value for pricing purposes, but as an expense to be offset against proceeds from the sale of land in the Scheme, as these roads were part of the land development and subdivision of farms.

QCA Analysis

SKM advised the Authority that the road network servicing farmland was not required for the provision of water infrastructure services. An agreement between SunWater and the Burdekin Shire Council regarding some of these roads states that they '*are additional to irrigation and drainage facilities*'. For this reason, the Authority considers that general access roads to irrigation farms should not form part of the asset base for pricing purposes, but should be considered as part of the initial land development.

Flood Mitigation Assets

The construction of the Burdekin Falls Dam provides flood mitigation benefits to properties downstream of the Dam. Whilst the 1980 report to Parliament noted that these benefits would accrue to development currently existing at that time, the report also estimated the benefits to both existing and new properties. At full development, the annual cost saving in flood damage costs for both existing and new development was estimated at $2.7 million.

However, the provision of flood mitigation services does not affect the nature of the assets required for the Scheme or their cost, as these benefits are incidental to those provided by assets within the optimised asset base. That is, no additional infrastructure is required to provide these benefits.

Accordingly, the Authority considers there is no case for adjusting asset values to reflect flood mitigation benefits.

Recreational Assets

SunWater provides recreational assets at the Burdekin Falls Dam, including picnic facilities, boat ramps, amenities blocks and public safety infrastructure.

Where assets are provided purely for recreational purposes, the costs of these assets should be recovered from the users of those assets, provided this is practical and cost-effective. However, the costs of implementing 'user-pays' charging at the Burdekin Falls Dam site is likely to outweigh the revenues collected.

A significant portion of these assets is provided for purely recreational purposes. The cost of purely recreational assets provided by SunWater at the Burdekin Falls Dam was estimated by SKM to be $1.5 million. No revenues are received by SunWater for these facilities. However, as these recreational assets were not included in the Arthur Andersen valuation, no further adjustment is necessary.

However, part of the capital involved in the provision of recreational assets at the Burdekin Falls Dam is also required for the safe operation of the site and to manage site access. The estimated value of these site management assets is around $0.7 million. These costs have been incorporated into the asset base.

Land and Resumption Costs

A water business typically holds land for buildings, pipelines and channels, and pumping facilities as well as the area submerged and adjacent to storages.

SunWater owns land associated with the Burdekin Falls Dam, associated recreational areas, pump stations, and reservoirs. Channels are located along land resumed at the time of construction.

The appropriate method for valuing land and easements is currently the subject of much discussion Australia-wide. Options are to:

- use historic cost;
- use historic cost indexed for inflation; or
- use the market value of land.

Other Jurisdictions

The Australian Competition and Consumer Commission (ACCC) (2001) expressed a preference for an ODV approach for valuing easements, but concluded that, in balancing the need for an adequate rate of return on investment and the need to avoid price shocks, indexed historical cost in valuing Sydney airport land and easements was appropriate.

IPART (1999d) argued that easements apply in perpetuity, are rarely replaced and that the use of replacement costs would result in price shocks. IPART concluded that actual cost should be used rather than replacement cost.

Stakeholder Comment

SunWater proposed that the market value of land be included in the asset base. SunWater also submitted that additional costs needed to be incorporated in the asset base to reflect:

- inundated land for the Burdekin Falls Dam and weirs $1.68 million
- land resumption costs for the Burdekin Falls Dam $7.70 million
- land under channels, drains and roads and other land $14.1 million

In addition, SunWater indicated that account needed to be taken of some unspecified BRIA land resumption costs.

BRIAC argued that the value of land used for water infrastructure should be valued at zero, as this land has no alternative use.

QCA Analysis

Land is a necessary component for the storage and delivery of water and, to the extent that it is relevant to current and forecast demand, should be incorporated in the asset base. Having regard to the state of national debate on this issue, the Authority recommends that historical cost indexed for inflation be adopted for land and easements for the Burdekin Scheme.

SKM reviewed SunWater's submission regarding land and concluded that, based on estimated historic cost indexed for inflation:

- land and land resumption costs total $14.8 million. SKM were unable to reconcile this land value with the lower figure proposed by SunWater; and
- the land under channels totals $2.5 million. This amount broadly aligns with more recent submissions by SunWater. The remainder has been accounted for in the development costs of the Scheme, or related to land under drainage infrastructure.

The Authority has accepted the advice of SKM and included in the Scheme's DORC valuation $17.3 million relating to the value of land underlying Scheme assets and costs relating to its acquisition/resumption. These issues will be addressed further prior to the Final Report.

Other Indirect Costs

Construction of the Burdekin Falls Dam required electricity and telephone connection to the dam site, and involved other indirect costs.

SunWater submitted that the costs of providing electricity and telephone connection to the Dam, amounting to $2.4 million were necessary for construction purposes. SunWater estimated other costs such as the establishment of temporary site camps and permanent site facilities, site survey and investigations and detailed designs at $9.4 million.

QCA Analysis

SKM considered that the additional indirect costs that SunWater proposed should be included in the asset base were reasonable, and these were therefore incorporated in the asset value.

Table 4.3: Summary of adjustments to Arthur Andersen's DORC

		$ million	***$ million***
Arthur Andersen DORC valuation for total Scheme			**393.9**
plus	adjustment for unit rates and indirect costs	8.6	
plus	adjustment for interest capitalisation	13.5	
Arthur Andersen DORC adjusted for unit rates and interest capitalisation			416.0
plus	working capital	0.6	
plus	Mingela to BFD Road	16.1	
plus	site management assets	0.7	
plus	land and resumption costs	17.3	
plus	electrical and communications	2.4	
plus	site camps and survey costs	9.4	
Arthur Andersen DORC adjusted for unit rates, interest capitalisation and additional assets			**462.5**

The valuation of $462.5 million (before optimisation) is comprised of $271.4 million for storage assets and $191.1 million for distribution assets.

4.4 Optimisation

A key issue in establishing DORC is the way in which optimisation is addressed. Optimisation seeks to account for inappropriate scale, configuration and technology in present assets, relative to those assets that would be developed today to meet present and expected future demand.

Approaches to optimisation range from a "greenfields" approach, which assumes that assets would be replaced without any constraints imposed on the configuration or type of assets constructed, to alternative "brownfields" approaches that might be constrained by factors such as the pattern of development of other infrastructure.

One variation on "brownfields" optimisation is "incremental optimisation", which is based on the premise that the existing assets would be replaced using fundamentally the same configuration as is presently in place, with adjustments only to the type of assets (improvements in asset technology, for example) and scale to match the desired level of service provision. The focus of incremental optimisation is on redundant assets, over-engineering and excess capacity.

Where optimisation has been adopted by regulators (including the Authority), it has generally been in the form of incremental optimisation.

In assessing the "optimal" value of the Burdekin Scheme assets, SKM's approach was to:

- assess the likely level of demand; and
- determine what configuration/scale of assets was necessary to provide a sufficient level of services to meet this demand.

Demand Projections

The Ministers' Direction required the Authority to use the demand forecasts used in the rural water price setting process. These cover the five years from 2000-01 to 2004-05.

However, to appropriately assess the optimised value of the Burdekin Scheme assets, it was necessary also to consider potential growth or changes in demand into the future.

Stakeholder Comment

SunWater submitted that, as a result of additional commercial projects forecast to come on line from 2005-06, demand beyond 2005 could dramatically increase and could result in the use of all available water in the Dam.

BRIAC and the QFF stated that there was considerable excess capacity within the Dam and no foreseeable future demand that would result in this capacity being utilised.

QCA Analysis

As directed, the Authority has used the demand figures used in the price paths. These apply until 2004-05 and were considered to be reasonable by SKM, who also considered the losses that would occur with the delivery of these volumes. However, in order to give consideration to the appropriateness of current capacity, it was necessary to estimate demand for water beyond the current price paths.

SKM assessed the risks associated with the commercial projects proposed by SunWater, reviewed and updated industry sector information and, after considering the materiality of demand related to certain projects, developed a risk profile for each material project.

These forecasts indicate that it is unlikely that there will be any increase in demand for water from within the BRIA for the purposes of sugarcane production over and above the full utilisation of existing allocations held by irrigators.

Some increase in demand for water is expected to come from urban/industrial customers, but this would be satisfied by the existing allocation held by NQWater. As the NQWater allocation is already subject to a contractual right, SKM considered it appropriate to include this volume in the "likely" demand scenario, although it recognised that it is not presently being used.

SKM's analysis of likely demand represents the most recent and comprehensive assessment available to the Authority. It incorporates updated information on demand from existing and new customers. Accordingly, the likely demand scenario developed by SKM has been used by the Authority as the basis for its assessment (see Table 4.4, below).

These estimates are consistent with the price paths, and include losses as specified in SunWater's IROL. Demand by BRIA and non-BRIA users features in Table 4.4.

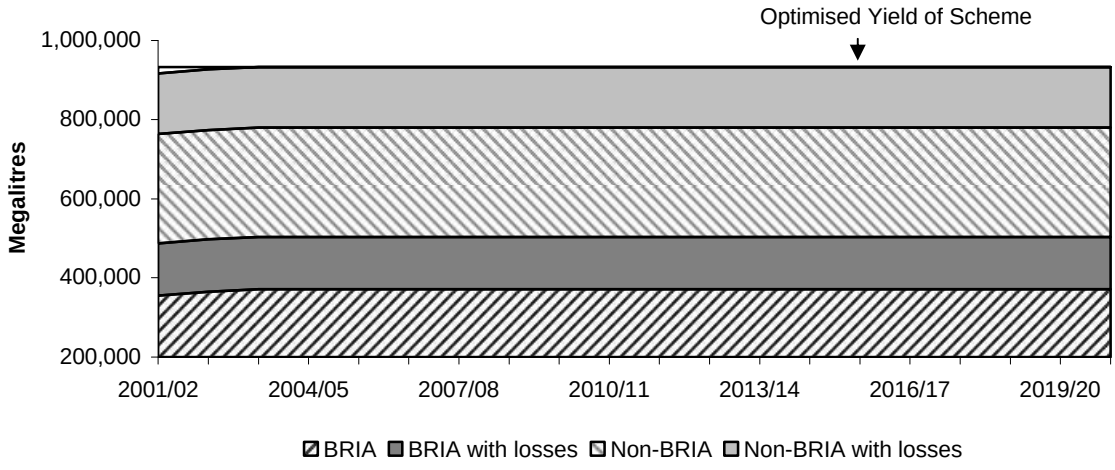
It is noted that, unlike the case of many urban facilities where high reliability water is required by industrial customers, the issue of a capacity cushion does not arise for irrigation provided at medium reliability with any shortages in capacity translating into reduced volumes supplied to irrigators.

Table 4.4: Likely Demand Scenario for BRIA (ML)

	2001-02	*2002-03*	*2003-04*	*2004-05*	*2009-10*	*2014-15*	*2020-21*
Channel*	281,400	291,400	297,400	297,400	297,400	297,400	297,400
River*	32,640	32,640	32,640	32,640	32,640	32,640	32,640
Other*	40,779	40,779	40,779	40,779	40,779	40,779	40,779
BRIA losses	132,971	132,971	132,971	132,971	132,971	132,971	132,971
Total BRIA with losses	487,790	497,790	503,790	503,790	503,790	503,790	503,790
Total Non-BRIA with losses	429,416	429,416	429,416	429,416	429,416	429,416	429,416
Total	917,206	927,206	933,206	933,206	933,206	933,206	933,206

* These figures do not include losses

Figure 4.2: Demand by Category of User



Optimisation of Storage Assets

The major storage assets of the Scheme are the Burdekin Falls Dam and the Clare Weir. In addition, minor storage services are provided by a series of weirs on the Burdekin River (the Gorge, Blue Valley and Clare Weirs) and Haughton River (the Giru and Val Bird Weirs). The value of these minor storage services is incorporated in distribution assets. The replacement cost of the Burdekin Falls Dam and the Clare Weir was estimated by Arthur Andersen at $212.8 million and by SKM (taking into account the adjustments referred to in section 4.2) at $228.0 million.

The IROL held by SunWater provides for total water allocations of some 1.12 million ML. This includes 184,241 ML of unused medium priority water being held by SunWater as an Interim Water Allocation. The total capacity of the Burdekin Falls Dam is 1.86 million ML.

SKM's report to the Authority suggested there was little likelihood that this surplus capacity would be drawn down by additional demand in the foreseeable future. Accordingly, SKM sought to value the "optimal" configuration of storage assets, taking into account all envisaged demand, including foreseeable demand into the future.

This analysis suggested that a dam with a Full Supply Level (FSL) of 152.54m (AHD)[25] would be sufficient to meet present and future demand. Such a storage would provide for an annual yield of 933,000 ML from 2004-05. The present dam has an FSL of 154m (AHD).[26] The reduction in DORC attributable to this smaller main embankment was estimated by SKM at $8.4 million.

SKM also noted that an oversized saddle dam was included in the Scheme for ready incorporation of a hydro-electricity power station, as was initially proposed for the Scheme. SKM has optimised out the excess capacity contained within this structure as there appears to be no prospect for such a facility within the timeframe considered by this analysis. The effect of the reduction in size of the adjacent saddle dam is to reduce the DORC by a further $15.0 million.

Finally, SKM noted that the construction of the Dam has resulted in the redundancy of several weirs in the Scheme, including the Gorge Weir. The value of these weirs has therefore been excluded from the optimised valuation. This adjustment was made in the previous Arthur Andersen valuation and consequently no further adjustment is required. A summary of all adjustments to storage assets appears in Table 4.5.

[25] Australian Height Datum, a measure of vertical height above a historically determined mean sea level which has an AHD of zero.

[26] The Authority notes the Department of Natural Resources and Mines is currently undertaking further hydrological analysis to confirm the annual supply yield for the Burdekin Falls Dam. For the purposes of the present analysis, the Authority has assumed that the storage can service the entire IROL annual allocation of 1,117 GL.

Table 4.5: Valuation of Storage Assets

		$ million	*$ million*
Arthur Andersen DORC			**212.8**
plus	adjustment for unit rates and interest capitalisation	15.2	
Arthur Andersen DORC adjusted for unit rates and interest capitalisation			**228.0**
plus	share of related costs		
	Mingella Road	16.1	
	land and resumption costs	14.8	
	detailed design and site surveys	9.4	
	electricity and communications	2.4	
	site management costs	0.7	
Arthur Andersen DORC adjusted for unit rates, interest capitalisation and additional costs			**271.4**
less	excess demand capacity	(8.4)	
	oversized saddle dam	(15.0)	
SKM DORC for storage assets			**248.0**

On the basis of SKM's analysis, the Authority accepts that the DORC value of the Burdekin Scheme storage assets is $248.0 million.

Distribution Assets

Distribution assets in the Burdekin Scheme comprise several main distribution channels as well as 400km of reticulation channels to individual farms. Other relevant assets include pump stations and metered outlets. The Arthur Andersen DORC estimate of the distribution assets is $181.1 million.

Stakeholder Comment

BRIAC stated that there was significant over-engineering of the channels, particularly the use of above ground channels. It also contended that, while part of the rationale for above-ground channels was to provide sufficient head for irrigation, irrigators were pumping anyway. Therefore, channels should be below-ground where feasible.

SunWater has submitted that, as in-ground channels were required to be lined to minimise seepage, it was cheaper to have channels constructed at above natural surface level than below-ground storages. SunWater stated that the raised channels provide water pressure to irrigators at a minimum head of 450 mm (a measure of pressure equivalent to the distribution channel being 450 mm above the irrigation farm). This reduces pumping costs for farmers. SunWater stated that the original decision to provide this level of pressure was partly due to consultation with local farmers and other representatives on a Farm Inspection Committee. However, SunWater has noted that most irrigators are now relying on pumping to some degree, due to subsequent changes in farm management practices.

SunWater also submitted that, because of the involvement of irrigators (through the Farm Inspection Committee) in the decision to use raised channels, it would be inappropriate to optimise the channels to below-ground channels due to:

- moral hazard implications - these may arise as customers of regulated infrastructure will learn that they will be able to invoke regulatory processes such as optimisation to avoid the financial consequences of their past recommendations on service standards;

- dynamic cost implications - there will be little incentive for SunWater to meet customers' requirements in the future where there is a regulatory risk that these costs may not be recovered due to future regulatory decisions; and

- regulatory risk - perceived higher risks for future investments in regulated infrastructure would be reflected in higher rates of return being required than otherwise.

Davco Farming submitted that the distribution channels within the Scheme were poorly designed and were too expensive to build and maintain.

QCA Analysis

With respect to the arguments raised by SunWater pertaining to the representation of irrigators on the Farm Inspection Committee, the Authority understands that the potential cost implications for water pricing were not considered as part of the decision making process. That is, irrigators assumed that any costs would not affect their price for water. Under these circumstances, concerns regarding moral hazard, dynamics cost implications and regulatory risk do not apply.

After adjustment by SKM for unit rate differences and changes in indirect cost factors, the Arthur Andersen estimate of distribution assets becomes $188.1 million. Other related assets that need to be incorporated include land resumption costs and working capital, which total $3.0 million (Table 4.6 refers).

Most irrigation schemes in other Australian jurisdictions and internationally use above-ground channels for main distribution channels. In-ground channels are generally used for reticulation to particular farms. The SKM report acknowledges that, under certain topography and soil types, the cost of lining below-ground channels is similar to the cost of construction of above-ground channels.

However, after analysing topography and soil types in the Burdekin Scheme, SKM advised that a greater proportion of channels could have been more cost-effectively placed in-ground. This would reduce the relevant channel assets value by $1.5 million.

SKM also considered irrigators' concerns regarding over-engineering of the dry-well pump at the Haughton Main Pump Station. Irrigators claim that these relatively expensive assets should not be included in an optimised asset base as the concrete submersible pumps could meet irrigators' demand. SKM noted that the submersible pumps may have to be shut down during flood events above 6,000 m^3/second to avoid damage from movement of river bed sediments.

SKM investigated the likelihood of such flood events and whether there was a possibility that areas within the BRIA would still require water from the Scheme. SKM concluded that there was a need for some form of pumping system that would be operable during a flood event, but that cheaper contemporary alternatives were available. SKM estimated that asset values should be reduced by $4.8 million to account for this purpose.

SKM's analysis also concluded that upstream control of system flows would have allowed for further cost efficiencies in regulating water flows through the use of 'overshot' regulators as opposed to the existing water regulators used in the Scheme. Adoption of this technology would reduce the DORC by a further $2.2 million.

Finally, SKM considered that there was significant spare capacity in the Elliot Main Channel, with only around three percent of the channel's capacity being used. SKM concluded that supply via a smaller channel along the existing alignment would be more efficient, with a consequent reduction in the asset value of $10.3 million.

As the distribution system was developed and put to productive use shortly thereafter, no interest capitalisation was incorporated by either Arthur Andersen or SKM in their asset valuations.

Allowing for these adjustments the Authority has determined the DORC value of the Burdekin Scheme distribution assets to be $172.3 million (Table 4.6 Refers).

Table 4.6: Valuation of Distribution Assets

		$ million	***$ million***
Arthur Andersen DORC			**181.1**
plus	adjustment for unit rates	6.9	
Arthur Andersen DORC adjusted for unit rates			**188.0**
plus	share of related costs		
	land and resumption costs	2.5	
	working capital	0.6	
Arthur Andersen DORC adjusted for unit rates and additional costs			**191.1**
less	greater proportion of channels below-ground	(1.5)	
	over-engineering of dry-well pump	(4.8)	
	efficiencies in regulating water flows	(2.2)	
	Elliot Main Channel spare capacity	(10.3)	
SKM DORC for distribution assets			**172.3**

On-farm water storages

An alternative water storage and distribution option is for individual farms to capture and store overland (non-river) water flows, in off-stream storages.

