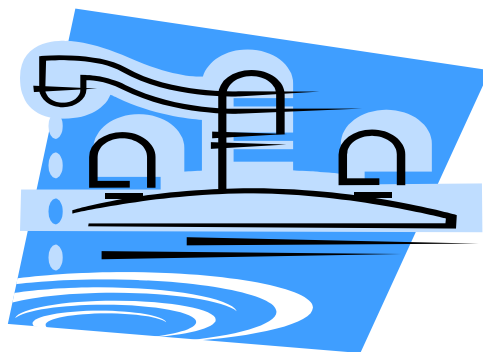




**Independent Consumer & Competition
Commission**

Water & Sewerage Pricing Review



Final Report

25th November 2004

The Independent Consumer and Competition Commission (Commission) is a statutory body, established under the provisions of the Independent Consumer and Competition Commission Act 2002 (the Act). The Commission has been given responsibility for the promotion of competition and fair-trading, the regulation of prices for certain goods and services, and the protection of consumers' interests, and other related purposes.

The Commission has three Commissioners:

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Forward

The Commission has undertaken its first full scale regulatory review of the prices and settings of the two water businesses in Papua New Guinea (PNG) – Eda Ranu and the PNG Waterboard.

This review signals a new approach undertaken by the Commission in determining and approving prices in the water industry. Under this approach, the Commission is providing each water business with significant incentives to drive efficiencies in the operating and maintenance costs of the water networks in PNG. The Commission expects that these incentives will result in water and sewerage prices which are reflective of the efficient costs of supplying water and treating sewerage in the various locations around PNG which have access to reticulated water networks.

The review process was undertaken by the Commission in a transparent manner to encourage the participation of the community through the input of their views and comments on the Issues Paper, which was released on the 17th May 2004, and on the Draft Report, which was released on the 5th October 2004. The submission of these views to the Commission has been invaluable in assisting the Commission reach its final decision.

The Commission has provided appropriate incentives to each water business to invest in the water and sewerage networks to increase capacity and service standards. The Commission regards this as a key feature of the new regulatory model and has attempted to provide the necessary investment signals to increase the access of Papua New Guineans to water and sewerage networks. At the same time, the Commission is concerned with the high level of unpaid for use and illegal connections that is currently occurring on existing water networks. While the Commission encourages greater access to the water network it should be noted that there are significant costs associated with the supply of water. These costs should be shared between all users. Theft of water or failure to pay for water consumed will only result in other users having to pay more for their water requirements. Both Eda Ranu and PNG Waterboard currently offer a lifeline tariff which should be accessed by any users of the water network who are experiencing financial difficulty.

This Final Report sets out the regulatory framework under which the two water companies will provide their services and the 5 year regulatory price path which shall apply from 1st January 2005 to 31st December 2009. Ultimately, the role of the Commission has been to balance the interests of the consumers and the water companies in arriving at the final prices.

Finally, I would like to take this opportunity to thank the individuals, businesses and organisations who gave their time to provide comments to the Commission. I would also like to thank my fellow commissioners and the staff of the Commission for their efforts during the review process.

Thomas Abe

Acting Commissioner

November 2004

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Executive Summary

Overview

This final water and sewerage report and price direction marks the conclusion of the Commission's review into the provision of water and sewerage services throughout Papua New Guinea which began in May 2004. The review was initiated by the Commission under section 25 A(6) of the *Prices Regulation Act*.

As a basic necessity to sustaining life and the positive externalities (such as health benefits) that can be derived from having access to clean water and sewerage services, it is vital that the management of the country's water and sewerage industry continues to improve, expand and reach higher levels of efficiency for the betterment of a developing country such as PNG.

The five year price directions, which begin on 1st January 2005, serve to send appropriate price signals to consumers for their water consumption needs. The Commission has acknowledged the difficulties that many families in Papua New Guinea face in paying for their water. Thus the Commission has supported the continuation of the life line tariff block that is offered by both water companies which allows consumers to access the first 12 kilo litres of water for a fixed amount of Kina. This amount of water should be adequate for basic needs such as cooking, drinking, and for hygienic use.

The final price paths presented in this report show the maximum average revenue that the PNG Waterboard and Eda Ranu will be allowed to earn. This maximum average revenue (MAR) will be allowed to grow by CPI + 7.8 % for the 5 year regulatory period for PNG Waterboard, while Eda Ranu's MAR will grow by CPI + 11% and + 10% respectively in the first two years, and subsequently grow by CPI + 5.0 % annually over the next 3 years.