Stakeholder Comment

Davco Farming estimated the costs of water captured and stored in on-farm water storages is approximately $100 per ML, depending on the specific site.

QCA Analysis

The Authority understands that the development of on-farm water storages, as suggested by Davco Farming, would require each individual farmer to gain the appropriate approvals to establish on-farm storage, to incur costs in developing site specific designs, and, in any event, may not be technically feasible for all current irrigators. There are also statutory limitations on the depth of off-stream storages, meaning that large volume storages consume large areas of land. The Authority also understands that, pursuant to the present development of a draft WRP for the Burdekin Basin under the *Water Act 2000*, there is currently a moratorium on commencing the construction of works which are intended to take or interfere with overland flows.

Furthermore, the Authority notes that, if on-farm storages were cheaper and more effective than obtaining water from the Scheme, on-farm storages would form the prevailing source of irrigation water in the BRIA. Such developments did not occur prior to the moratorium being imposed.

Summary of Optimisation

A summary of the optimisation process, compared against the Arthur Anderson depreciated replacement cost, is shown below in Table 4.7.

Table 4.7: Summary of Optimisation

	$ million	***$ million***
Arthur Andersen DORC valuation for total scheme		**393.9**
SKM final DORC valuation for total scheme - comprising:		**420.3**
SKM DORC for storage assets	248.0	
SKM DORC for distribution assets	172.3	

4.5 DORC Value attributable to BRIA

The Authority's valuation of DORC as at October 2000 is summarised in Table 4.7. In the first year of the price path, the DORC valuation is estimated at $420.3 million. However, some of these assets are used to provide water to other users.

The DORC value of assets relevant to this price investigation should include only those assets that are used exclusively by BRIA irrigators, plus a share of "common" assets that also provide services to non-BRIA irrigators and other users across the Scheme.

The allocation methodology adopted by the Authority retains the existing Scheme "segments" which underpin the present gazetted prices. The Scheme is segmented into:

- *channel assets*, including water supply assets associated with taking water from the Burdekin River and distributing it via the channel system to customers on both the left and right banks of the river. It includes the pump stations on the river and a component of the Clare Weir;

- *river assets*, including water supply assets other than the channel assets associated with taking water direct from the Burdekin River. This segment includes riparian pumpers and the North and South Water Boards; and

- *other assets*, including assets associated with supply to the Haughton River for riparian pumpers, and supply to the Giru and Reedbeds systems to support groundwater use. This includes the remaining share of the Clare Weir not allocated to channel assets.

Common assets include the Burdekin Falls Dam, the Clare Weir, and the Haughton Main Channel. These assets were allocated across the users of these assets according to the following methodology:

- the DORC for the Burdekin Falls Dam and Clare Weir was allocated between Channel, River and Other users based on proportional water allocations specified in the IROL (see Table A.4 in Appendix A);

- the DORC for the Haughton Main Channel was allocated between Channel and Other users based on proportional water allocations specified in the IROL. Other users in the Scheme use water from a watercourse supplemented from the Haughton Main Channel; and

- high security water allocations were "grossed up" by a factor of 1.8 to account for the higher level of supply security attributable to this allocation. This factor was determined using the available hydrological modelling of the Scheme by the Water Reform Unit (WRU) (2000).

The value of assets in the Channel, River and Other segments, respectively, were then allocated to either "BRIA" or "non-BRIA" users based on proportional water allocations specified in the IROL. The outcomes of this allocation methodology are outlined in Table 4.8 below.

Table 4.8: Allocations of Assets to BRIA

Users	*DORC ($m)*	*% Attributable to BRIA*	*DORC for BRIA Assets ($m)*
Channel	328.4	68.8	226.1
River	73.3	17.5	12.8
Other	18.6	96.0	17.8
Total	420.3	61.1	256.7

After allocation of common costs across all users, the Authority concludes that the appropriate DORC for the BRIA assets is $256.7 million.

4.6 Incorporation of Capital Contributions in DORC

The portion of capital on which a rate of return could be charged, if deemed appropriate, is the capital not accounted for by any capital contributions.

However, before this can be calculated, the treatment of capital contributions in relation to optimised and depreciated assets needs to be considered.

Treatment of Capital Contributions made in Respect of Optimised Assets

An issue arises as to how capital contributions should be optimised when the asset towards which the contribution was made is optimised.

QCA Analysis

This issue is essentially about who bears the risk of optimisation. If a capital contribution is not optimised when an asset is optimised, the asset owner bears the full risk of optimisation. On the other hand, if the capital contribution is optimised, the users of the asset share the risk of optimisation with the owner.

In principle, there is no reason why different capital contributions may not be treated differently depending on the nature and cause of the asset optimisation. The key areas of optimisation have been outlined above and involved redundant assets, over-engineering and excess capacity. As the asset owner was best placed to manage these risks, it is considered that the asset owner should bear the full risk of the optimisation.

Allocation of Capital Contributions

The capital contributions outlined in chapter 3 were depreciated on the same basis as were the assets to which the contributions related. They were then allocated to the various users on the same basis as were the assets to which the capital contributions related. This allocation method was outlined in Section 4.4 above. Details of the resulting allocations are set out in Tables A.5 and A.6 in Appendix A. As those tables indicate, the capital contributions attributable to the BRIA amounted to $49.7 million

Capital Not Accounted for by Capital Contributions

On the basis of the asset valuation outlined in section 4.5 and taking account of the capital contributions above, the capital attributable to the BRIA not accounted for by capital contributions attributable to the BRIA was $207.0 million as at October 2000, as shown in Table 4.9.

Table 4.9: Capital Not Accounted for by Capital Contributions

BRIA Users	***DORC for BRIA Assets ($m)***	***Capital Contributions to BRIA Assets ($m)***	***Remaining Capital ($m)***
Channel	226.1	44.2	181.9
River	12.8	2.2	10.6
Other	17.8	3.3	14.5
Total	256.7	49.7	207.0

For illustrative purposes only, the Authority has also estimated the capital that would not have been accounted for by capital contributions had the Commonwealth grant been determined to be a capital contribution. The outcome is illustrated in Table 4.10. This analysis indicates that, for the BRIA channel assets, there is still a significant level of capital not accounted for by capital contributions.

Table 4.10: Capital Not Accounted for by Capital Contributions assuming the Commonwealth Grant was a Capital Contribution

BRIA Users	*DORC for BRIA Assets ($m)*	*Capital Contributions to BRIA Assets ($m)*	*Remaining Capital ($m)*
Channel	226.1	125.5	100.6
River	12.8	12.4	0.4
Other	17.8	9.2	8.6
Total	256.7	147.1	109.6

The Authority considers that, for irrigators in the Burdekin Scheme, the capital not accounted for by capital contributions was $207.0 million as at October 2000.

4.7 Economic Value

Previous Estimates

In June 2000, prior to the corporatisation of SWP and the formation of SunWater, an estimate of the value of SWP was prepared for the Queensland Government. The purpose was to determine the value of the assets transferred from Government to the corporatised SWP. The value of SWP was determined to be the NPV of the free cashflows of SWP discounted at a rate of return appropriate for the riskiness of the cashflows.

Key parameters to the valuations were:

- forecasts of free cashflows for a period of 20 years and an assumption that cashflows continued in real terms in perpetuity thereafter; and
- a nominal post-tax WACC of 8.89%. A 100% equity capital structure was assumed with dividend imputation of 100%.

On this basis, an EV of $210 million for all of SunWater's water infrastructure assets was established. This value was consistent with appropriate accounting standards and was audited by the Queensland Audit Office as part of the process of preparing the first financial statements for SunWater. The valuation was also endorsed by the Queensland Government during the corporatisation process for SunWater.

Stakeholder Comment

BRIAC submitted that the value of the Scheme had been revealed through auction sales of land. Thus, BRIAC argued that the value of the Scheme had been determined by the market and irrigators should not be asked to pay any additional amounts for Scheme services.

QCA Analysis

Unless an asset has a higher NRV, the EV of an asset is essentially the NPV of expected revenues and costs. These expectations are a function of many factors including the business strategy of the service provider and related commercial pricing practices, the ability of its customers to pay, the expected productivity gains that the entity anticipates that it and its

customers can achieve over time, and the relative market power of the service provider and the customers. Accordingly, estimates of EV can vary significantly depending on the assumptions applied. In the market, they are determined by prevailing expectations.

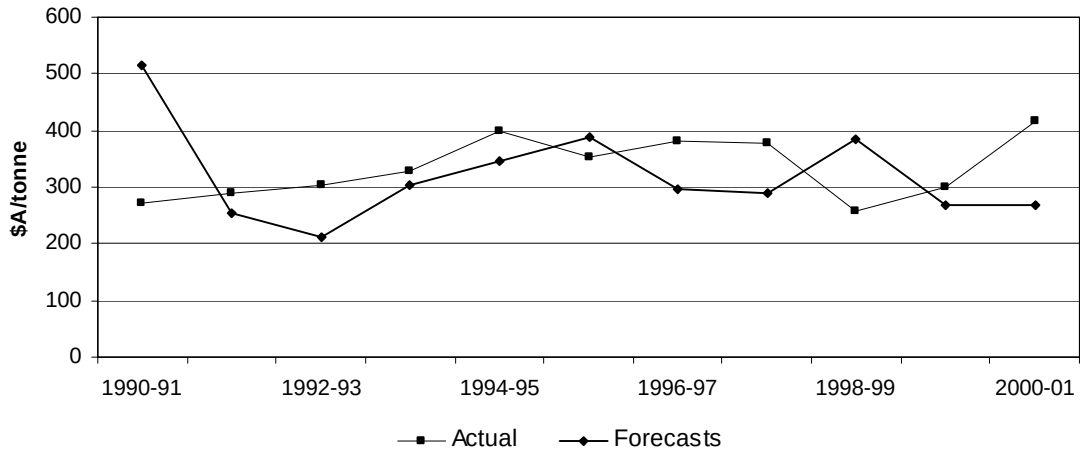
An issue then arises as to how to calculate the EV of a monopoly service provider with regulated prices.

Whilst the calculation of an EV for a business with existing regulated prices can provide useful information, if this value is used for regulatory asset valuation purposes it will entrench existing prices. Depending on the expected capacity of users to pay, this may not be appropriate, as either users may not be able to pay the current prices in perpetuity or the service provider may be able to seek to increase prices.

Expected Capacity to Pay

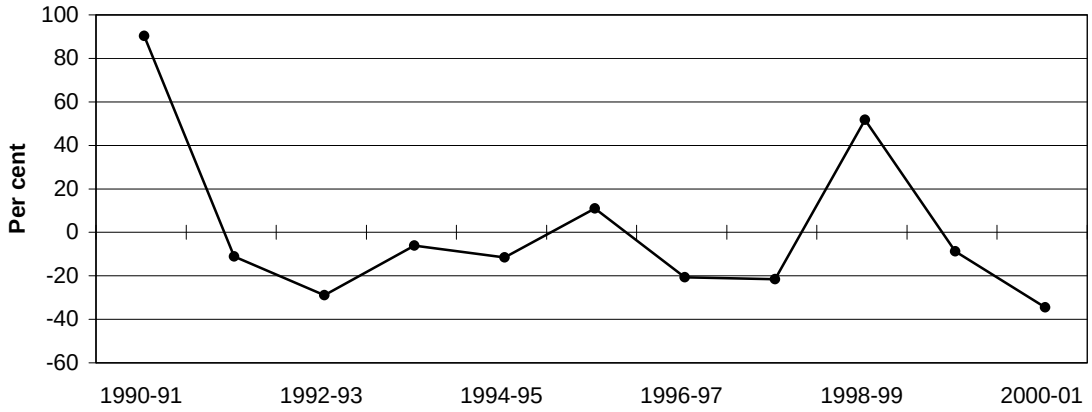
The expected capacity of users to pay can be estimated by measuring the NPV of users' expected revenues and costs (that is, the users' EV). For commodity markets, revenues are dependent on prices that are set on world markets. These prices vary considerably according to international demand and supply as do expectations of future prices. For example, ABARE's two-year projections of the sugar price varied from the actual price by up to 90% as shown in Figure 4.4. Forecast values appear in Figure 4.3.

Figure 4.3: Comparison of ABARE's Two-year Ahead Forecasts for the Raw Sugar Price and the Actual Price Achieved



Source: ABARE, Agriculture and Resources Quarterly, 1990 to 1993; Australian Commodities: Forecasts and Issues, 1994 to 2002.

Figure 4.4: Percentage Error of the Two-year Forecasts for the Raw Sugar Price



Source: ABARE, Agriculture and Resources Quarterly, 1990 to 1993; Australian Commodities: Forecasts and Issues, 1994 to 2002.

As a result of the variability in world prices, and the often unrealised price expectations, estimates of users' expected capacity to pay should be treated with caution.

Nevertheless, the Authority considers that estimation of the expected capacity of users to pay the gazetted prices is an important factor in assessing those prices.

As a result, the Authority has estimated the expected capacity of users to pay as at October 2000 by the calculation of the EV of the users. Where this value is less than the DORC value of assets, further consideration as to the sustainability of prices is required.

In doing so, it is recognised that it is not only the existing users that are relevant for this purpose. Prospective competing future users also need to be taken into account. Sugarcane producers purchase 97.4% of the water supplied by SunWater to channel and river irrigators in the Burdekin Scheme. Other producers who purchase the remaining 2.6% of irrigation water supply a range of products including mangoes, avocadoes, melons, pumpkins, capsicums and zucchini.

Given the dominant position of sugarcane producers, the Authority has focussed on the expected capacity of sugarcane producers to pay. It is accepted that this will underestimate the capacity of all users to pay, but probably only to a small extent.

For the analysis of users' capacity to pay at October 2000, the Authority considered:

- the international spot price for sugar prevailing at that time; and
- the latest ABARE projections of world sugar prices.

For comparative purposes, the Authority also considered the current gazetted price paths.

For the purposes of its assessment:

- channel and river irrigators were not differentiated as there was insufficient production data specific to growers in these areas;

- the costs of providing water service were based upon the lower bound estimates for the purposes of the gazetted prices and incorporate the targeted 20% productivity gain over the five year period of the price paths; and

- the cost of sugarcane production was estimated by Economic Insights Pty Ltd on the basis of

  – ABARE surveys conducted in the Burdekin region from 1993-94 to 1995-96. The survey results are widely used by industry analysts and were used by the recent Hildebrand Inquiry into the sugar industry;

  – a Burdekin Sugar Benchmarking Analysis prepared by Macarthur Agribusiness for the Sugar Research and Development Corporation. These data are for the 2000-01 financial year based on information supplied by farm accountants; and

  – information provided by Davco Farming, one of the larger sugarcane farmers in the BRIA, based on the current cost of its own operations and estimates of other farmers in the BRIA.

Feedback was sought from the BRIAC, CANEGROWERS, industry accountants and Davco Farming, all of which considered the estimates to be representative of the likely cash costs of the average efficient BRIA farmer. For the purpose of this analysis, these costs were assumed to remain constant in real terms.

The estimates also provided for:

- a salary of $40,000 for farm management services; and

- the maintenance of the service potential of the farm by including estimates of envisaged future capital replacement ($1.25 per tonne).

The data sources were all relatively consistent and indicate that the average efficient sugarcane production cost in the BRIA is approximately $26.25 per tonne of sugarcane produced. ABARE estimates of sugarcane production costs in other areas in Queensland range from $29 to $35 per tonne of cane, inclusive of a farmer's salary, as well as depreciation and interest (interest was not included in Economic Insights' estimates).

While these figures are based on the average efficient irrigator in the BRIA and there will be variations either side of the average, the ABARE farm survey data indicates the variance of costs in the Burdekin is relatively low (a standard error of 8%).

On the basis of the above information, estimates of the expected capacity of sugarcane producers to pay as at October 2000 are summarised in Table 4.11 below.

Table 4.11: Users' EV as at October 2000 ($ million)

Based upon International Spot Price	741
Based upon ABARE Projections 1[a]	630
Based on ABARE Projections 2[b]	307
Based upon Water Reform Unit price assumptions	215

[a] Assumes that the final price projection is held constant in real terms for perpetuity.
[b] Assumes that after the five year projections, the average of these projections is held constant in real terms for perpetuity.

Key assumptions underlying the EVs are:

- an international sugar spot price of $423/tonne in October 2000 (Queensland Sugar);
- ABARE projections of $267/tonne in 2000-01, $349/tonne in 2001-02, $373/tonne in 2002-03, $409/tonne in 2003-04, and $455/tonne in 2004-05 (ABARE 2000);
- WRU forecast sugar price assumptions of $225/tonne in 2000-01, $266/tonne in 2001-02, $307/tonne in 2002-03, $330/tonne in 2003-04 and $360/tonne in 2004-05;
- where the spot price is used, it is assumed that that price will continue in real terms in perpetuity. Where price projections over a number of years are used, it is assumed that the final price contained in the scenario will continue in real terms in perpetuity after the end of the period covered by the scenario, except in the case of ABARE 2 where the average of the projected prices ($371/tonne) is assumed to continue in real terms in perpetuity;
- these sugar prices were then converted into a price received by growers in the Burdekin on the basis of a historic relationship. This was confirmed with Canegrowers representatives in the Burdekin Scheme; and
- a 30 year cashflow analysis was conducted, with a perpetuity factor applied at the end of this period to simulate the ongoing nature of the business.

The discount rate used was the WACC determined for the Burdekin River Irrigation Area, as outlined in Chapter 5. The same rate of return for the Scheme and irrigators was used as the Authority was unable to determine a robust estimate of an appropriate WACC for irrigators. However, in the absence of more specific information, it is considered reasonable to use the same rate of return for the Burdekin River Irrigation Area and irrigators given their common interests. Furthermore, the EVs calculated using this discount rate are indicative only, and subject to the caveats noted above.

It should be stressed that not all of the expected capacity to pay as measured by the users' EV is available to meet water charges. Users also have capital invested on which a rate of return is desired. As such, the users' EV represents the capacity of users to pay a return on the capital of both SunWater and the users themselves. An obvious issue for consideration is the sharing of the users' EV between SunWater and the users.

In this regard, the Authority also calculated the expected capacity to pay of irrigators at October 2000 after allowing for a full return on past farm development costs. This results in an EV of $413 million using the ABARE 1 forecasts and $567 million using the international spot price at October 2000.

The EVs outlined in this section compare with the EV of the assets at October 2000 based solely on current gazetted prices of $37 million. This EV was calculated by assuming that the current price path will be continued in real terms in perpetuity, with the cash flows also discounted by the WACC determined for the BRIA in Chapter 5.

This analysis indicates that, when they were set in October 2000, gazetted prices lay well within the expected capacity of irrigators to pay based on estimates of future sugar prices.

It should also be noted that the Authority's assessment of irrigators' expected capacity to pay as at October 2000 has not taken into account potential productivity gains that could have been expected from irrigators and the potential for other higher value crops to pay a higher price for water. This would further raise the estimate of expected capacity to pay at the time.

An alternative means of estimating the EV of the Scheme is through land values which are considered to reflect the purchasers' estimate of the future benefits associated with production. However, the Authority found that the relationship between projected and prevailing prices of sugarcane and land values varied significantly over the period for which relevant information was available and no meaningful conclusions could be derived from such an approach.

The Authority considers that, when they were set in October 2000, gazetted prices lay well within the capacity of irrigators to pay based on the estimates of future prices of sugar.

5. WEIGHTED AVERAGE COST OF CAPITAL

Summary

The Ministerial Direction requires the Authority to determine the appropriate weighted average cost of capital that could be incorporated in the price of providing water infrastructure services to irrigators in the Burdekin River Irrigation Area within the Burdekin Haughton Water Supply Scheme. The weighted average cost of capital (WACC) is the most common means of estimating the rate of return that compensates investors for the risks they face through ownership of assets.

The Authority considers that an appropriate estimate of the WACC for the provision of water infrastructure services to irrigators in the Burdekin River Irrigation Area within the Burdekin Haughton Water Supply Scheme was 8.27%, as at October 2000, on a post-tax nominal approach.

Parameter	*QCA Recommendation*
Risk free rate (%)	*6.17*
Market risk premium (%)	*6.00*
Capital structure - proportion of debt (%)	*50*
Cost of debt margin (%)	*1.80*
Asset beta	*0.35*
Equity beta	*0.40*
Gamma	*0.50*
Tax rate (%)	*0.30*
Inflation rate (%)	*2.5*
Nominal post-tax WACC (%)	*8.27*

5.1 Introduction

The rate of return is a forward-looking concept and represents the return expected by investors in capital markets for investments of a given level of risk. Before an investment is made, it represents the return that an investor requires in order to invest. After an investment has been made, it represents the rate used to discount anticipated cash flows to determine the current value of the investment (that is, the EV of the investment).

In competitive capital markets, the rate of return is determined by the forces of supply and demand for capital. However, for a regulated entity, this is not possible and the rate of return is established by the regulator. The regulated rate of return should be set at a level that is equal to what would be expected in a competitive market for that level of risk. If the allowed rate of return is too high, prices charged to end consumers will be above the level that is truly reflective of costs. On the other hand, if the allowed rate of return is too low, investment by asset owners will be constrained and the quality of service offered to customers may decline.

5.2 Issues in Determining the Rate of Return Framework

The rate of return for a particular business activity can be derived by calculating the appropriate WACC. WACC recognises that capital is provided from two sources, namely lenders and equity investors (owners or shareholders). It 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 Capital Asset Pricing Model

The cost of attracting and retaining equity funds is not directly observable and must be estimated using data from securities markets. A number of alternative models have been developed to estimate the cost of equity funds, the most common of which is the CAPM.

The central concept of CAPM is that of undiversifiable risk (known as beta (β)). Essentially, the total risk of a business activity can be separated into two distinct classes of risk, being undiversifiable and diversifiable risk. Undiversifiable risk refers to the riskiness of an entity compared to the market as a whole. It can be calculated by a linear regression based on historic data.

The remaining risk is known as diversifiable risk. This risk can be removed by holding the asset or investment as part of a well diversified portfolio of investments. CAPM assumes that investors will not be compensated for the risk they can cost-effectively avoid through diversification. That is, it assumes that investors will only be compensated through the rate of return for risk that cannot be avoided through diversification. This is not to say that diversifiable risk is irrelevant for valuation purposes, because the rate of return (based on undiversifiable risk) is then applied to the business activity's expected cash flows. These expected cash flows should reflect the diversifiable risks.

Beta is a statistical assessment of the degree of undiversifiable risk associated with an asset or investment relative to the overall stock market. It assesses the systematic risk of the asset or investment, which is the risk that distinguishes it from the market as a whole. Since the beta of the market portfolio is one, a business activity can be identified as being more or less risky than the market as a whole. For example, an enterprise with a beta of one has undiversifiable risk that is perfectly correlated with the expected return for the market as a whole. The further a beta departs from one, the more its returns are expected to vary from those of the market as a whole. A higher beta is considered more risky, and a lower beta less risky, than the market as a whole.

Beta is used as an input to CAPM. CAPM also requires estimates of the risk free rate and the expected return on the market as a whole.

Other Jurisdictions

Most regulatory decisions in Australia over recent years have employed a CAPM/WACC approach to determine the rate of return and the cost of equity.

Stakeholder Comment

SunWater considers that the application of the WACC is appropriate and that the return on equity should be determined by applying CAPM.

BRIAC raised a number of arguments against the use of WACC/CAPM. It argued that:

- there are two alternative approaches to determine the rate of return in respect of the BRIA: a traditional public finance approach or WACC utilising CAPM. BRIAC endorsed a traditional public finance approach. According to BRIAC, this equates to the actual interest rate charged on loans for the Burdekin Haughton Water Supply Scheme. In this context, BRIAC then submitted that, as SunWater does not have any loans in respect of the Scheme, the actual return on capital should be zero;

- the cost of equity capital to the Government is zero as it is raised through taxation and not in the capital markets;

- the public sector discount rate should be much less than the private sector discount rate because there are external benefits which need to be taken into account;

- the WACC/CAPM approach represents a notional cost of capital, not the actual cost of capital;

- the use of a private 'equity premium' in CAPM is irrelevant to public sector projects as governments only issue debt instruments and do not raise equity capital; and

- using a benchmark based on private sector capital (CAPM) is not appropriate as SunWater are not subject to the same market disciplines including:

  - proper accounting treatments of all revenues, costs, asset values and depreciation;

  - the avoidance of simple inflation adjustments to asset bases, costs and revenues as this does not reflect likely competitive market outcomes;

  - debt costs would be actual, not notional; and

  - the business operator bears all the risk of asset ownership including optimisation and obsolescence.

QCA Analysis

While the views of BRIAC have been considered, the Authority considers that WACC should represent the opportunity cost of the capital invested in the assets. Important features of the opportunity cost of capital are that, at any given time:

- the cost of capital is a forward looking concept that reflects the expected return, relative to risk, that should be earned from investing in the asset; and

- the risk is derived from the expected characteristics of the cashflows produced by the asset relative to investments in alternative assets.

In this regard, the Authority notes that:

- the cost of capital relates to assets and is independent of the source of financing. Consequently, the financing of an asset from public rather than private sources will not alter the cost of capital that attaches to the asset. Rather, it is the riskiness of the asset which will determine the cost of capital;

- to ensure the efficient use of resources, investment decisions in the public sector should be based on the same cost of capital as used in the private sector for assets of the same risk characteristics;

- compliance with the principle of competitive neutrality between the public and private sector also requires the use of the same cost of capital for similar assets;

- where a lower cost of capital is applied to an investment because of government ownership, inappropriate investment and consumption decisions will result;

- government equity investments are not costless or riskless. The government does face an implicit cost or opportunity cost from funds invested in BRIA infrastructure and these investments do involve risks.

Consequently, public sector investments require an appropriate risk premium for the same reasons as do private sector investments.

The Authority is mindful of a preference amongst regulatory bodies in Australia for utilising CAPM to estimate the cost of equity, primarily because CAPM is considered more objective than alternative models, is conceptually simple in terms of defining and measuring the equity beta, and may be applied across all business activities.

At the same time, the Authority notes that there are practical difficulties in implementing CAPM, especially in respect of publicly owned monopoly assets for which there are often no directly comparable business activities listed on a stock exchange.

The Authority also notes that CAPM is a single period model, which assumes that all investors have a common time horizon of unspecified length. It therefore has difficulty capturing the multi-period nature of most investments. As a result, the application of CAPM involves a certain degree of imprecision. However, the Authority believes that CAPM remains the simplest and best understood approach to determining the cost of equity for regulatory purposes, and accordingly supports its use.

5.3 Issues in the Selection of a WACC Equation

WACC can be calculated on either a pre-tax or a post-tax basis and on either a nominal or a real basis. Alternative specifications are discussed in Appendix B. The appropriate WACC to use depends on what is included in the business activity's cash flow. For example, nominal cash flows should be discounted with nominal discount rates while post-tax cash flows should be discounted with post-tax discount rates. Each of the approaches should be equal in perpetuity but there can be significant differences when measured in discrete time.

The major elements driving WACC are the determination of the cost of equity, the cost of debt, and the appropriate capital structure. The selection of an appropriate tax rate and the treatment of dividend imputation are also important, either through direct inclusion in the WACC formula or in the cash flows.

Pre-tax or post-tax WACC

The formulation of WACC and the definition of the cash flows used to calculate the revenue requirement should be consistent. A business activity's cost of equity funds (as imputed using CAPM) is usually expressed on a post-tax (but before personal tax) basis.

The use of a pre-tax rate of return is advocated on the grounds that it avoids the need to explicitly estimate the tax obligations of the regulated business, and is therefore less intrusive, leaving the regulated business activity to manage its own tax affairs. However, a tax calculation still needs to be undertaken to convert the post-tax rate of return indicated by CAPM benchmarks to the corresponding pre-tax rate required for the regulatory framework. Hence, as

both approaches require tax liabilities to be properly assessed, there is little difference between a post-tax and pre-tax formulation of WACC in this respect.

Arguments in favour of a post-tax WACC include:

- post-tax measures of return are more relevant to investors;
- corporate taxes are a cost to the company like any other cost;
- adopting a post-tax WACC requires cash flow modelling to explicitly address the cash flow implications of taxation liabilities and a business activity's financial position. Accordingly, this approach is more transparent and rigorous; and
- there is difficulty in estimating a long term effective tax rate, as the tax system is not static.

Nominal or Real WACC

Nominal and real rates of return are equivalent provided consistency is maintained with inflation adjustments, depreciation allowances and debt. In other regulatory decisions, the Authority has adopted a nominal WACC. Arguments in favour of a nominal framework include:

- depreciation in a nominal framework is transparent and there is no potential for confusion over the extent of recovery. This is not the case for a real framework, as depreciation allowances include adjustments for inflation so that accumulated depreciation may exceed the actual cost of the asset unless depreciation amounts are deflated;
- similarly, interest expenses and other non-inflationary cash flows such as capped revenues or revenues from contracts containing no CPI adjustments require particular caution when converting from nominal to real. Errors in the conversion will result in discrepancies in the underlying cash flows;
- tax and balance sheet items such as debt and equity are all expressed in nominal terms. Consequently, the stock of debt must be deflated if modelling is to be undertaken in real terms;
- a nominal WACC is directly comparable with other financial benchmarks such as the nominal rate of return of other investments; and
- the nominal approach is the preferred approach of academics and financial market participants.[27]

At the same time, the Authority notes that the use of a real WACC has sometimes been promoted on the basis that:

- there is no need to deflate the asset base, as is required in applying a nominal WACC;
- it simplifies the estimation of rebates for contributed assets (using a nominal approach, inflation gain on assets must be identified and separated); and
- it simplifies cash flow models, particularly when different rates of inflation may be defined for capital and operating expenditure (opex) costs.

[27] For example see Davis (2000).

Other Jurisdictions

The ACCC (1999) noted:

> 'Given there is little to choose between post-tax and pre-tax formulations, the issue is fundamentally how best to assess tax liabilities – short or long term. There are a number of flaws associated with the use of a long term pre-tax WACC including:
>
> - front end loaded investor returns (where actual tax payments tend to be concentrated towards the end of the life of the assets. This arises because tax depreciation provisions (especially in the presence of accelerated depreciation) historically have allowed capital expenditures to be written off faster than the economic rate of depreciation. As a result businesses obtain returns well in excess of those intended under the regulatory framework in the early years but these are offset by lower than commercial returns later on);
> - uncertainty over long term tax provisions; and
> - difficulties in estimating long term effective tax rates and applying them within a formula based approach.'

The ACCC (2000a) discussed a number of problems associated with converting a nominal post-tax WACC to a real pre-tax WACC, including:

- conversion formulae have been shown to be significantly in error in ensuring the correct return on equity, although this problem can be overcome by modelling the expected cash flows and taxes over the life cycle of the asset portfolio; and

- the conversion process is unsuitable for assessing revenues over multiple periods where the business regime (principally taxes and inflation) is more likely to change, as it is extremely difficult to adjust the returns already allowed to take account of the new business regime, resulting in over- or under-recovery of costs.

The ACCC (2000a) noted that using a post-tax nominal framework avoids these problems as the return on equity and estimated taxes payable allowances are separated in the Annual Average Revenue Requirement formula. The tax payable can therefore be adjusted from period to period. The ACCC cited support for such an approach from Professors Officer, Hathaway and Davis.

The ACCC also discussed a drawback of the post-tax nominal framework, namely that customers of a network at different points in time will pay different charges for the same set of assets as a result of the assets' changing tax position rather than the underlying value of the service being provided. This is particularly the case where the firm takes advantage of tax concessions in the early years of the life of an asset, with tax liabilities increasing over time (the so-called S-bend debate). In effect, this approach passes on to users the tax benefit attached to the investment by the legislators. Moreover, where a firm has a portfolio of assets, this effect is somewhat muted. In addition, the forthcoming removal of accelerated depreciation will mean the S-bend phenomenon is progressively reduced.

Stakeholder Comment

SunWater supports the use of a post-tax nominal WACC.

QCA Analysis

The Authority supports the views of the ACCC and a range of independent experts (such as Professors Davis, Hathaway and Officer), which indicate that there is a general trend toward the

use of a post-tax nominal framework. In particular, the post-tax specification is preferred for its transparency and because tax liabilities are explicitly treated as cash flows in the years that they occur. For these reasons, all of the Authority's pricing decisions to date have been based on a post-tax nominal basis.

5.4 Quantifying the Risk Free Rate

The derivation of a return on equity under CAPM requires the estimation of a risk free rate. The risk free rate represents the rate of return on an asset with zero default risk.

There are two issues that need to be considered in the choice of an appropriate proxy for the risk free rate:

- the maturity period of bonds that should be used to identify the interest rate; and
- the method of measurement of the risk free rate (in particular, whether an 'on the day' rate should be applied or whether the rate should be averaged over some period of time).

Other Jurisdictions

Table 5.1 summarises the approaches adopted by different jurisdictions in determining the risk free rate.

Table 5.1: Risk free rates used in regulatory decisions

Entity/Author	*Industry*	*Benchmark bond*	*Estimation factor*
ACCC (2000b)	Gas transmission	10 year Commonwealth	40 day moving average
OffGAR (2000b)	Gas transmission	10 year Commonwealth	20 day average
IPART (2000b)	Gas distribution	10 year Commonwealth	20 day average
IPART (2000a)	Water Supply	10 year Commonwealth	20 day average
IPARC (1999)	Water and electricity	10 year Commonwealth	20 day average
GPOC (2001)	Bulk water	10 year Commonwealth	45 day average
ACCC (2000a)	Electricity transmission	10 year Commonwealth	40 day moving average
QCA (2001a)	Electricity distribution	10 year Commonwealth	20 day average
IPART (1999d)	Electricity distribution	10 year Commonwealth	20 day average
ORG (2000)	Electricity distribution	10 year inflation indexed	20 day average
OTTER (1999)	Electricity distribution	10 year Commonwealth	12 month rolling average

Most regulators have elected to apply the ten year Commonwealth bond based on some form of averaging. While the choice of averaging period is somewhat arbitrary, the rationale for adopting the 20-day average is to minimise the effect of daily distortions while capturing the most recent information and expectations on inflation.

Stakeholder Comment

SunWater supported the risk free rate being determined on the basis of the 10 year Commonwealth bond rate with that rate being determined on the basis of the 20 day average yield.

QCA Analysis

Choice of Maturity

In terms of the maturity period, the debate centres on whether the maturity of the risk free rate should be set equal to, or as close as possible to, the life of the investment, or to the regulatory review period.

According to Officer (1981), 'the appropriate rate is that on a risk free security, eg. a government bond or note, of the same duration as the term of the investment'. This approach is supported by the ORG (1998a, p.14):

> 'In other relevant jurisdictions, there is recognition that amortisation of relevant assets must be over their full economic life which implies that investors must have an expectation that they will be compensated for making long term investments before they commit to the investment. Therefore, even though regulators may review investment returns at regular intervals, it would be a mistake to believe investors' planning horizons only extend to the next review. Models of expected returns and any regulation of those returns must reflect and take account of the investors' planning horizons. The reapplication of the prevailing long term rate every five years is sufficient to achieve this, as the owners of the project make their investment decision based on the life of the project, using the appropriate discount rate determined with reference to the prevailing yield curve.'

The ORG also noted that some gas industry stakeholders had expressed concern that the use of short term rates to coincide with the regulatory period would cause companies to concentrate their re-funding around each price review determination. It was argued that the use of such a rate would also cause periodic spikes in corporate bond rates due to the concentration of refinancing around the time of each re-set of the regulatory WACC.

It is also important to ensure that there is consistency between the choice of the risk free rate and the assumed market risk premium (MRP). According to ORG (1998a), given that the available risk premium is expressed relative to the ten year bond rate, this rate is preferred as there is no additional benefit for calculation of the equity rate of return in using the five year bond rate.

In this context, ORG argued that selection of the five year bond rate as the risk free rate would require the application of a MRP which measures the expected return on equities as a margin over the five year bond yields:

> 'It has been suggested for example, that the choice of a shorter (or longer) rate will just lead to a higher (or lower) measured market risk premium, with no effect on the expected return for the well-diversified portfolio (and hence little effect on the required equity return). As the estimation of the market risk premium generally has used the current yield to maturity on Commonwealth Government securities of about ten years until maturity, this argument suggests that the risk-free rate should reflect a security of a similar term.'

As opposed to Officer, Davis (1998) suggests that, if the allowable WACC is to be revised periodically, then it is not necessary to use a long term rate for the risk free rate. Rather, Davis seeks to relate the prevailing interest rate to the length of the review period:

> 'Given the anticipated life of the assets and the likely time pattern of the resulting cash flows, it would seem very difficult to sustain an argument for use of a risk-free rate greater than 10 years. Use of a shorter maturity rate would not be inappropriate – particularly if there were to be regular regulatory pricing reviews.'

Other arguments used to support the use of a rate linked to the regulatory period include that:

- it is rare for initial debt funding for capital investments to extend beyond ten to fifteen years and, in any event, it is likely that interest swaps would be re-set on a five yearly basis. However, interest rate swaps are available for a range of maturities from one to ten years; and

- even where a long term cost of capital is appropriate to the valuation of long-lived assets, it does not follow that it is appropriate for pricing decisions in the short run when the asset values are adjusted annually for inflation (thus removing the need for an inflation risk premium) and the allowable cost of capital can be revised at each review (to adjust for long term changes in market perceptions).

However, as indicated earlier, adoption of a five year bond rate as a matter of principle would effectively require a counterbalancing adjustment to the MRP on the basis that it has traditionally been calculated against the ten year bond rate. Given the broad consistency of the margin between the five year and ten year bond rates over time, the most practical approach is to adopt the ten year bond rate and use the standard calculation of the MRP.

With respect to the issue of a premium to address the difference between the ten year bond rate and a 30 year bond rate, the Authority recommends that no adjustment should be made on the grounds that:

- the 30 year market is too thinly traded to return an appropriate measure of the premium; and

- consistent with the argument concerning the relationship between the risk free rate and the MRP, adoption of a 30 year rate would require a compensating adjustment to the calculated MRP, thereby substantively negating the impact of adopting a 30 year rate.

The Commonwealth ten year bond has been used as the benchmark for estimating the MRP as it is a liquid investment, provides the best reflection of the market risk free rate and can be identified using available market data. However, given that the arguments are finely balanced, and that the ten year bond is preferred for practical reasons, it is considered that there is scope for further research and analysis on this issue.