This price path will allow both PNG Waterboard and Eda Ranu to recover efficient operating costs, to meet the costs of capital and recover the costs for depreciation.

This general price direction means that the two water companies will be able to set prices for the different categories of customers they have. However the average revenue of these categories must be equal to or be less than the maximum average revenue that the Commission will allow under the price path.

The price direction for 2005, with CPI calculated as 6.6 % shows that there will be price adjustments of 14.4% and 17.6% for PNG Waterboard and Eda Ranu respectively.

Background to this Decision

The Commission has the responsibility to regulate the prices of water and sewerage services and thus has conducted a review into the pricing of these services provided by the PNG Waterboard and Eda Ranu.

The review was undertaken in the context of legislative changes relating to the introduction of the *ICCC Act 2002* and in conjunction with amendments made to certain provisions of the *Prices Regulation Act, Chapter 320*. Appendix 3 of the final report contains the several requirements that the Commission had to comply with in determining the new prices for water and sewerage services.

Consultation

During the review process, the Commission provided numerous opportunities to the community, key government departments, Eda Ranu and PNG Waterboard to participate in the tariff reviews. These included the opportunity to make submissions on the Issues Paper and the Draft Report. A list of submissions received as part of this review is at Appendix 4. The time table of the review process has been as follows:

- Release of Issues Paper 17th May 2004
- Receipt of Submissions on Issues Paper 18th July 2004
- Release of Draft Report 5th October 2004
- Receipt of Submissions on Draft Report 22nd October 2004
- Release of Final Report 25th November 2004

Regulatory Environment

The introduction of the *Independent Consumer and Competition Act 2002* changed the nature of regulation in Papua New Guinea. Prior to the *ICCC Act*, the determination of prices under the *Prices Regulation Act* placed greater emphasis on pricing outcomes and were less transparent than the reviews envisaged under the *ICCC Act*. These reviews (prior to *ICCC Act*) failed to consider important issues such as the protection of consumer's interest; service standards; and the encouragement of cost efficiencies.

Under the current regulatory structure in place, Section 21(2A) of the amended *Prices Regulation Act* requires the Commission to consider these issues more appropriately.

Services to be regulated

The Commission has considered that the lack of competition that the two water companies face in the provisions of water and sewerage services could lead to a misallocation of resources and inefficient costs which would translate to uncompetitive prices.

Hence the Commission has decided to continue to directly control the price of water tariffs and the price of sewerage tariffs by placing a maximum average revenue cap on both water companies.

The length of the regulatory period

The Commission has adopted a five year regulatory period which will begin on 1st January 2005 and end on 31st December 2009.

Service Standards

The Commission considers that there is a need for a consistent and transparent process by which customer disputes are resolved and that service standards are met. An important aspect to this process is the need to strike an appropriate balance between the need of both PNG Waterboard and Eda Ranu to make a profit and therefore sustain their businesses, and the needs of consumers. As such the Commission considers that there is a need for both businesses to develop a global customer contract which would apply to all customers so that both the business and the consumers are aware of their respective rights.

The Customer Contract should specify the following types of information:

- Who is covered by the contract – for example the customer, Eda Ranu's and PNG Waterboard's employees and contractors
- What is covered by the contract – for example access to the customer's property.

It should also detail water supply specifics, such as flow rates, drought and emergency response plans and water quality. Meanwhile, in terms of sewerage supply it should provide specific responses to situations arising from sewage spills, sewer blockages and interruption of service. The following issues should also be covered in the Customer Contract:

- Bill Payment;

- Restriction of Services;
- Meters;
- Construction Works;
- Entry onto customer's property;
- Enquiries;
- Complaints; and
- Dispute Resolutions.

In developing this customer contract the Commission expects that Eda Ranu and PNG Waterboard will consult with key customer advocates. The Commission expects that both Eda Ranu and PNG Waterboard will have developed these consumer contracts by the end of 2005 and the Commission will only approve the annual price adjustment for 2006 if the businesses are able to provide the Commission with the terms and conditions of the contract by that time.

The Commission will work with both Eda Ranu and PNG Waterboard to determine an appropriate mechanism which provides both services providers the appropriate incentive to deliver services. The Commission aims to work with both companies to develop this mechanism so that it can be introduced as part of the 2007 price adjustment process. This mechanism will be referred to as the service standard mechanism.

Demand Forecasts

Eda Ranu has predicted a steady growth in demand for their water and sewerage services over the 5 year regulatory period. Eda Ranu based their figures on a population growth of 2.75 % per annum in Port Moresby.