Method of Measurement

In terms of the measurement of the risk free rate, it is possible to use either an 'on the day' rate or an average. The 'on the day' rate is considered to be the theoretically correct rate to use, as it reflects all available information, including any historical information about previous rates. However, this rate may be subject to short term volatility, for example, due to central bank intervention or abnormal trading activity. To overcome this problem, some form of averaging may be used. For example:

- a short term average of the 'on the day' rate could be applied if the rate suffers a perturbation on the day of the decision; or

- an average rate reflecting trading over (say) the past 20 to 40 trading days could be used.

On the issue of averaging versus an 'on the day' rate, the Authority notes that other regulators considered the 'on the day' approach to have greater theoretical validity, but preferred an average on the grounds that it removes the potential for a short term fluctuation to influence the rate used.

The Authority has concluded that an averaging process should be used and has opted to average the selected interest rate over 20 trading days.

For the purpose of determining the WACC, the Authority recommends that a 20 trading day average of the ten year bond rate should be used, an approach consistent with the Authority's recent regulatory decisions. For the 20 trading day period ending 6 October 2000, the Commonwealth government bond rate averaged 6.17%.

5.5 Quantifying the Market Risk Premium

The CAPM formula also requires the estimation of the MRP, measured as the difference between the expected return on equity investments as a whole and the risk free rate. The MRP represents the reward that investors require to accept the uncertain outcomes associated with equity investment, relative to the return provided by the risk free rate.

Other Jurisdictions

In recent regulatory decisions for electricity, gas and water throughout Australia, the MRP has generally been set at 6%, with IPART preferring a range of 5% to 6%. Office of the Water Regulator's (Ofwat - UK water industry regulatory body) final decisions for UK water suppliers used a range of 3% to 4%.

Stakeholder Comment

SunWater proposed a MRP of 6.5%, which is in line with long-term historical averages, but higher than the 6% typically used by the Authority and other regulators in Australia. SunWater indicated that their argument for an increase in the MRP (relative to the Authority's previous decisions) is not based on any new evidence or recent data. Rather, they argued that it is due to a more accurate assessment of the existing data.

SunWater argued that the long-term historical MRP is between 6% and 8% and that a value at the lower end should not be chosen as this may produce a WACC that discourages new investment. Their principal reasons relate to claims that previous regulatory decisions:

- have not adequately reflected the range of estimates; and
- have not used an appropriate point within that range.

SunWater contended that a range of 6% to 8% is appropriate for a long term MRP based on the various studies that have been undertaken. They stated that the midpoint of this range, 7% is well above the 6% figure that has generally been used by regulators in Australia.

SunWater raised a number of reasons why a point estimate at the lower end of the range is inappropriate, including:

- the data on the MRP does not provide statistically significant results to support the hypothesis that the MRP has reduced over recent years;

- while there has been a period when the *ex post* MRP has departed significantly from the long-run average, it is likely there will be a period when the *ex ante* MRP is changing but in the opposite direction;

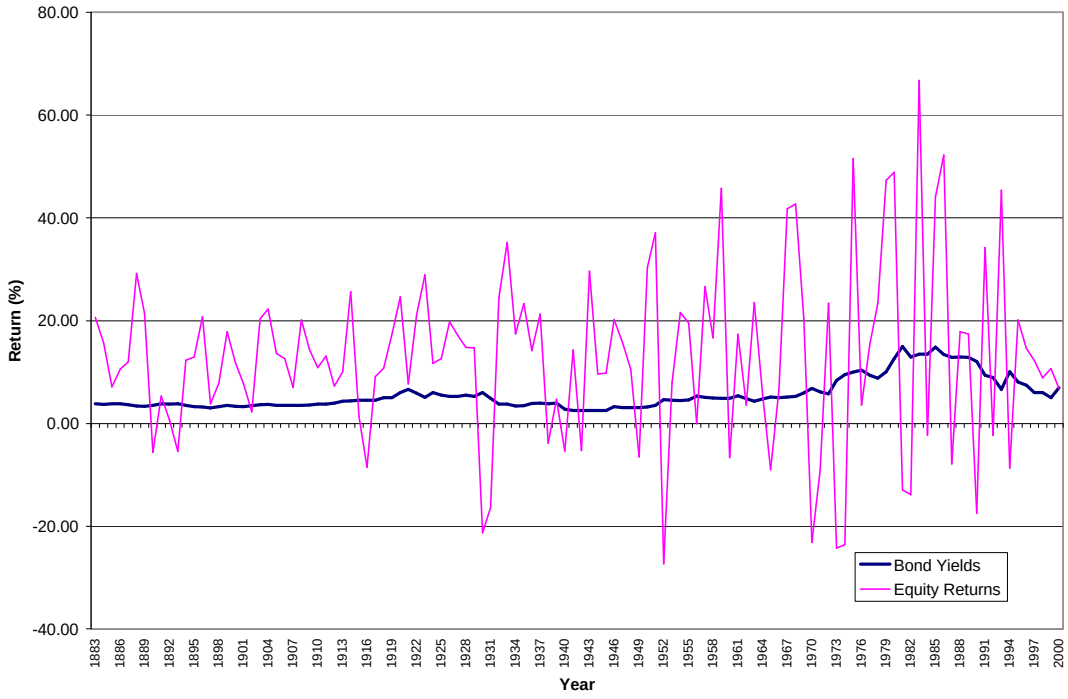
- reasons used by regulators in the past to justify any structural change in the market and the adoption of a point at the low end of the range are not justified based on available data; and

- due to the short period that the Australian market has been deregulated and integrated into the international market, there is insufficient data to determine an appropriate MRP based on data from an unregulated market, presumably one undistorted by government intervention. SunWater suggested that a benchmarking approach with a similar market may be more appropriate. SunWater suggested that this benchmarking approach would indicate that a figure at least at the upper end of the 6% to 8% range would be appropriate for Australia.

QCA Analysis

The MRP is based on the difference between the return on the market as a whole and the risk free rate, both of which vary over time. As shown in Figure 5.1, equity market returns are significantly more volatile than debt market returns. Both the equity and debt markets are influenced by short term business cycles and the fact that measures of the risk premium are influenced by the measurement period.

Figure 5.1: Bond and equity returns: 1882 to 1998



CAPM requires that a forward-looking MRP be based on a time frame corresponding to the period of the analysis. However, in practice, this data does not exist. Alternative methods are suggested in the literature to estimate the MRP, including surveys, consumption based modelling and the use of historical data.

Most regulators have preferred the use of a MRP proxied from historical data. Officer (1985) measured the MRP as the difference between the arithmetic nominal return on shares and the average annual yield on long dated government securities.

Problems with the use of historical data to estimate the MRP include:

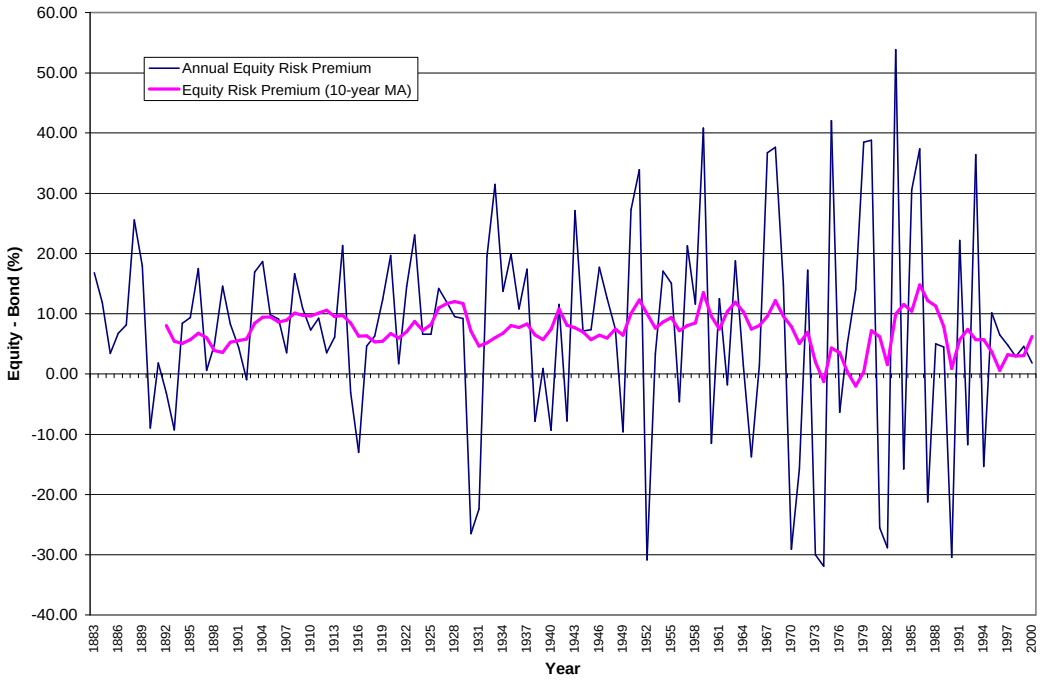
- the choice of proxies for the risk free rate and the return on the equity market. Typically, studies will use the All Ordinaries Accumulation index as their proxy for the equity market and the ten year Commonwealth bond rate as proxy for the risk free rate;

- structural breaks, which may cause the average ex post returns for the market and the risk free rate to differ materially from those initially expected. A structural break occurs when time series data switches from one regime to another due to an exogenous shock. For example, the deregulation of Australian interest rates in 1979 or the floating of the Australian dollar in December 1983; and

- whether the averages should be arithmetic or geometric. Arithmetic means are consistent with the CAPM framework. However, the use of geometric means has been justified on the grounds that it takes into account continuous compounding. Geometric averages will be lower than arithmetic averages.

The Authority calculated market risk premia for the period 1887 to 1998 using Officer's method. Figure 5.2 shows the annual and ten year moving average MRP. The ten year average equity risk premium has been relatively stable over the past century. This has occurred despite increased volatility in the annual MRP series and the change from regulated to deregulated financial markets over the past 25 years.

Figure 5.2: Market risk premium



Prior to the introduction of dividend imputation in July 1987, equity returns observed in the stock market represented rates of return after all corporate taxes had been paid (but before shareholder taxes were paid) and therefore could be used in determining the post-tax cost of equity funds for an entity. IPART (1998b, p.16) suggested that, following the introduction of

dividend imputation, the risk premium could have fallen to reflect the additional value of franking credits received on an investment.

The findings of Australian academic studies and regulatory decisions suggest that the MRP has ranged from 6% to 8%. There is also a general view that this historical range may be too high, though as yet the evidence is inconclusive. In correspondence with the Authority, Professor Officer indicated that he supports a range of 5% to 7% for the current MRP.

This change from earlier periods cannot be solely attributed to dividend imputation. This has also been a period of low interest rates, low inflation and stability in the Australian economy, combined with high levels of private share ownership, increased institutional ownership of shares arising from changes in superannuation, and reduced information risks due to improved communication and technology.

The Authority has made a series of regulatory determinations in which a MRP of 6% has been adopted. Justification for moving away from 6% cannot be proven in a statistical sense.

On balance, the Authority believes that, even after revisiting all historical data, there is insufficient evidence to change the level of the MRP from previous regulatory decisions of 6%.

Following consideration of submissions and recent regulatory trends, the Authority concluded that the most appropriate estimate for the MRP is 6%.

5.6 Determining the Capital Structure

Capital structure refers to the proportion of debt in the total capital employed by a business. Capital structure affects the level of financial risk and return to equity holders. The higher the level of debt, the higher the equity beta will be and the higher the corresponding cost of equity. In general, there is potential for companies with predictable cash flow businesses, particularly in a regulated natural monopoly environment, to operate with higher gearing ratios than those with a mix of other business activities.

Other Jurisdictions

The level of gearing assumed in other regulatory decisions is typically in a range from 50% to 60%. Both IPART's (2000a) review of NSW water businesses and ORG's (2000) review of electricity distribution entities used a debt to assets ratio of 60%. IPARC (1999) used a range of 40% to 60% in its price direction for ACTEW.

In Tasmania, GPOC (2001) used a debt to assets ratio of 50%. In all recent electricity and gas decisions, a gearing level of 60% has been adopted.

Ofwat in the United Kingdom has proposed a benchmark gearing (debt to debt plus equity) ratio of between 45% and 55% for both regulated water and water and sewerage companies. This represents its view of a prudent and desirable capital structure for such companies. Where companies are outside this range, Ofwat imputes a shadow capital structure for the purposes of determining a regulated price.

Stakeholder Comment

SunWater proposed a gearing level of zero, which is essentially the actual capital structure of the Scheme. Their rationale for this is that current prices would preclude SunWater from being able to service any debt.

QCA Analysis

The capital structure adopted for regulatory purposes may be that actually existing for the regulated business activity, or some industry benchmark.

Adopting actual capital structures raises the question of how changes over time in the actual capital structure are to be incorporated into the WACC, and at what point in time a capital structure is to be determined for input into the WACC.

Australian urban water utilities generally demonstrate low levels of gearing, as shown in Table 5.2 for selected entities. In contrast, the South East Queensland Water Corporation (formerly South East Queensland Water Board) has been established with a gearing of approximately 50% as part of the corporatisation process, up from a gearing of around 12% previously.

Low levels of gearing can be appropriate when there is concern about cash flow volatility resulting in an inability to meet interest payments to external parties. However, no evidence has been provided that this is the case for BRIA assets.

Table 5.2: Debt/equity ratios – Australian water businesses, 2000-01

Water Business	***Debt /(Debt + Equity)***
Brisbane City Council	0.12
Gold Coast Water	0.12
ACTEW	0.84[1]
Melbourne Water Corporation	0.26
Hunter Water Corporation	0.05
SA Water Corporation	0.21
Sydney Water Corporation	0.17

Source: Water Services Association of Australia (WSAA), 2001.
1. ACTEW's level of debt includes borrowings to fund capital repatriation to the ACT Government.

There is a general trend amongst corporatised infrastructure entities to move to more commercial capital structures and typically closer to 50% debt to total assets. And, having regard to the low volatility of the revenues associated with the BRIA, the Authority has adopted a gearing rate of 50%.

If evidence of substantial cash flow volatility were to be provided, the Authority would be prepared to reconsider this matter. At the same time, the Authority notes that gearing variations do not have a substantial impact on an entity's WACC, rather they impact the return on equity.

5.7 Determining the Cost of Debt

The cost of debt is the return that a business activity's debt holders demand on new borrowings. It varies depending on a variety of risk factors including liquidity, timeliness and default, the latter two of which are in turn affected by the gearing of the company (high gearing means a high level of debt relative to cash flows and consequently a higher risk of default), the short term volatility of cash flows and the long term security of revenue.

The cost of debt may be determined either as a weighted average of the existing debt of the business activity or the marginal rate at which a business activity can raise debt financing. The latter is usually expressed as a margin over the risk free rate.

Other Jurisdictions

The debt margins used by other regulators have ranged from 80 to 160 basis points. IPART (2000a) used a range of 80 to 100 basis points for its price direction for the Sydney, Hunter, Gosford and Wyong water suppliers. IPARC assumed a range of 100 to 120 basis points for ACTEW. GPOC (2001) used a debt margin of only 70 basis points for its bulk water prices draft report. The Authority (QCA 2001) adopted a margin of 165 basis points for its final determination for electricity distributors, consistent with a BBB+ debt rating.

Stakeholder Comment

SunWater did not propose any debt margin as their preferred capital structure involved no debt.

BRIAC proposed that, if any debt did actually exist, the rate incorporated should be the cost of the actual debt. This is the Government bond rate, or the risk free rate.

QCA Analysis

The use of the actual cost of debt (either an average of actual costs, or the marginal cost of debt) has the benefit of reflecting those costs currently faced by the entities concerned. However, such an approach has the potential to entrench higher debt costs and does not create incentives to seek the most efficient form of financing, as it accepts the prevailing rate of debt even if it is not the most cost effective available.

The use of a margin above the risk free rate provides an incentive to ensure that debt costs are efficient and competitively neutral. This view is consistent with the approach adopted by the ACCC, IPART and ORG.

The margin above the risk free rate should reflect the credit rating of the business activity. Credit ratings are normally performed in a two stage process. The first stage is qualitative and assesses the relative business risk profile of a business activity.

The second stage is the quantitative assessment of the business activity's financial risk profile as a consequence of the methods used to finance its business activities and its capital structure. These assessments are used in combination to arrive at a credit rating.

SunWater's SCI requires that SunWater has a target credit rating of BBB. This represents the perceived target level of risk for SunWater's debt and has been adopted for the purposes of the establishment of a WACC for the provision of water services in the BRIA. Nevertheless, the Authority notes that there may be a case for the adoption of a higher credit rating when the cashflows of the BRIA are considered and this issue is being further considered for the purposes of the Final report.

The spread between BBB rated corporate bonds and Government bonds is known to increase with the maturity of the bonds. For internal consistency, the Authority has based its analysis on the spread between bonds of ten years maturity.

Based on the differential between the risk free rate and BBB rated debt with a ten year term as at the time the price paths were set, that is October 2000, a debt margin of 180 basis points is recommended.

5.8 Determining Equity and Asset Betas

Estimating asset and equity betas requires information on the economic performance of a particular business activity, including its dividends, capital repatriation and changes in market value, over a continuous period. This information is not readily available for business activities such as rural water businesses that are not listed on a stock exchange or a similar equity market.

Because of the relative scarcity of publicly-listed regulated utilities, this problem has confronted Australian utility regulators (including the Authority) in the past. The typical response has been to estimate a proxy beta, based on a range of reference points, including:

- comparable Australian companies listed on the Australian Stock Exchange (ASX), as well as listed companies that have a similar risk profile;
- comparable overseas listed companies;
- decisions and judgments of other regulators, both in Australia and overseas; and
- factors that impact on the variability of, in this context, SunWater's returns, relative to the water sector in general and to the economy overall.

Appendix C discusses the equity, debt and asset betas in more detail and identifies issues in their calculation.

Other Jurisdictions

Few jurisdictions have explicitly considered appropriate regulatory asset/equity beta benchmarks for rural water business activities. The focus of regulatory price setting in this sector has by and large been on setting price paths which satisfy the lower bound revenue threshold. This revenue benchmark, by definition, does not incorporate a return on capital and, consequently, the application of CAPM and the estimation of its components has not been considered necessary.

In New South Wales, IPART's October 2001 determination of bulk water prices for the NSW Department of Land and Water Conservation (DLWC) indirectly considered the appropriate rate of return, in relation to the return that would apply to all new rural water investments. IPART initially proposed a rate of return of 5% (real, pre-tax), though the Tribunal was persuaded by the DLWC that this return should be increased to 7%. However, IPART did not provide any explanation of the parameters underpinning this figure, so no direct asset/equity beta comparison can be inferred.

However, for urban water businesses there have been several recent regulatory decisions explicitly addressing the estimation of asset and equity betas. Table 5.3 outlines asset and equity betas used in these recent regulatory decisions, including the Authority's recently released draft decision for the GAWB.

IPART's (2000a) price determinations for the Hunter, Sydney, Wyong and Gosford water providers were based on asset betas over a range from 0.3 to 0.45. IPART's method produced a range of real pre-tax WACCs from which a point estimate was selected. As a result, no point estimates for asset and equity betas were reported. IPART used a similar approach in its NSW electricity distribution determination (1999e), this time using an asset beta range of 0.35 to 0.5.

Table 5.3: Asset and equity beta factors used in regulatory decisions

Entity/Author	*Industry*	*Asset beta*	*Equity beta*
ACCC (2000b)	Gas transmission	0.6	1.5
OffGAR (2000b)	Gas transmission	0.65	1.33
IPART (2000b)	Gas distribution	0.4-0.5	0.9-1.1
IPART (2000a)	Water Utilities	0.3-0.45	0.65-1.02
IPARC (1999)	Water and electricity	0.3-0.5	0.74-0.79
GPOC (2001)	Bulk water	0.3-0.55	0.495-0.958
OffGAR (2000a)	Gas distribution	0.55	1.08
SAIPAR (2000)	Gas distribution	0.45-0.6	0.94-1.06
ACCC (2000a)	Electricity transmission	0.35-0.5	1.0 (range of 0.78-1.25)
QCA (2001a)	Electricity distribution	0.45	0.71
QCA (2000b)	Below-rail coal network	0.45	0.76
QCA (2001b)	Bulk water	0.45	0.60
ORG (2000)	Electricity distribution	0.5	0.95

IPARC's (1999) determination for ACTEW used asset betas ranging from 0.3 to 0.5, while GPOC, in its draft report for bulk water pricing, used an asset beta range of 0.3 to 0.55.

Ofwat (1999b) quoted a range for equity betas of 0.7 to 0.8 for its water and sewerage charge determinations for UK water companies. Asset betas were not specifically identified.

In other sectors, ORG's electricity distribution price determination (2000) and the Authority's below rail coal network analysis (QCA 2000b) were based on an asset beta of 0.4.

Stakeholder Comment

Of the submissions received, only one (from SunWater) presented a view on the estimation of asset and equity betas. The BRIAC submission disputed the validity of using the WACC/CAPM approach itself, but did not provide specific comments on the method by which asset or equity betas should be determined by the Authority.

SunWater's submission recommended an asset beta of 0.60. The submission noted that, in the absence of any comparable listed Australian companies, relevant benchmarks can be drawn from overseas listed companies, as water businesses are not always publicly owned internationally.

SunWater identified a large number of listed overseas companies with operations in water (filtration and separation) and water treatment. This analysis implied a mean adjusted asset beta of 0.62, which SunWater proffered as support for an asset beta range of 0.60-0.70 and for its recommended asset beta of 0.60.

SunWater's submission also provided a discussion of recent regulatory decisions on appropriate asset betas for the water sector, though it contended that its recommended asset beta of 0.60 was preferable to the observed range from recent regulatory decisions of 0.30-0.50.

SunWater also commented that observed low variability in its cashflows was more the result of a low Ministerially-determined price path than a measure of the underlying volatility of the business' cashflows relative to the economy overall.

QCA Analysis

The lack of readily observable market data for rural water businesses presents a particular problem for the Authority in estimating an appropriate asset/equity beta for the BRIA. It means that the Authority must rely on second-best alternatives, such as benchmarks drawn from international companies or from other "similar" regulatory determinations.

There are a number of problems in drawing comparisons from overseas companies and markets. Equity betas measure the relationship between a business activity and the equity market overall. As a measure of relative risk, observed equity betas in one country are not directly transferable to another.

Two prominent sources of potential error here are that different country stock market indexes have different compositions, and are measured in different (local) currencies. For instance, relative to the Australian market the US market is weighted more heavily towards technology stocks and less heavily towards resource stocks. The same economic shocks will therefore affect these markets differently, and a beta estimated in one market will differ from that estimated in the other.

Using foreign comparator businesses is inappropriate unless compensating adjustments are made to account for fundamental structural differences between markets. These issues do not appear to have been taken into account by SunWater in its submission.

Looking at the analysis presented to the Authority by SunWater, comparator companies have been drawn from a number of different countries, including France, Brazil, China, Chile, Greece, Spain, Hong Kong, Italy, Israel, the United Kingdom and the United States. Arguably, the more substantive differences between the Australian market and equity markets in developing countries makes these benchmarks less valid. Looking only at the US and UK companies, the (unadjusted) average asset beta falls in a range from 0.45 to 0.62. Adding the companies from France, Spain and Italy – which gives a total of 17 companies – the average asset beta is marginally lower, at 0.44.

The Authority also notes recent data published by the London Business School's Risk Measurement Service that suggests that utility company betas in the UK are continuing to fall. For instance, the Kelda and Severn Trent water companies have seen their respective equity betas drop from 0.76 and 0.60 in July 1999, to 0.43 and 0.22, in April this year.[28] This trend is evident across the UK utilities sector, and seems counter-intuitive given a move towards more highly geared capital structures on the part of many utilities. One theory is that the variance of utility company earnings has not changed markedly, but overall equity market volatility has increased over this period, hence beta as a measure of relative risk has declined.

In regard to drawing comparisons from "similar" regulatory decisions, the Authority has looked for guidance at a range of domestic regulatory decisions as shown in table 5.3. In doing so, the Authority estimated comparable business activities' equity, debt and asset betas using CAPM

[28] London Business School (2002), *Risk measurement service: April – June 2002*, 24:2

with an appropriate adjustment to raw equity betas for the tendency of the betas of many listed entities to move towards one over time (due to growth or diversification).

The Authority adjusted betas in accordance with the approach applied by Bloomberg as follows:

*Adjusted beta = 0.33 + raw beta * 0.67.*

The procedure has a number of inconsistencies in its implementation which suggest that the use of adjusted equity betas is not without significant problems. These include:

- adjusted betas can potentially overstate (understate) the asset beta of low (high) raw equity beta business activities (depending on whether the assumptions underlying the beta adjustment are justified in the particular case). For example, assume a business activity has a raw equity beta of 0.39, debt to equity ratio of 0.50, debt beta of 0.12 and a corresponding asset beta of 0.30. The business activity's adjusted equity beta is equal to 0.59. This equity beta corresponds with an asset beta of 0.43. The adjustment for this relatively low equity beta business activity is disproportionate when compared to a business activity with an equity beta close to one;[29]

- the adjustment procedure does not consider the level of leverage in the business - low leverage firms may substitute debt for equity over time thereby increasing the equity beta without increasing their business risk. For example, if the business described above was 100% equity financed, with a raw equity beta of 0.39, this would correspond to a raw asset beta of 0.39. However, using the beta adjustment would increase the equity beta to 0.59 which corresponds to an adjusted asset beta of 0.59; and

- the adjustment does not recognise that the provision of water services to the BRIA will involve an increase in business risk over time, given the single purpose of the business activity.

The difficulties outlined above merely serve to highlight that the calculation of the WACC using CAPM to estimate the return on equity involves some degree of imprecision. At the same time, the Authority considers that, in applying CAPM in a regulatory setting, regard must be had to the risks of allowing too low a rate of return. Consequently, the Authority has considered adjusted (as well as raw) betas in the assessment of the rate of return.

Based on all the above, it has been concluded that asset betas for the water industry typically fall within a range from 0.3 to 0.45, with most falling around 0.3 to 0.4, although GPOC considers they may range up to 0.55 in Tasmania given that State's smaller water businesses and the tendency for these to have less diversified customer bases.

However, such comparisons are not without difficulties. Most importantly, for the purpose of comparison, utilities and regulatory determinations should be in the same market sphere. Yet all of the available regulatory precedents in the water sector are for *urban* water supply agencies, or for bulk water supply businesses that provide water exclusively to urban/industrial customers.

The obvious question is whether the same asset (equity) beta should be used for the BRIA as for a metropolitan water business such as Sydney Water or GAWB.

[29] For example, consider an entity with the higher raw equity beta at 1.05, debt to equity ratio at 0.40, debt beta of 0.06 and an asset beta of 0.77. This firm has an adjusted equity beta of 1.03 and a corresponding asset beta of 0.75.

The Authority's review of available literature suggests that little research has been undertaken in this area. In part, this is because in the past there has been no need to consider the application of CAPM to the rural water sector and how the necessary input components might be estimated.

While it is probable that there are differences between rural and urban water supply that might give rise to variations in nondiversifiable risks (which should properly be reflected in estimates of asset betas), it is difficult to quantify the impact of these factors - in some instances even the direction of the impact is unclear.

However, returns in the rural sector are more likely to be determined by factors unrelated to the general performance of the economy. For example, returns in the rural sector will be affected more by climatic factors and conditions in international commodity markets. In addition, it is noted that there is a very low correlation between sugar prices and domestic equity market movements.

Further, in the case of the BRIA, the Authority noted that revenues can be expected to be stable (and therefore not reflective of movements in domestic equity markets) given the low variation in the water required to irrigate sugarcane.

Accordingly, the Authority is of the view that the asset beta for the BRIA should be consistent with the lower end of the range generally suggested for the urban water sector. As a result, it is recommended that an asset beta of 0.35 be used for the BRIA. With a 50/50 debt/equity capital structure and a debt beta of 0.30, the equity beta is equal to 0.40. The Authority notes that the adopted asset beta of 0.35 closely aligns with the lower end of the range suggested by IPART when methodological differences are taken into account.

5.9 Determining the Dividend Imputation Rate

Under the dividend imputation tax system, Australian resident taxpayers who receive dividends from Australian resident companies can claim a credit for tax that has already been paid by those companies in respect of that dividend income. Ignoring timing impacts, an Australian resident taxpayer can therefore be completely compensated for the incidence of company tax (but not personal tax).

It is possible to record the impact of dividend imputation either as an adjustment in the WACC calculation or as an adjustment to the cash flows of the business.[30] This adjustment factor is known as gamma.

Gamma is typically expressed as a number between zero and one. A gamma of 0.5 implies that $0.50 of each dollar of company tax paid will be redeemed by shareholders as an imputation credit. Higher (lower) estimates of gamma tend to reduce (increase) the estimated cost of capital, other things being equal.

Estimation of gamma

The valuation of imputation credits is determined by the following three key events in the life of imputation credits:

- creation;
- distribution; and

[30] Recording the impact of dividend imputation in the cash flows helps to avoid any possibility of double counting of dividend imputation in both the cash flows and in the WACC.

- redemption or utilisation.

The creation of imputation credits

Franked dividends are those dividends paid out of profits on which Australian corporate tax has been levied and which therefore carry a credit for income tax paid by the company. The after tax return to an Australian resident taxpayer on a share with a franked dividend will be greater than the return on an equivalent share with a non-franked dividend.

Dividends are able to be franked if the entity's income is earned in Australia and hence taxed at the corporate tax rate, and if the income has been earned since the introduction of the imputation tax system on 1 July 1987. It should also be noted that both dividends and franking credits can be issued from retained earnings and not just from the current year's free cash flows.

Distribution of imputation credits

An entity's dividend policy affects the value of imputation credits. The smaller the payout ratio, the less value imputation credits hold, as the time value of imputation credits diminishes if a company defers payment of fully franked dividends.

The introduction of dividend imputation in Australia has resulted in companies adopting generally higher payout ratios than during the pre-imputation period. Hathaway and Officer (1995) found that 80% of company tax payments are distributed as imputation credits.

The New Tax System reverses some of the incentive for high dividend payout ratios that emerged from dividend imputation because it gives capital gains a favourable tax treatment.

Redemption or utilisation of imputation credits

Shareholders attach different values to imputation credits depending on their tax status. Investors who do not pay Australian income tax, such as governments and foreign companies, gain no value from imputation credits, whereas Australian resident taxpayers can gain a full 100% benefit under the New Tax System.

Hathaway and Officer (1995) determined that 60% of the distributed franking credits are redeemed by taxable investors. However, under the New Tax System, Australian residents who were previously only able to claim imputation credits to the extent of any tax liability are now entitled to a refund if their franking rebates exceed their tax payable. Subject to the other effects of the New Tax System, this of itself would tend to increase utilisation levels relative to historical benchmarks.

Other Jurisdictions

As noted above, CAPM estimates generally have not been undertaken for rural water authorities in Australia (or indeed internationally). Hence, there is no specific rural water sector guidance from other jurisdictions on the appropriate value of imputation credits for the BRIA.

Looking to other utility sectors, most jurisdictions have adopted a gamma of 0.50 for gas, electricity and water regulatory determinations. IPART has preferred to use a range, from 0.3 to 0.5, while the ACT's IPARC (now the Independent Competition and Regulatory Commission (ICRC)) (1999) used a range of 0.25 to 0.5. GPOC used a gamma of 0.5, as did the Authority's recent regulatory decisions for electricity, gas and rail.

The ACCC (1999, 2000a) argued that there was no well-founded basis for discriminating in favour of one type of investor over another – such a process may distort pricing outcomes based on share ownership, and does not take into account other tax advantages or disadvantages that may be available to investors. As a result, the ACCC supported the use of an industry average gamma. This view is also supported by the Office of the Tasmanian Energy Regulator (OTTER) (1999) and IPART (1999d, 1999g).

Stakeholder Comment

SunWater argues that imputation tax credits should be valued at zero as they are essentially worthless to a marginal (price setting) investor, where the marginal investor is not an Australian resident.

SunWater drew on previous research that indicated that most infrastructure investment in Australia had significant foreign equity involvement, which in its view suggested that a (hypothetical) marginal investor in SunWater is most likely to be a company with substantial foreign ownership and dividend imputation credits for this investor will be close to worthless. SunWater provided information on recent private sector investments in the water industry to demonstrate this point, all of which involved significant multinational involvement.

No other submissions explicitly addressed the matter of dividend imputation. BRIAC submitted that SunWater should be treated as an income tax-exempt entity and, therefore, in BRIAC's view, the corporate tax rate in any WACC estimate should be zero, making any estimate of the effectiveness of dividend imputation irrelevant.

QCA Analysis

The treatment of dividend imputation is an area of significant regulatory controversy. There are both empirical differences as to the appropriate way gamma should be estimated, and theoretical objections to the way that imputation is accounted for in WACC determination.

In the context of the present investigation, the most prominent issue raised by stakeholders was whether gamma should be estimated based on the value of imputation credits to a "marginal" investor, assuming non-government equity investment in the Burdekin Haughton Water Supply Scheme, of which the BRIA forms an integral part, were to be permitted.

SunWater submitted that the marginal investor is more relevant than estimates of market averages as it is the investor at the margin that determines share prices, and hence the cost of equity capital. In SunWater's view, the marginal investor in the Australian market for infrastructure equities is most likely to be a foreign domiciled company (or at least a domestic company with a substantial proportion of its shares held by overseas investors) that would "at best experience considerable difficulties in accessing imputation credits".

To support this view, SunWater cited a recent study by Cannavan, Finn and Gray (2002), which shows that, for companies with substantial foreign ownership, the market value of imputation credits was negligible. This would infer a value of zero for gamma.

Other studies, however, suggest that investors generally place a much higher value on franking credits. One such study by Walker and Partington (1999) considered equity market outcomes where there was contemporaneous trading of cum-dividend and ex-dividend shares, and found that gamma was significantly above zero – indeed, for the period assessed, gamma ranged between 0.88 and 0.96. The Authority is aware, however, of concern over placing too much stock in these results, as they are based on observed market outcomes in small and thinly-traded

specialised markets on the ASX and the nature of the markets themselves tends to attract those investors who value imputation credits most highly.

Notwithstanding that some recent studies do support a lower (possibly even zero) value for gamma for companies with significant foreign ownership, it is by no means certain that non-government ownership of the Scheme - were it permitted - would be dominated by foreign interests. Nor does it necessarily follow that the marginal investor would be a foreign resident unable to benefit from Australia's system of dividend imputation. This conclusion is derived from the fact that:

- foreign investment in the water sector to date has mostly been in the areas of water and wastewater treatment and in some standalone pipeline assets, and mostly through vehicles such as so-called "public private partnerships" (PPPs). There is no market experience to guide any view on whether equity participation in a water business would be by foreign companies or domestic companies with a substantial foreign shareholding;

- in other utility sectors where privatisation initially saw substantial entry by foreign-based companies (such as Victoria's privatised electricity sector), there is now an apparent trend towards domestic companies taking a greater share of the market for equity in privatised utilities. It is arguable whether the "marginal" investor in these sectors is still foreign owned and unable to benefit from franking credits; and

- SunWater is not a large business in a global, or even an Australian, sense. At present, SunWater is capitalised at approximately $210 million, with the Burdekin Haughton Water Supply Scheme representing only a fraction of this amount. It is unlikely that a domestic investor or the domestic equity market could not absorb capital of this scale, and therefore it is not obvious that there would be a need for foreign investment.

Also of concern to the Authority is the apparent bias that would be introduced into the WACC estimates were the Authority to determine a value for gamma based on whether the marginal investor was foreign or domestic. That is, the Authority is not convinced that the WACC should be higher for foreign-owned entities and lower for domestic-owned entities. Such a distinction draws away from the fundamental objective of assessing the relative riskiness of the assets, which should be unaffected by asset ownership and thus be competitively neutral.

The Authority also notes that the entire regulatory application of CAPM is structured around a domestic market, with all the parameters drawn from Australian market data. It is insufficient to simply adjust the value of gamma to account for the impact of foreign equity investors being unable to access franking credits. Rather, the regulator would need to apply an international CAPM framework, with matching international estimates for all the relevant parameters.

This is essentially the position adopted by the ACCC in its recent decision on access arrangements for GPU GasNet, and is based on advice commissioned by the ACCC from Lally (2002).

The Authority is of the view that it should persist with the approach of using a domestic CAPM. Of particular relevance here is the Authority's view that this approach is consistent with presently accepted commercial and regulatory practice, and therefore it possesses benefits in terms of being transparent, understood by market participants, and is reasonably consistent with the approach adopted by other jurisdictions.

Taking these factors and stakeholder comments into account, the Authority has concluded that:

- all BRIA profits will be earned in Australia and therefore are eligible to be franked;

- a domestic CAPM model is appropriate;

- the 80% market average of fully franked dividends identified by Hathaway and Officer is the best available estimate, as is their estimate of the range of utilisation of imputation credits at 60%.

On this basis, the level of gamma adopted is 0.5 (reflecting a distribution rate of 0.8 multiplied by the estimated utilisation rate of 0.6 and applied to 100% of BRIA profits).

While the changes to capital gains tax and the changes which allow the full flow through of imputation credits to resident taxpayers may have an impact on these levels, there is currently no clear indication of their impact. Further, the influences may be offsetting as the New Tax System may tend to reduce the level of dividend distribution, but may increase the utilisation rate.

As noted earlier, it is possible to record the impact of dividend imputation either as an adjustment in the WACC calculation or as an adjustment to the cash flows of the business. The Authority's view is that it is appropriate to address the impact of dividend imputation in the cash flows as such an approach allows for more flexibility in modelling different scenarios and also enhances transparency.

5.10 Determining the Tax Rate

The estimation of a post-tax nominal WACC requires the identification of the cost of tax either:

- as part of the WACC formula (see Appendix B); or

- as part of the cash flow (WACC3 in Appendix B is then applied).

In either case, it is necessary to determine the appropriate rate of tax to be applied.

In response to a report reviewing the tax system, the Federal Government announced on 21 September 1999 that it would reduce the company tax rate from 36% to 34% for the 2000-01 income tax year and to 30% thereafter. In addition, accelerated depreciation is to be abolished for tax purposes. In determining the tax rate to be applied, there are two broad alternatives, namely the statutory rate, or the effective rate. The effective tax rate adjusts the statutory rate for the timing of tax payments and differences in the tax position of certain assets.

The owner of infrastructure assets with a long life may claim a higher tax deduction in the early years of the assets' lives, where the period allowed for tax depreciation is less than the expected productive lives. Under these circumstances, the effective tax rate may be below the statutory rate.

Where tax is incorporated as a cost element in cash flows, the statutory rate is applied to forecast taxable income in order to determine tax payable, after allowing for appropriate deductions. If incorporated into the WACC, the effective tax rate should be used to avoid potentially over-compensating the service provider for tax liabilities incurred.

Other Jurisdictions

Tax rates in regulatory determinations in Australia have ranged from 30% to 36%, largely reflecting the timing of decisions.