PNG Waterboard's demand growth is less consistent. This is as a result of PNG Waterboard operating in four different markets which have varying growth rates.

Revenues and Costs

In order to determine the maximum average revenue cap for each of the two water businesses, the Commission has given consideration to their respective costs and revenues by using a building block approach. The Commission's assessment of these costs and revenues are further explained below.

The Commission's assessment of costs included;

- the determination of the initial Regulatory Asset Base (RAB) and a rate of return to apply to the RAB;
- the roll forward of the RAB, based on indexation, disposables, capital expenditure and depreciation;
- the operating and expenditure costs for the business; and
- the recovery of Depreciation expenses.

Regulatory Asset Base and Capital Expenditure

RAB at 2001

For the purpose of determining an opening RAB the Commission employed a return on assets test to determine the revenue stream that the assets of the business generated. The Commission discounted these revenue streams to 2001 to determine the value of the assets to the business at that time; thereafter the Commission rolled forward this value of the RAB to 2004.

The Commission's final decision for the opening RAB for the PNG Waterboard and Eda Ranu is K68.12 million and K20.74 million respectively.

RAB 2005 – 2009

The Commission has rolled forward the 2004 opening RAB by adjusting it for changes in depreciation, projected capital expenditure and inflation. The Commission has expressed to the water companies that only prudent capital expenditure will be rolled in. The Commission treats depreciation differently to accounting depreciation, by depreciating the asset over its entire life using a straight line approach.

Tables ES.1 and ES.2 summarise the Commission's final decision in regard to the roll forward of the RAB for PNG Waterboard and Eda Ranu.

Table ES.1 Roll forward of the initial RAB – Eda Ranu

Year ending 31 December (nominal Kina '000)	2005	2006	2007	2008	2009
Opening value	20,734	80,167	143,230	210,303	281,624
Capital expenditure (net of capital contributions)	56,600	56,440	56,440	56,440	56,440
Disposals/assets written off	Nil	Nil	Nil	Nil	Nil
Depreciation	1,089	2,049	3,083	4,201	5,408
Indexation	3,923	8,671	13,716	19,082	24,787
Closing value	80,167	143,230	210,303	281,624	357,444

Table ES.2 Roll forward of the initial RAB – PNG Waterboard

Year ending 31 December (nominal Kina '000)	2005	2006	2007	2008	2009
Opening value	68,152	88,929	114,326	137,342	163,031
Capital expenditure (net of capital contributions)	16,822	20,106	16,336	17,627	13,382
Disposals/assets written off	Nil	Nil	Nil	Nil	Nil
Depreciation	2,170	2,628	3,119	3,631	4,161
Indexation	6,125	7,919	9,800	11,692	13,578
Closing value	88,929	114,326	137,342	163,031	185,830

Cost of Capital

To determine an appropriate rate of return for investing in water and sewerage infrastructure, the Commission has employed the parameters contained in Table ES.3

The Commission determined a pre-tax real weighted average cost of capital of 10.05 %.

Table ES.3 Parameters used in the calculation of the WACC

Parameter	Value
Nominal Risk Free Rate	12.86%
Real Risk Free Rate	4.50%
Inflation Rate	8.00%
Cost of Debt Margin over rf	2.00%
Nominal pre-tax cost of debt	14.86%
Real pre-tax cost of debt	6.35%
Market Risk Premium	6.00%
Corporate Tax Rate	30.00%
Effective Tax Rate for Equity	30.00%
Gearing (D/V)	60.00%
Debt Beta	7.0%
Asset Beta	35.0%
Equity Beta	75.4%
Post-tax nom return on equity	17.38%
Post-tax real return on equity	8.69%
Nominal Vanilla WACC	15.87%
Real Vanilla WACC	7.29%
Post-Tax Nominal WACC	13.19%
Post-Tax Real WACC	4.81%
Pre-Tax Nominal WACC	18.85%
Pre-Tax Real WACC	10.05%

Operating Costs

During the review process the Commission called upon the two water companies to provide details of operating, expenditure and maintenance costs which they sought to recover. Having assessed the

efficiency of these costs, the Commission believed that there was scope for improvement in terms of efficiency gains.

To encourage greater efficiency the Commission applied a compounding efficiency factor of 1% and 2% per year on PNG Waterboard and Eda Ranu respectively. The Commission believes that these efficiencies could be gained through the reduction of leakages throughout the network.

The Commission's final decision for efficient operating costs are set out in table ES.4.