Stakeholder Comment

BRIAC raised a number of issues questioning the validity of the tax equivalents regime applicable to Queensland statutory bodies. BRIAC also raised a number of issues regarding the amount of tax payable in the event that a tax equivalents regime was adopted. These related to measures designed to minimise the level of tax payable and included the use of prior tax losses and the creation of what BRIAC considered to be tax exempt structures.

QCA Analysis

The Authority does not accept the arguments raised by BRIAC against the tax equivalents regime. It is clearly open to the government to levy charges on statutory bodies equivalent to the tax that would be payable if they were subject to company taxation. In addition, there are valid competitive neutrality grounds for doing so, in that an objective of the reform of government business enterprises is to make them subject to the same disciplines that would apply if they were not in public ownership and were subject to competitive forces.

At the same time, the Authority accepts that a commercial entity would seek to minimise the level of taxation that it pays. The Authority has not given detailed consideration to the various tax minimising structures suggested by BRIAC as, because of carried forward tax losses, no income taxation is included in the maximum allowable revenue for the BRIA. At the same time, the Authority notes that no other commercialised, corporatised or privatised government business enterprise in Australia has adopted the suggested structures, despite tax being a significant issue for many of them.

As the Authority's approach is to incorporate any income tax liabilities based on statutory rates in the cashflow, no adjustment to WACC is necessary on account of income tax. The statutory tax rate used in the analysis was 30%. However, as indicated, there is no tax included in the cash flows due to carried forward tax losses.

5.11 Expected Inflation

In applying its preferred nominal post-tax approach, the Authority requires a projection for inflation over the regulated period. Four primary methods exist for the estimation of expected inflation:

- survey based methods, where market participants are surveyed to assess their expectations of inflation;
- statistical methods, using regression or time series models;
- models based on the Fisher Theory of Interest (1907), which suggests that there is a systematic relationship between nominal interest rates, real interest rates and the expected rate of inflation. Using this theory, the level of expected inflation is implied from the yields on nominal and Commonwealth Treasury capital indexed bonds; and
- the use of secondary sources, including monetary and fiscal policy documents. For example, the Reserve Bank of Australia's medium term inflation target is 2 to 3%. Similarly, in forecasting future revenues, State and Commonwealth governments report anticipated CPI as part of their budgets.

Other Jurisdictions

The ACCC (2000a) stated that it is appropriate to derive the expected inflation parameter from the difference between Commonwealth and indexed bond rates.

IPART has calculated inflation by reference to the difference between the ten year Commonwealth bond rate and the relevant indexed bond rate. GPOC (2001) also used this method.

Stakeholder Comment

No comments were received on this matter.

QCA Analysis

The estimate of inflation used in the determination of the price paths was 2.5% This seems reasonable, given the economic circumstances at the time. To ensure consistency with the figures used in the price path, which the Authority is directed to use, an inflation rate of 2.5% is proposed.

6. EXCESS RETURN ON CAPITAL

Summary

The Ministers' Direction requires the Authority to determine whether the gazetted price paths for the Burdekin River Irrigation Area incorporate any excess return on capital, based on the Authority's analysis of asset values, capital contributions and the weighted average cost of capital.

For this purpose, the Ministers' Direction specified that the Authority should use the lower bound costs of the Scheme incorporated in the gazetted price paths.

On the basis of its estimates of depreciated optimised replacement cost, capital contributions and weighted average cost of capital, the Authority considers that the gazetted price paths did not incorporate any excess return on capital as at October 2000.

6.1 Lower Bound Costs

The Ministers' Direction specified that, for the purpose of determining any excess return on capital, the Authority should use the lower bound costs of the Scheme incorporated in gazetted price paths.

Stakeholder Comment

BRIAC submitted that the Authority should determine whether an excess return on capital exists by using efficient lower bound costs, rather than the lower bound costs incorporated in the gazetted price paths:

> … the QCA is not "bound" to accept lower bound costs as applied in setting the gazetted price paths. While it is sensible to "use" the lower bound as applied for the gazetted price paths this can only sensibly mean that the lower bound is to be taken as a starting point for inquiry rather than conclusive evidence of what are efficient lower bound costs. Logically, the lower bound costs assumed to date have to be open to examination in auditing the price paths for excess returns on capital, else the inquiry would be futile…

BRIAC noted that:

- a Marsden Jacob Report (2000), commissioned by the Burdekin Interim Local Management Committee, 'strongly argues that efficient opex is considerably below that identified by the Water Reform Unit'; and

- benchmarking studies conducted by the WRU showed that corporate overheads of SWP (a predecessor of SunWater) were above those of Goulburn-Murray Water and Southern Rural Water.

BRIAC also commented on the appropriateness of individual elements of the lower bound (including return of capital, tax equivalents, externalities, and labour costs including accrued superannuation entitlements) and the allocation of lower bound costs across users.

The North Burdekin Water Board also submitted that the Authority should use efficient costs to determine the excess return on capital within the gazetted price paths.

Davco Farming submitted that the operating and management costs of the Scheme were above efficient levels and that the corporate overhead costs of the Scheme were particularly high

compared to relevant benchmarks. Davco Farming submitted that local management of the Scheme could significantly reduce the price of water to Burdekin irrigators.

QCA Analysis

The Ministers' Direction clearly requires the Authority to accept the lower bound costs incorporated in the gazetted price paths. The Authority does not consider that it has a discretion in this area.

Insofar as there are any concerns about the relevance of lower bound costs, it is noted that:

- SunWater must comply with the requirements of the COAG pricing agreements, the *GOC Act 1993*, its own SCI, and the monopoly prices oversight provisions of the *Queensland Competition Authority Act 1997*;
- under relevant COAG pricing principles, full cost recovery for rural water schemes is defined as falling within a range of outcomes:
  - an 'upper bound' – which is defined as the recovery of the costs of operation, maintenance and administration, regulatory compliance, asset consumption, taxes and return on capital, the latter calculated using a WACC; and
  - a 'lower bound' – which is defined as the recovery of the costs of operation, maintenance and administration, regulatory compliance, refurbishment of assets, taxes, interest and dividends (if any); and
- a commercial service provider could continue to maintain its service provision where all operations, maintenance and administration costs are met and the service potential of assets is maintained. Any less revenue than this would result in the cessation of business activity over time. This level of revenue aligns with the concept of a lower bound as defined under COAG pricing principles.

6.2 The Return on Capital within the Gazetted Price Paths

Methodology

BRIAC raised some methodological issues relating to the calculation of the return on capital component of prices using DORC and WACC. In particular, they submitted that:

- any upward revaluation of the asset base (or capital gain) should be included as income and offset against the revenue required of users; and
- if grants are counted towards the asset base, they must also be counted as income and offset against the revenue required of users.

The Authority has recognised these issues as follows:

- the Authority's calculation of the required return on capital does take account of capital gains which occur after the initial revaluation. These capital gains are offset against the overall required return on capital on an annual basis, resulting in a lower maximum allowable revenue requirement for pricing purposes; and
- as outlined in Chapter 3, capital payments should be regarded as capital contributions if it was the expectation of the relevant parties at the time that the capital payment would be

recognised for pricing purposes, provided that users have not already been fully compensated through lower historical prices or the relevant assets have not been consumed. The Authority does not consider that the Commonwealth grants or State Consolidated Fund payments towards the Burdekin Scheme were capital contributions, for the reasons outlined in Chapter 3.

Analysis

To establish whether the gazetted price paths incorporate any excess return on capital, based on the Authority's analysis of asset values, capital contributions and weighted average cost of capital, the Authority has:

- identified the net revenues associated with the current price paths and subtracted from these the lower bound costs. See table 6.1; and

- established the net maximum allowable revenue consistent with the Authority's estimates of the DORC value of Scheme assets not accounted for by capital contributions of $207.0 million (Chapter 4) and the appropriate WACC of 8.27% (Chapter 5). See table 6.2.

Where the net maximum allowable revenues associated with the Authority's DORC and WACC (estimated in table 6.2) exceed the net revenue associated with gazetted price paths (table 6.1), then there is no evidence that there is any excess return on capital in the gazetted price paths. All tables refer only to the Scheme irrigators currently serviced by SunWater.

Table 6.1: Net Revenues Based on Gazetted Price Path[a] ($ thousand)

	2000-01	***2001-02***	***2002-03***	***2003-04***	***2004-05***
Aggregate Revenue	10,679	10,946	11,272	11,554	11,822
Aggregate Lower Bound Costs	8,649	8,814	8,954	9,077	9,151
Net Revenues Above Lower Bound	2,030	2,132	2,318	2,477	2,671
Allocation of Net Revenue to					
Channel Irrigators	1,283	1,364	1,543	1,698	1,870
River Irrigators	161	167	172	179	186
Other Irrigators	586	601	603	600	615

[a] *Does not include drainage revenues or costs and assumes an inflation rate of 2.5%*

Table 6.2: Net Maximum Allowable Revenues based on Authority's DORC and WACC[a] ($ thousand)

	2000-01	*2001-02*	*2002-03*	*2003-04*	*2004-05*
Aggregate Revenue	19,943	20,442	21,633	22,593	23,158
Aggregate Lower Bound Costs	8,649	8,814	8,954	9,077	9,151
Net Maximum Allowable Revenue	11,294	11,628	12,679	13,516	14,007
Allocation of Net Maximum Allowable Revenue to					
Channel Irrigators	9,849	10,145	11,156	11,951	12,398
River Irrigators	609	626	643	662	682
Other Irrigators	836	857	880	903	927

[a] *Does not include drainage revenues or costs and assumes an inflation rate of 2.5%*

For illustrative purposes only, the Authority has also calculated the maximum return on capital applicable to BRIA assets not accounted for by capital contributions had the Commonwealth grants been determined to be a capital contribution. This result is shown in Table 6.3

Table 6.3: Net Maximum Allowable Revenues based on Authority's DORC and WACC assuming the Commonwealth grant is a capital contribution[a] ($ thousand)

	2000-01	*2001-02*	*2002-03*	*2003-04*	*2004-05*
Aggregate Revenue	14,447	14,809	15,689	16,394	16,804
Aggregate Lower Bound Costs	8,649	8,814	8,954	9,077	9,151
Net Maximum Allowable Revenue	5,798	5,995	6,735	7,317	7,653
Allocation of Net Maximum Allowable Revenue to					
Channel Irrigators	5,280	5,462	6,186	6,751	7,068
River Irrigators	23	25	28	31	35
Other Irrigators	495	508	521	535	550

[a] *Does not include drainage revenues or costs and assumes an inflation rate of 2.5%*

The net maximum allowable revenue based on the Authority's DORC and WACC is higher than that which results from the gazetted price path. The rate of return recouped by SunWater from gazetted prices is less than 1% on the relevant capital base.

However, had the Commonwealth grant been determined to be a capital contribution, the gazetted price path for non-channel irrigators (river irrigators and other) would include a small excess return on capital. It should be noted that this result is affected by the method of allocating costs between user groups and that a different basis for allocating costs between user

groups may have resulted in a different relative outcome. However, the overall position of the BRIA would be unchanged.

Some factors identified in Chapter 7 as being relevant to the price charged to users may require an adjustment to the revenues received by SunWater from sugarcane growers. However, the terms of reference for this assessment only allow the Authority to determine any excess return on capital based upon the Authority's analysis of the capital unaccounted for by capital contributions and the relevant WACC for the Burdekin Scheme.

On the basis of its estimates of the DORC and WACC as at October 2000, the Authority considers that the gazetted price paths do not incorporate any excess return on capital.

7. APPROPRIATENESS OF POSITIVE RATES OF RETURN ON ASSETS

Summary

The Ministers' Direction requires the Authority to advise under what circumstances it would be appropriate for an entity to charge a positive rate of return on scheme assets. While the Authority has sought to address this issue in a generic manner, it has also sought to reflect the submissions of stakeholders which have focussed on the Burdekin Scheme.

Corporatised entities, such as SunWater, are required to operate on a commercial basis and to enhance the value of their business to shareholders. Accordingly, such entities should only invest in new projects when a commercial rate of return is achievable. Matters of a broader public interest nature should be addressed through the payment of transparent community service obligations by Government.

Such entities should always seek to achieve a commercial and therefore positive rate of return. Circumstances when it may not be appropriate for an entity to charge a positive rate of return (or a fully commercial rate of return) include:

- *when transitioning users to more commercial rates of return;*
- *when contractual or legislative constraints exist;*
- *during periods of substantial excess supply;*
- *where there are redundant or over-engineered assets in the asset base;*
- *where capital contributions should be recognised;*
- *a number of situations when differential prices would be possible but not appropriate;*
- *when broader public interest matters determined by government are reflected in CSOs; and*
- *where market circumstances limit the capacity of users to pay.*

The Authority notes that, under prevailing expectations of prices for sugar, sugarcane irrigators in the BRIA do not have a capacity to pay a positive rate of return (although other irrigators may). However, the Authority notes that the estimated capacity of sugarcane producers to pay has shown considerable volatility in the past and may do so in the future. The Authority also notes that, given that volatility, point in time estimates of expected capacity to pay based on future prices are necessarily quite problematic and caution needs to be exercised when using them for pricing purposes. As the current price paths do not provide a mechanism by which SunWater can capitalise on past capacities to pay, it would be inappropriate to reduce the return when the expected capacity to pay is low. The situation would be different if SunWater had a more market based pricing policy which sought to share in industry highs and lows with other participants in the industry. This is of course an option for future price paths

In addition, the Authority notes any reduction in prices for water services to remove the current excess over lower bound costs will only reduce costs of sugarcane production in the BRIA by 2 to 3%. Such a reduction would obviously be of assistance to sugarcane producers in the current circumstances, but a more comprehensive response to the situation within the industry is required.

The nature and form of any assistance and related adjustment is a matter for the Queensland Government and the industry to determine rather than SunWater in its capacity as a commercial service provider.

7.1 Introduction

In responding to the Ministers' Direction to advise under what circumstances it would be appropriate for an entity to charge a positive rate of return on scheme assets, the Authority has sought to also take into account submissions received in respect of this issue as they relate to the particular circumstances of the BRIA. This issue has been assessed against the framework established in previous chapters.

The Authority also notes that this issue has a significant temporal dimension. In particular, there is the issue of when it is appropriate to seek a positive rate of return before an investment is made and when it is appropriate to do so after the investment has been made. A further issue is whether a positive rate of return should be sought annually or on some other basis (for example, a whole of investment basis).

7.2 Before the Investment

No submissions were received by the Authority on the issue of whether a positive rate of return should be applied to new investments. Submissions focussed on the current circumstances relating to the BRIA and thus related to the issue of whether a rate of return should be achieved after an investment has been made.

Principles

Under the *GOC Act 1993*, corporatised entities are required to be commercially successful (s 20 (1)) and to act in accordance with their SCI (s 92(b)). For example, SunWater's SCI requires it to increase the value of the business to its shareholders, and it is free to do so by investing in commercially viable projects.

As noted in Chapter 4, for any new projects, a commercial service provider will seek to achieve a commercial rate of return on the full value of the assets to be employed. This will ensure that services are provided on a sustainable basis with consumers paying, and investors receiving, prices consistent with the ongoing delivery of services.

Such an approach is consistent with the requirements of COAG, where clause 3(d)(iii) requires that future investment in new schemes is to be undertaken only after appraisal indicates that it is economically viable (and ecologically sustainable).

However, corporatised entities may also have non-commercial regulatory obligations which are relevant to the return the entity seeks to recover from prices for its services. In such cases, a CSO is required to be specified in the SCI of the entity. COAG also provides for CSOs and requires these to be made on a transparent basis.

In respect of CSOs, it is noted that:

- many activities have indirect effects on third parties, and these can be quite diverse;
- only some activities are generally considered to warrant government intervention in a market. Typically cited examples include regional development, environmental considerations and equity;

- many of these effects are not normally taken into account by commercial service providers, as it is generally not their role to address broader community requirements and priorities; and

- government is responsible for addressing broader public interest matters and is best placed to do so, having regard to the net benefits and its expenditure priorities.

In some cases, broader public interest objectives may be achieved through the establishment of an appropriate legislative framework.

Taking all the issues into account, the Authority considers that a full commercial rate of return should be sought by corporatised service providers such as SunWater when undertaking new investments. Should the Government wish such entities to address issues of a broader public interest nature, on the basis of the Government's assessment of expenditure priorities and community needs, these should be addressed through the payment of transparent CSOs, of either a capital or recurrent nature, or by the establishment of an appropriate legislative framework.

7.3 After the Investment

As noted in Chapter 4, an entity may not always be able to achieve a positive rate of return after an investment has been made, as a result of changing market conditions including the capacity of users to pay.

Stakeholder Comment

The North Burdekin Water Board stated that it is inappropriate to charge a rate of return given current international sugar prices. These conditions include international pressures facing the sugar industry due to 'protectionist policies by the EEC and the USA and the massive increase in sugar production achieved by Brazil in recent years'.

BRIAC have consistently supported a reduction in the rate of return and in particular they submitted that:

- it is not appropriate to charge a rate of return on irrigation schemes inconsistently and in a discriminatory manner within an existing irrigation scheme;

- the retrospectivity of pricing policy developments for the BRIA existing prior to COAG, and the lack of clear information on changes in prices to reflect rate of return factors, are arguments against the appropriateness of charging a positive rate of return;

- it is not appropriate for an entity to charge a rate of return on Scheme assets where such conduct would be precluded as unlawful;

- in a monopoly market it is not appropriate to charge a market based rate of return for capital expended because this may include excess capital expenditure or 'gold plated' works;

- 'sunk capital is sunk capital and … once capital assumes a fixed form such as water channels or dams, it has lost the opportunity to turn itself into capital elsewhere and its value is simply its scrap value';

- the current approach to determining the regulatory asset base to which a rate of return may be applied by an upwards inflation adjustment is fundamentally unsound as a proxy for competitive market outcomes;

- in the absence of any relevant capital costs, annual charges in excess of efficient opex are not appropriate and should be credited as recoupment of capital. Failure to do so will result in farmers being unable to pay higher prices (than short run marginal cost) and exit from the industry. This would undermine the viability of the Scheme; and

- national competition policy payments received by the government should be used to compensate irrigators for changes in policy which occurred after irrigators had purchased farms.

BRIAC also stated that the original decision to construct the Scheme was based upon a conventional cost benefit analysis in which broader public interest matters were taken into account. BRIAC also argued that it is not appropriate to charge a rate of return on Scheme assets where those assets were created as a result of past government and parliamentary social policies, rather than being demand-driven by those willing to pay.

Furthermore, BRIAC stated that the network infrastructure investment in the Burdekin Scheme:

- provides benefits not only in terms of the land values of farms in the designated irrigation area, but also in terms of farms, towns and people in the surrounding area, including Townsville. These benefits extend to the State and the Commonwealth; and

- has a multiplier effect, which results in more tax revenue for the Government as it:

  - increases the productivity of other industries, which often generates further revenues for Treasuries from the increased output of downstream industries; and

  - generates regional economic growth, which provides other external benefits to the Government through enhanced tax collections (eg land tax, rates, payroll taxes, goods and services tax); and

- has benefits that are often reflected or captured in the form of location rents of land, as recognised by the Burdekin Scheme land resumption and resale financing process.

The QFF noted that broader community benefits should be recognised through the provision of transparent subsidies.

Davco Farming stated that the State and Federal Governments are obliged to promote rural and regional development to correct capital imbalances created by:

- the legislated diversion of rural and regional income to superannuation funds which 'is spent on centralised office fees and is invested in centralised stock, property and capital markets'; and

- the centralised location of State and Federal bureaucracies, and large private company head offices, in major cities. Davco noted that SunWater's head office was located in Brisbane.

QCA Analysis

Under current legislative and policy settings, a corporatised or commercial entity is able to charge a positive rate of return on existing schemes:

- the government has the power under the *Water Act 2000* to change the basis on which it sets water charges, subject of course to any pre-existing contractual arrangements. It is not constrained by past water legislation or past representations;

- as outlined in Chapter 2, under the *Government Owned Corporation Act 1993*, one of the key objectives of a corporatised entity is to be commercially successful. The Act does not limit this objective to new schemes; and

- under the COAG Water Resource Policy, rural water schemes are required to achieve positive real rates of return on the written down replacement cost of assets, wherever practicable. This requirement applies to existing schemes and future investment in new schemes is to be undertaken only after appraisal indicates that it is economically viable (and ecologically sustainable).

Accordingly, a corporatised or commercial entity is able to charge a positive rate of return on existing schemes. The Government is also under no obligation to retain any existing arrangements in place at the time of a legislative or policy change.

The Authority also considers that national competition policy payments provided for the implementation of COAG reforms should not be used to avoid the implementation of those reforms, as suggested by BRIAC. This would not stop the use of these funds to effect the structural adjustment that the implementation of competition reform may require. However, this is a matter for government.

A corporatised or commercial entity (whether it is SunWater or a sugarcane grower) should always seek to achieve a commercial, and therefore positive, rate of return. Circumstances when it may not be appropriate for such an entity to charge a positive rate of return (or a fully commercial rate of return) include:

- when transitioning users to more commercial rates of return;

- when contractual or legislative constraints exist;

- during periods of substantial excess supply;

- where there are redundant or over-engineered assets in the asset base;

- where capital contributions should be recognised;

- a number of situations when differential prices would be possible but not appropriate;

- when broader public interest matters determined by government are reflected in CSOs; and

- where market circumstances limit the capacity of users to pay.

Nevertheless, consistent with its charter to increase shareholder value, SunWater should seek to maximise the rate of return it achieves on its assets on an ongoing basis.

Transition Paths

When there are changes in the capacity of users to pay, or where charges to users do not appropriately reflect the costs needed to provide an appropriate return to the service provider, the price increases needed to maximise the return to the service provider may be significant – and may have the potential to adversely impact on users, at least in the short term.

Therefore, in such circumstances, it may be appropriate for a service provider to moderate its desire to maximise the return on its assets and provide for any price increases to be staged in a manner that allows users sufficient time to adjust. The rural water price paths adopted by the government are consistent with this approach.

Contractual and Legislative Constraints

Contractual and legislative constraints can limit the achievement of positive or higher rates of return. This is accepted as a given by the Authority.

The Authority is not, however, aware of any basis for the contention that changes in prices are unlawful. Legal advice available to the Authority is that under the *Water Act 2000*, the Premier and Treasurer are not constrained by current or past water legislation, contract or past representations.

Excess Supply Capacity

The pricing approach to regulated assets seeks to establish a scale of infrastructure which is appropriate to current and prospective demand. Nevertheless, for certain periods excess supply may arise. This will particularly be the case if a facility has been constructed that is substantially in excess of the optimum.

In these circumstances, short term variations in commercial pricing, with consequent impacts on the rate of return, may be justified to ensure that the maximum volume of water is available to the community. This may include the sale of water without seeking to recover any return on capital. This is appropriate provided no users who are willing to pay more are excluded and the sale has no longer term impact on the security of supply for other users.

Redundant or over-engineered assets

BRIAC has also raised several concerns relating to redundant or over-engineered assets.

The Authority agrees that it is inappropriate to seek to recover a positive rate of return on such assets. In fact, the whole process of asset optimisation is designed to identify and remove any such assets from the asset base for pricing purposes.

Capital Contributions

BRIAC raised a number of concerns in regard to the issue of capital contributions. This issue was addressed in detail in Chapter 3. In general, it is inappropriate for the asset owner to charge users a positive rate of return on capital contributions that have been made. Further, as outlined in Chapter 3, capital payments should be regarded as capital contributions (and thus reflected in the prices paid by users of the asset) if it was the expectation of the relevant parties at the time that the capital payment would be recognized for pricing purposes, provided that users have not already been fully compensated through lower historical prices or the relevant assets have not been consumed.

Differential Pricing

Because different users may have different capacities to pay, charging users different prices may enhance the capacity of an entity to maximise the return on Scheme assets. This can involve different prices to similar users of the same services, different prices to different users of the same services, different prices for new users compared to those paid by existing users and different prices between schemes for the same services.

Stakeholders have also commented upon this issue, as follows:

- SunWater submitted that the Authority should take account of the existing differences in the water services provided to users, and the existing geographic grouping of users within gazetted prices;

- BRIAC argued that:

  – if other pre-existing users were charged a lower price which reflected a lower rate of return, this advantage should be extended to all pre-existing BRIA users; and

  – if users in other schemes are charged lower prices involving lower rates of return, this advantage should be extended to all BRIA users.

- other stakeholders, including Davco Farming and the South Burdekin Water Board, noted that different users were reliant upon different infrastructure in the Scheme.

Differential pricing which reflects differences in the cost of service provision can provide important incentive signals for growers in choosing the appropriate location for their enterprises or their appropriate service level. The Authority therefore considers that prices which reflect differences in service quality and costs are appropriate, provided these factors can be meaningfully disaggregated and the administrative costs of doing so are warranted. In the current circumstances, price differentiation between channel, river and other BRIA users is recommended on the basis of the availability of specific cost information for each.

In respect of the issue of existing users and new users, the Authority considers that prices between new and existing users should not be differentiated as:

- competitive markets do not differentiate between users according to whether they are existing or new users (unless contractual obligations exist); and

- water is a resource with few, if any, substitutes and all users, existing and prospective, are able to adjust their consumption to reflect the availability of water and related costs.

Following on from this point, the Authority does not consider that it is valid to charge lower prices to pre-existing users simply because other pre-existing users have obtained a lower price through contractual or other negotiations.

In respect of BRIAC's concerns regarding differentiation in rates of return between schemes, the Authority considers that differentiation in pricing between schemes is acceptable where it reflects identifiable costs associated with each scheme. Such cost reflectivity is consistent with key pricing principles (see for example the Authority's *Statement of Regulatory Pricing Principles for the Water Sector*, QCA 2000a). In addition, it is reasonable for there to be differences in ex post returns between schemes where there are differences in the capacity to pay, provided that no monopoly rents are involved.

So far as different users of the same services are concerned, there is no economic objection to charging different prices based on different capacities to pay provided prices do not involve monopoly rent seeking. Indeed, taking a longer-term view, the EV of the Burdekin Scheme may not depend on the current commercial position of the sugarcane growing sector (presently the predominant user of water), but on future uses that might emerge for water and SunWater's ability to capture higher prices (and greater EV) from these users. In addition, the situation could arise where users willing to pay a higher price could be seeking water currently used by sugarcane producers. However, this is not likely to be of significant concern to the Burdekin as:

- SunWater holds an IWA of some 184,241 ML in the Burdekin Scheme that is currently unutilised;
- the advent of water trading may itself provide a means for prices to adjust appropriately; and
- no allocations of water have been sold since the gazetted price paths (for ongoing water supply) were established in October 2000.

In any case, such a situation would be likely to involve broader adjustment and public benefit issues which cannot be effectively considered without a specific case to consider.

In respect of similar users of the same services, it is not generally considered to be appropriate to charge differential prices. This reduces the incentives available to the more productive users of a service, as their greater returns are targeted, often to support the lower return from less efficient competitors. Moreover, it may be difficult to identify differences in the capacity to pay between individuals and this situation may fluctuate markedly over time depending on individual circumstances.

In summary, charging users different prices may enhance the capacity of an entity to achieve a more commercial rate of return. Where differential prices are not achievable or appropriate, an entity may be unable to achieve a full commercial rate of return.

The Public Interest

The Authority accepts that the activities of commercialised entities such as SunWater may have public interest implications. Furthermore, the Authority accepts that it may be efficient in a macroeconomic sense to promote activities which benefit the public interest. However, it is considered that these benefits can best be assessed by the Queensland Government, after appropriate consideration of its expenditure priorities, through the payment of transparent CSOs rather than through adjustment to the effective rates of return for commercialised entities.

So far as regional development in particular is concerned, the Burdekin region has a population of approximately 19,000 with the principal towns being Ayr and Home Hill. Within the Burdekin region, the sugar industry is the dominant employer and wealth generator, and any significant downturn in the industry is likely to have a major impact on local economic activity, employment and social cohesiveness. For example:

- using sugar cane processed by the Invicta Mill as a guide for BRIA production, as value of production data specific to the BRIA is not available, at least 40% of the total value of agricultural production in the Burdekin region comes from sugar cane produced in the BRIA;
- cane growing accounted for 63% of employment in agriculture or 16% of total regional employment. Sugar manufacturing was the second largest employer in the region,

accounting for 74% of all manufacturing employment or 11% of total employment (ABS 1996 census employment data);

- the sugar industry has significant flow-on effects throughout the regional economy. Available statistics indicate that these linkages are particularly significant to 'other agriculture', finance, property and business services industries; and

- the provision of local government infrastructure and services depends upon the Burdekin Shire Council raising sufficient revenue through council rates and charges. In the Council's recent submission to the Independent Assessment of the Sugar Industry (the Hildebrand Report), it stated that approximately 62% of its rate revenues were attributable to cane farms and mills and that the Burdekin Shire Council is more reliant on rate revenues from the sugar industry than any other local government authority.

It is clear that the dependence of the region upon sugar poses particular problems. In this regard, it may be that a critical mass of users is required to justify a minimum level of services in regional centres and, if irrigators are unprofitable and withdraw from the industry, this would penalise other efficient producers who are located in the same region. However, these are issues more appropriately addressed by the Government and not SunWater.

In response to the specific issues raised by stakeholders, the Authority:

- accepts that, where a Scheme was constructed in the past on the basis of broader benefits to the community, it is necessary to ensure that the rate of return only relates to those assets driven by demand. In addition, the Authority notes that current prices seek to recover a return on only a portion of DORC;

- notes that acceptance of the argument that a particular activity generates other benefits to the economy which can then be taxed would see all activities in the economy subsidised; and

- notes that all activities have linkages with other parts of the economy and therefore generate flow-on benefits or 'multiplier' effects. These flow-on effects do not necessarily equate to increases in economic welfare as multipliers do not:

  – address the question of whether the benefits of increased activity in one area outweigh the costs; or

  – evaluate the economic merits of other investment options.

On these latter two matters, it is worth noting that the 1980 report to Parliament, which listed significant secondary benefits derived from input-output analysis, stated that these benefits relating to the Burdekin Scheme did not represent a net benefit to the State:

> 'The secondary benefits outlined below should not be seen as an indication of the level of net benefit to the State. Any part of the capital or operating costs which, in the absence of the proposed scheme would be expended in some other way elsewhere in Queensland would also be the subject of multiplier effects. The net State benefit would be represented by the difference between the secondary benefits accruing from the proposed scheme and the potential secondary benefits which might otherwise be realised. The secondary estimates outlined below, should, from a State point of view, be interpreted as gross estimates only.'

Capacity to Pay

The Authority accepts the North Burdekin Water Board's submission that the capacity to pay should be taken into account in setting prices – indeed, capacity to pay may preclude any rate of return being achieved or limit the achievement of a fully commercial rate of return.

In the case of the Burdekin, in the absence of material alternative customers, SunWater is dependent upon the capacity of sugarcane producers to pay.

As in most commodity industries, the actual and expected capacity of sugarcane producers to pay will vary significantly over time. Figure 7.1 below shows historical prices for sugarcane and compares alternative scenarios identified by the Hildebrand Inquiry for the next 30 years. Figure 7.2 shows changes in ABARE forecast and projected prices since 2000 when price paths were established.

Figure 7.1: Historical Real Sugar Cane Prices

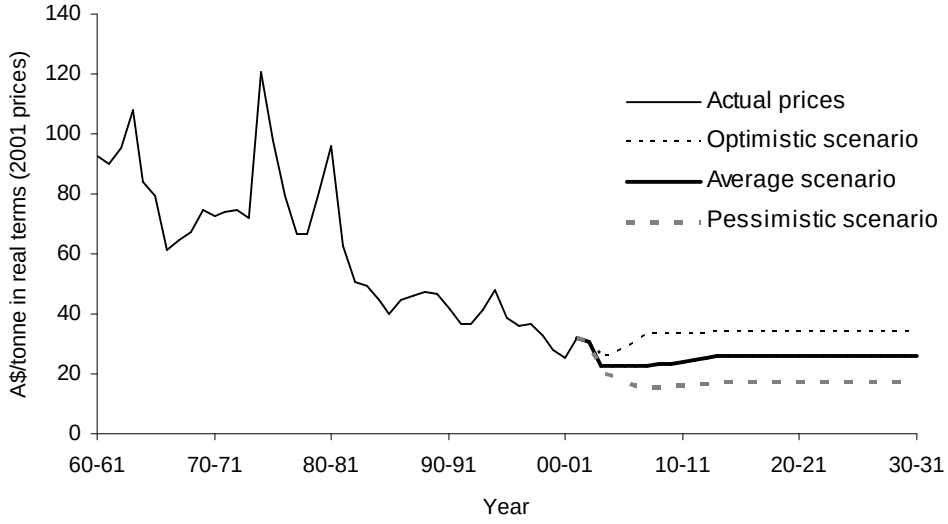
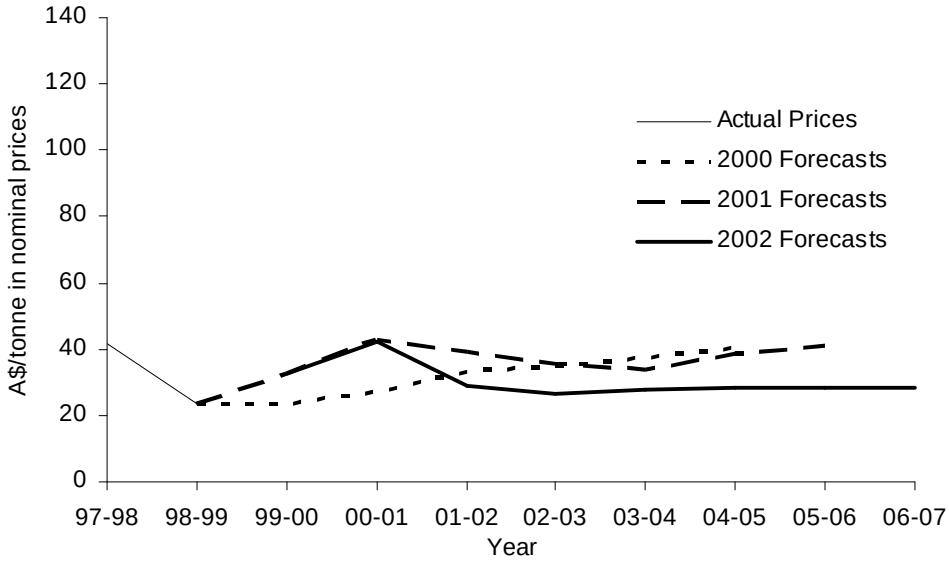


Figure 7.2: Forecasts of Sugarcane Prices based upon ABARE Forecast Sugar Prices



Against this background, it is evident that the actual and expected capacity of sugarcane producers to pay has varied significantly over time. There are also a wide range of estimates of expected capacity to pay when the forecasts and projections established for the purposes of the Hildebrand Inquiry are considered. In this regard, Table 7.1 outlines estimates of the expected capacity of sugarcane producers to pay for water, based on an assessment of their EV. As outlined in Chapter 4, it is stressed that not all of the expected capacity to pay as measured by the users' EV is available to meet water charges. BRIA users also have capital invested on which a rate of return is desired. As such, the users EV represents the capacity of users to pay a return on the capital of both SunWater and the users themselves. An obvious issue for consideration is the sharing of any users EV between SunWater and the users.

Table 7.1: Users EV based on various price assumptions ($m)

August 2002 – Hildebrand Average Scenario ($25/tonne)	0
August 2002 – Hildebrand Optimistic Scenario ($35/tonne)	194
October 2000 international spot price	741
August 2002 international spot price	0

The assumptions concerning the costs of production were outlined in Section 4.6.

Based on a continuation of current price expectations, it is clear that sugarcane producers do not have the capacity to pay a positive rate of return on capital. This conclusion also holds under the average scenario developed for the Hildebrand enquiry. This is the case because the projected prices are lower than the current costs of average BRIA canefarmers. However, this is not the case if the Hildebrand optimistic scenario prevails. At the same time, history has shown that there is considerable volatility in sugarcane prices, including forward estimates of sugarcane prices, as outlined above and in Chapter 4, rendering any forecast of capacity to pay somewhat problematic.

The question therefore arises as to whether the expected low capacity to pay should result in a reduction in the positive rate of return to SunWater implied by current price paths, which have been established to apply until June 2005. BRIAC have consistently supported such a view.

In this regard, it is noted that a commercial service provider would, in general, only provide a price adjustment for a customer where a failure to do so would affect the longer term viability of the service provider. Such a circumstance may arise if commodity prices on international markets fall sufficiently so that the current nature and level of farming activity is unprofitable in the longer term.

For a number of regulated entities, prices are set for a five year period, as are rural water price paths. Where revenues to the service provider either exceed or fall below those regulated prices by a designated amount (for example 15%), the price paths are typically revisited.

There is clear evidence, however, that the industry faces severe difficulties which may have long term implications. In this regard, a recently released survey of Queensland rural debt undertaken by the Queensland Rural Adjustment Authority indicates that:

- debt servicing costs for sugarcane growers have increased considerably over recent years; and

- there has been significant downgrading of sugarcane growers' debt, with the majority of debt held by sugarcane farmers in the Tropical North region now rated B+ ("borrowers who are considered potentially viable long-term but are experiencing debt servicing

difficulties") and B- ("borrowers who are experiencing debt-servicing difficulties and a deteriorating debt situation but with continuing support from lenders").

The Authority notes submissions by BRIAC that:

- the application of a rate of return on capital which would force water users out of business may not be appropriate;
- it is better for society to partly subsidise a productive activity than to wholly subsidise a wholly unproductive activity; and
- wherever the cost to the taxpayer of unemployment benefits exceeds the cost of any subsidy (implied by the absence of a rate of return component), subsidisation is preferable and that this is likely to be the case 'in a second best world where labour and resources are not perfectly mobile'.

The Authority notes that the expected capacity of sugarcane producers to pay has exhibited considerable volatility in the past and may do so in the future. The Authority also notes that, given that volatility, point in time estimates of expected capacity to pay based on estimates of future prices are necessarily quite problematic and caution needs to be exercised when using them for pricing purposes. As the current price paths do not provide a mechanism by which SunWater can capitalise on past capacities to pay, it would be inappropriate to reduce the return when the expected capacity to pay is low. The situation would be different if SunWater had a more market based pricing policy which sought to share in industry highs and lows with other participants in the industry. This is of course an option for future price paths.

In addition, the Authority notes that the return to SunWater above lower bound only accounts for 2 to 3% of the costs of sugarcane production in the BRIA. While such a reduction in prices would obviously be of assistance to sugarcane producer in the current circumstances, a more comprehensive response to the situation within the industry is required.

The nature and form of that assistance and any related adjustment is a matter for the Queensland Government and the industry to determine rather than SunWater in its capacity as a commercial service provider. Where the Queensland Government may wish a lower price to apply than that which SunWater can obtain as a commercial service provider, then SunWater should be in receipt of an appropriate CSO to make up the difference.

A. STATISTICAL APPENDIX

Table A.1: Total Expenditure for Irrigation Works and the Burdekin Falls Dam (October 2000 $m)

	Irrigation Works	*Burdekin Falls Dam*		*Total Expenditure*
		Queensland Government Expenditure	*Commonwealth Government Expenditure*	
1979-80		3.2	0.0	3.2
1980-81		7.8	0.0	7.8
1981-82		7.9	0.0	7.9
1982-83	13.9	7.9	7.7	29.5
1983-84	10.8	9.0	24.8	44.6
1984-85	12.3	10.8	36.4	59.5
1985-86	33.5	9.6	44.1	87.3
1986-87	31.4	0.9	47.5	79.7
1987-88	29.2	0.4	22.3	51.8
1988-89	17.1	0.4	4.7	22.1
1989-90	21.0		5.8	26.8
1990-91	21.6		3.8	25.4
1991-92	23.3		0.2	23.5
1992-93	22.9		0.0	22.9
1993-94	14.6			14.6
1994-95	16.9			16.9
1995-96	17.5			17.5
1996-97	17.7			17.7
1997-98	9.2			9.2
1998-99	10.8			10.8
1999-00	2.7			2.7
2000-01	5.5			5.5
Total	**331.8**	**57.8**	**197.4**	**587.0**

Note: Expenditure data sourced from Sun Water Accounts and DNRM submission to the Public Works Committee. Indexed using yearly average of CPI and BMI (Building Materials Index).

Table A.2: Comparison of estimated and actual expenditure for Burdekin Scheme - Burdekin Falls Dam and Irrigation Area Works ($m)

	Estimated expenditure (1980 report)		*Actual expenditure*
	December 1977 $m	***October 2000 $m***	***October 2000 $m***
Gross expenditure[a]			
Burdekin Falls Dam	75.0	257.1	255.2
Irrigation Area Works	94.4	323.7	331.8
Total	164.4	580.8	587.0
Expenditure net of land and water entitlement sales			
Burdekin Falls Dam	75.0	257.1	255.2
Irrigation Area Works	80.2	275.0	227.5
Total	155.2	532.1	482.7

[a] Irrigation Area Works gross expenditure = net expenditure plus revenues from land sales.
Source: Estimated expenditure sourced from 1980 report to Parliament (pages 3,10 and 15). Actual expenditure from SunWater and the Authority's estimates.

Table A.3: Total (Non-Depreciated) Capital Contributions[a] (October 2000 $ thousand)

	Channel	***River***	***Other***	***Total***
Retention Farms (Headworks Contributions)	8,331	1,103	-	9,434
Auction Sales of Land	20,964	-	-	20,964
Water Sales	20,398	6,523	3,787	30,708
Meters and Barratta Main Channel Upgrade	1,370	671	71	2,112
Total	51,063	8,297	3,858	63,218
Commonwealth Grant[b]	127,979	62,782	6,665	197,405
Total including Commonwealth Grant	179,022	71,079	10,523	260,623

[a] These figures represent contributions relevant to all parties and have not been depreciated to reflect the aging of assets.
[b] Included for information purposes only.

Table A4: Basis of Cost Allocation

Users	*ML*	*Losses*	*ML (with markup for priority[a])*	*Losses (with markup for priority[a])*	*Total*	*Per cent*	*Per cent of total*
Channels							
BRIA	281,721	138,459	281,721	144,158	425,879	68.8%	44.6%
NQWater	10,000	4,838	18,000	9,094	27,094	4.4%	2.8%
NQWater	110,000	53,214	110,000	55,576	165,576	26.8%	17.3%
SunWater	0	0	0	0	0	0.0%	0.0%
Amenities	99	53	178	98	276	0.0%	0.0%
Total	**401,820**	**196,564**	**409,899**	**208,926**	**618,826**	**100.0%**	**64.8%**
River							
BRIA	53,120	0	53,120	0	53,120	17.5%	5.6%
Boards and Other	250,500	0	250,500	0	250,500	82.5%	26.2%
Total	**303,620**	**0**	**303,620**	**0**	**303,620**	**100.0%**	**31.8%**
Haughton/Giru/Other							
BRIA	20,549	9,941	20,549	10,382	30,931	96.0%	3.2%
Citiwater	480	232	864	437	1,301	4.0%	0.1%
Total	**21,029**	**10,173**	**21,413**	**10,819**	**32,232**	**100.0%**	**3.4%**
TOTAL	**726,469**	**206,737**	**734,932**	**219,745**	**954,677**		**100.0%**

[a] High priority water allocations (as specified in the IROL for the Burdekin Scheme) are marked up by 1.8 to reflect the higher level of supply security attributable to this allocation. This factor was determined using the available hydrological modelling of the Burdekin Scheme by the WRU. High priority water allocations include those for urban uses (such as NQ Water's 10 000 ML allocation and water allocated to amenities and Citiwater) and initial losses (allocated to all users).

Table A.5: Depreciated Capital Contributions[a] (October 2000 $ thousand)

	Channel	***River***	***Other***	***Total***
Retention Farms (Headworks Contributions)	7,199	1,019	-	8,218
Auction Sales of Land	18,117	-	-	18,117
Water Sales	17,627	6,029	3,256	26,912
Meters and Barratta Main Channel Upgrade	1,183	621	62	1,866
Total	44,126	7,669	3,318	55,113
Commonwealth Grant[b]	118,282	58,034	6,161	182,477
Total including Commonwealth Grant	162,408	65,703	9,478	237,589

[a] Contributions have been depreciated to reflect the aging of assets.
[b] Included for information purposes only.

Table A.6: Depreciated Capital Contributions relevant to BRIA[a] (October 2000 $ thousand)

	Channel	*River*	*Other*	*Total*
Retention Farms (Headworks Contributions)	7,199	1,019	-	8,218
Auction Sales of Land	18,117	-	-	18,117
Water Sales	17,627	568	3,256	21,451
Meters and Barratta Main Channel Upgrade	1,183	621	62	1,866
Total	44,126[b]	2,208	3,318	49,652
Commonwealth Grant[c]	81,402	10,153	5,912	97,468
Total including Commonwealth Grant	125,528	12,361	9,230	147,120

[a] BRIA's share of depreciated capital contributions. These are based on table A.5 and reflect the capital contributions made by, or attributable to, BRIA users. In particular, some of the water sales noted in table A.5 were to non-BRIA river users. In addition, the Commonwealth grant applies to all users of the Dam and has been attributed to users based on the allocations in table A.4.
[b] BRIA channel contributions do not match the figure reported in section 4.5 ($44.2 million) as the figure in section 4.5 has been rounded to add to the correct total BRIA contribution ($49.7 million).
[c] Included for information purposes only.

APPENDIX B: ALTERNATIVE MEASURES OF WACC

Classical tax system

As noted by Officer (1994), under a classical tax system, the appropriate definition of a company's pre-tax WACC can be expressed as follows:

Cash Flow	WACC
X_0	$r_o = \frac{r_e}{(1-T)}\frac{E}{(E+D)} + r_d\frac{D}{(E+D)}$ where r_e is the return on equity r_d is the return on debt (the cost of debt) E is the market value of equity D is the market value of debt T is the corporate tax rate

The amount of tax collected from the company under a classical tax system by the government can be found as $X_g = T(X_0 - X_d)$. Hence,

$$X_0 = T(X_0 - X_d) + X_e + X_d$$

which converts to:

$$X_0(1-T) = X_e + X_d(1-T)$$

The after-tax WACC under a classical tax system can be expressed as either:

Cash Flow	WACC
X_0(1-T)	$r_1^c = r_e\frac{E}{(E+D)} + r_d(1-T)\frac{D}{(E+D)}$
$X_0 - (X_0 - X_d)T_c$	$r_2^c = r_e\frac{E}{(E+D)} + r_d\frac{D}{(E+D)}$

Dividend imputation system

Under the dividend imputation tax system, shareholders recover, via imputation tax credits, some proportion of the corporate taxes that have already been paid. This has two effects in relation to the calculation of WACC. First, it decreases the effective corporate tax rate and thereby increases the cash flows to shareholders. Second, the decrease in the effective tax rate will reduce the effective tax shield provided by debt relative to equity. Therefore, under dividend imputation, it is necessary to allow for increased cash flow to shareholders and the increased after-tax cost of debt.

In the presence of dividend imputation, the effective tax rate changes from T_c to $T_e = T_c(1-\gamma)$ where:

- T_c is the statutory tax rate (equivalent to the classical tax rate); and
- γ is the value of imputation credits, representing the proportion of tax collected from the company which gives rise to the tax credit associated with a franked dividend.

In the presence of dividend imputation, the appropriate definition of a company's pre-tax WACC can be expressed as:

Cash Flow	WACC
X_0	$r_o = \frac{r_e}{\left(1-T_c\left(1-g\right)\right)}\frac{E}{\left(E+D\right)} + r_d\frac{D}{\left(E+D\right)}$

Under dividend imputation, the effective level of company tax is defined as:

$$X_g = T\left(X_0 - X_d\right) - gT\left(X_0 - X_d\right)$$
$$= T\left(X_0 - X_d\right)\left(1-g\right)$$

Hence:

$$X_0 = \left(X_0 - X_d\right)T_c\left(1-g\right) + X_e + X_d$$

which converts to:

$$X_0\left(1-T_c\left(1-g\right)\right) = X_e + X_d\left(1-T_c\left(1-g\right)\right)$$

In the presence of dividend imputation, the appropriate definition of a company's post-tax WACC can be expressed as:

Cash Flow	WACC
$X_0(1-T_c)$	$WACC\ 1 = r_e \frac{(1-T_c)}{(1-T_c(1-g))}\frac{E}{(E+D)} + r_d(1-T_c)\frac{D}{(E+D)}$
$X_o(1-T_c(1-g))$	$WACC\ 2 = r_e \frac{E}{(E+D)} + r_d(1-T_c(1-g))\frac{D}{(E+D)}$
$X_0 - (X_0 - X_d)T_c(1-g)$	$WACC\ 3 = r_e \frac{E}{(E+D)} + r_d \frac{D}{(E+D)}$
$X_0(1-T_c) + gT_c(X_0 - X_d)$	$WACC\ 4 = r_e \frac{E}{(E+D)} + r_d(1-T_c)\frac{D}{(E+D)}$

Under WACC 1, cash flows are presented as the standard after-tax cash flows under a classical system. The WACC must account for the imputation effects.

Under WACC 2, all operating income is taxed at the company tax rate, adjusted for imputation. The WACC must correct for the overstated tax shield.

Under WACC 3, the effective after-corporate-tax income attributable to equity and debt holders is fully and correctly recognised in the cash flows. All tax adjustments are kept out of the WACC and are recognised directly in the cash flows.

Under WACC 4, imputation is fully and correctly recognised as a modified cash flow but tax is overstated as the debt shield is ignored. The WACC must correct for the overstated tax effect.

APPENDIX C: THE RELATIONSHIP BETWEEN EQUITY, DEBT AND ASSET BETAS

The WACC relationship expresses the entity's cost of capital as the weighted average of the required return on its equity and debt. Because of the equivalence between the assets of the entity to a portfolio of the entity's equity and debt with respective weights of $\frac{E}{E+D}$ for equity and $\frac{D}{E+D}$ for debt, the return on assets can be expressed as follows:

$$R_a = R_e\left(\frac{E}{E+D}\right) + R_d\left(\frac{D}{E+D}\right)$$

Substituting CAPM, expressed as $R_i = R_f + ß_i (R_m - R_f)$, for each of the returns (R_a, R_e and R_d) gives:

$$R_f + b_a\left(R_m - R_f\right) = \left(R_f + b_e\left(R_m - R_f\right)\right)\left(\frac{E}{D+E}\right) + \left(R_f + b_d\left(R_m - R_f\right)\right)\left(\frac{D}{D+E}\right)$$

which is equivalent to:

$$b_a = b_e\left(\frac{E}{D+E}\right) + b_d\left(\frac{D}{D+E}\right)$$

where:

R_i is the expected return on asset *i*;

R_a is the return on assets;

R_e is the return on equity;

R_d is the return on debt (the cost of debt);

R_f is the risk free rate;

R_m is the expected return on the market portfolio of risky assets;

$ß_i$ is the beta, or non-diversifiable risk, of asset *i*;

$ß_a$ is the asset beta;

$ß_e$ is the equity beta; and

$ß_d$ is the debt beta.

An asset beta represents the risk arising from the sensitivity, or covariance, of the operating cash flows generated by the assets of an entity compared with the market in general. Asset betas are not directly observable and therefore must be derived from equity betas. The difference between an asset beta and an equity beta reflects the extent to which debt is used to finance the entity's assets.

It is obvious from the above that the beta of an entity's assets is equal to the betas of the entity's equity and debt weighted by the respective weights for equity and debt. Whilst equity and debt betas can be calculated via CAPM based methods, the asset beta can only be inferred via the above relationship.

Issues in the estimation of the equity beta

An entity's equity beta (β_e) reflects both the market risk associated with its assets and the financial risk carried by shareholders due to the entity's use of debt financing. CAPM assumes that a linear relationship exists between an entity's gearing and the premium associated with that gearing. Two factors have been identified as key determinants of an entity's equity beta:

- financial leverage – the ratio of debt to equity, where a higher level of debt implies a higher beta; and
- sensitivity to cash flows – relative to overall economic activity, where more cyclical cash flows are associated with higher betas.

Typically, equity betas are estimated using historical data through the application of the market model which is derived from CAPM (expanded as follows):

$$R_i = R_f + b_i R_m + b_i R_f$$

$$R_i = R_f (1 - b_i) + b_i R_m$$

$$R_i = a_i + b_i R_m$$

where

a_i is equal to $R_f (1 - b_i)$

b_i is the equity beta

The estimation of equity betas is not without controversy. There are numerous issues relevant to its estimation that the Authority considered, including the following:

- the choice of return measure – for example whether returns should be discrete or continuously compounded, whether raw or excess returns should be used and whether nominal or real returns should be used. Typically the risk free rate and MRP are both expressed as discretely compounded returns;
- the choice of proxy for the market portfolio. By definition, the measurement of a beta is relative to a MRP, which in turn relates to a single specific market. Accordingly, beta estimates for a company differ depending on which stock market index is used – systematic risk is largely country specific and meaningful beta estimates can only be derived using a national index from a company's own country of operation. Therefore caution is required in comparing betas of companies operating in similar industries but in different countries as betas reflect the risk of a company relative to the market in which it operates. Differences in market composition of national share markets do not facilitate direct comparison of betas. As outlined in Table C1, the Australian stock market has a greater component of resource stocks, which account for 16.5% of total Australian market capitalisation. This suggests that the ASX may have a different risk profile compared with the US stock market (where resources stock account for 6.9% of total US stock market capitalisation, and 7.4% of total UK stock market capitalisation);

Table C1: Composition of market indices

Index (as at 30 Nov 1998)	*Resource Sector*	*Industrial Sector*	*Market Capitalisation*
Australian All Ordinaries Accumulation Index	16.5%	83.5%	A$417.0 billion
US Standard & Poors 500	6.9%	93.1%	US$10.6 trillion
UK FTSE 100	7.4%	92.6%	£1.04 trillion

- the sampling interval for the data and the length of the estimation period. Estimates using short interval data (measured at daily or weekly intervals) are systematically biased, such that highly traded securities are overstated whilst those of infrequently traded securities are understated. Alternatively, use of long intervals (measured quarterly or annually), lowers the number of data points used in the estimation process and diminishes the accuracy of beta measures. Empirical evidence discussed in Brailsford, Faff and Oliver (1997) shows that beta estimates using monthly data estimated over four to five year intervals provide the most reasonable trade-off between the number of observations and the stability of beta estimates; and

- beta is typically estimated using the market model, using an ordinary least squares approach. As with all econometric modelling applications, there are a number of assumptions which need to be satisfied in order to produce a robust estimate.

The Authority regards the stability of beta as an important issue in identifying the appropriate equity beta for utility businesses. Empirical evidence from Australian markets strongly supports the mean reversion of beta. Raw beta values, derived from historical data, can be adjusted based on the assumption that beta factors change over time, especially in industries where there is considerable structural reform underway.[31] The true beta has a tendency over time to move toward the market average of one and this adjustment may be represented as:

Adjusted (future) beta = Raw Beta * (0.67) + 0.33

This is the approach adopted by Bloomberg (2000), which appears to be generally accepted by practitioners.

The Authority is still reviewing the use of an adjustment factor for beta. However, for the purpose of the draft recommendation the Authority has applied the Bloomberg adjustment factor as follows when estimating betas:

$$Adjusted\ beta = 0.33 + 0.67b_I$$

Issues in the estimation of debt betas

The debt beta (β_d) reflects the financial risk borne by shareholders due to the entity's use of debt financing. CAPM can be used to identify the debt beta.

[31] International studies supporting the use of adjusted betas include Sharpe, Alexander and Bailey (1995) and Blume (1975).

$$R_d = R_f + b_d \left[R_m - R_f \right]$$

Transformed

$$b_d = \frac{\left(R_d - R_f \right)}{\left[R_m - R_f \right]}$$

where

R_f = the risk free rate

R_m = the expected return on the market portfolio of risky assets

R_d = the expected return on debt

$b_d = \frac{Cov\left(R_d, R_m \right)}{Var\left(R_m \right)}$ = the debt beta

$\left[R_m - R_f \right]$ = the equity risk premium

The debt beta calculation is very sensitive to the size of the MRP. If the latter increases it will reduce the size of the debt beta.

Some regulators apply the CAPM based model with a 50 basis point adjustment to reflect the administrative costs of establishing and maintaining a debt financing facility. The resulting adjusted debt beta will be lower than the unadjusted debt beta. However, equity capital also incurs administrative and other costs and fees. To adjust the cost of only one form of capital (debt or equity) would distort the relative costs. Since there are administrative costs associated with both forms of capital, the Authority does not support an adjustment to the cost of debt or equity for fees which are operating expenses to the business.

Issues in the estimation of asset betas

CAPM assumes a linear relationship between the equity beta and the gearing of an entity. Hence, it is possible to calculate asset betas from equity betas. The asset beta refers to the beta applicable to the assets of an entity that has no debt. The gearing of the entity needs to be taken into account in estimating asset betas because default risk is incorporated in equity values and this needs to be removed to arrive at the entity's risk profile independent of its financial structure. The adjustment of estimated equity betas to remove the financial risk associated with a security, leaving the risk of the asset encapsulated in the asset beta (β_a), is known as de-levering of the equity beta.

There are several approaches to de-levering and re-levering betas and there is no consensus as to which method is the most appropriate. The Authority identified the methods used extensively by academics and regulators to de-lever and re-lever equity betas, and broadly categorised them as follows:

- the standard or textbook approaches including both the Brealey Myers (1999) and Conine (1980) approaches;
- the Davis (1998) approach; and,
- the Appleyard & Strong (1998) / Monkhouse approach.

The Authority undertook an analysis of the alternative approaches and found that the resulting impact on WACC of using the alternative approaches was not significant. This view was also supported by the ORG (2000a) which noted:

> ‘‘The impact on the estimated after-tax WACC of using a different debt beta and levering approaches [is] not significant, however, *provided* that the same approach is used when deriving a proxy asset beta from the comparable entities, as is used when deriving a proxy asset beta back into an equity beta.’

Based on its analysis of the alternative approaches and consistent with its use of the post-tax nominal WACC, the Authority has used the Brealey/Myers approach in all de-levering/re-levering applications.

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