Table ES.4 Eda Ranu's and PNG Waterboard's Operating Costs

Financial year ending 31 December (Kina 2004)	2005	2006	2007	2008	2009
Commission's operating expenditure allowance for Eda Ranu (000)	55,061	57,822	56,777	55,151	53,659
Commission's operating expenditure allowance for PNG Waterboard (000)	19,900	19,600	19,400	19,200	19,000

Total revenue requirement

Given the Commission's decisions on RAB, operating costs and the WACC, the Commission has determined the total revenue requirements for PNG Waterboard and Eda Ranu. These are displayed below, in tables ES.5 and ES.6

Table ES.5 The Commission's cost building blocks—PNG Waterboard

Year ending 30 June (2004 Kina '000)	2005	2006	2007	2008	2009
Operating expenditure	19,900	19,600	19,400	19,200	19,000
Depreciation	2,009	2,253	2,476	2,669	2,832
Return on fixed assets (pre-tax)	7,272	8,713	9,989	11,039	11,871
Total revenue requirement	29,181	30,566	31,865	32,908	33,703

Table ES.6 The Commission's cost building blocks—Eda Ranu

Year ending 30 June (2004 Kina '000)	2005	2006	2007	2008	2009
Operating expenditure	55,061	57,822	56,777	55,151	53,659
Depreciation	1,009	1,756	2,448	3,088	3,680
Return on fixed assets (pre-tax)	4,671	9,576	14,032	18,079	21,747
Total revenue requirement	60,741	69,155	73,257	76,318	79,086

Price Path

The Commission determined the price path by linking the costs of providing the service (revenue requirement) over the regulatory period with the projected demand over the same period. From this, the Commission has determined the Maximum Average Revenue that the two water companies can earn from the provision of their services.

Table ES.7 sets out the 5 year regulatory price path for PNG Waterboard and Eda Ranu.

Table ES.7 Eda Ranu's and PNG Waterboard's price path for water & sewerage services.

Year ending 31 December	2005	2006	2007	2008	2009
Eda Ranu	CPI + 11.0%	CPI + 10.0%	CPI + 5.0%	CPI + 5.0%	CPI + 5.0%
PNG Waterboard	CPI + 7.8%	CPI + 7.8%	CPI + 7.8%	CPI + 7.8%	CPI + 7.8%

Pass-Through

The Commission has allowed for both PNG Waterboard and Eda Ranu in making a submission for tariff adjustments to incorporate effects of a pass-through event during the regulatory period. Pass through events are;

- a change in taxes
- an act of terrorism
- major natural disaster
- an augmentation event

Other Regulatory Issues

Throughout the review process the issue of illegal connections has been an extremely sensitive and highly contentious issue. While the response from the public to the Issues Paper and the Draft Report has been very poor, the Commission has acknowledged the unhappy views that consumers have displayed in letters to the editor in the two national newspapers. The majority of rate payers are aware that unpaid for use through illegal connections is being subsidised by users who are paying for their water. The Commission's view is that because this is a very sensitive matter, water being a vital factor in sustaining life, a public forum involving key government departments, key ministers, both water companies, community leaders and the Commission would assist in developing an appropriate national policy response to the illegal use of water.

1. Introduction

The Independent Consumer and Competition Commission (*“the Commission”*) is a statutory body, established under the provisions of the *Independent Consumer and Competition Commission Act 2002* (*“the ICC Act”*). The Commission has been given the responsibility for the promotion of competition and fair trading, the regulation of prices for certain goods and services, and the protection of consumers’ interests, and other related purposes.

In its role of regulating prices of certain declared goods and services, the Commission has the responsibility to regulate the prices of water and sewerage services provided by the PNG Waterboard and Eda Ranu. The relevant declarations for water and sewerage services have been made under Section 10 of the amended *Prices Regulation Act 2002*.

Briefly, the current regulatory arrangements under the *Prices Regulation Act* (Chapter 320) cover the following areas:

- PNG Waterboard water tariff categories;
- PNG Waterboard sewerage tariff categories;
- Eda Ranu water tariff categories; and
- Eda Ranu sewerage tariff categories.

Under the provisions of Section 25A (6) of the *Prices Regulation Act 2002*, the Commission has decided to undertake a major review of the pricing regulatory arrangements affecting water and sewerage services.

The review is to be undertaken in the context of legislative changes relating to introduction of the ICC Act and in conjunction with amendments made to certain provisions of the *Prices Regulation Act, Chapter 320*. The Commission has the opportunity as part of this review to consider whether continuing price control or regulation of water and sewerage services is required, and if so the form of regulation that should apply to these services.

To assist the Commission in making informed decisions, the Commission released an issues paper on 17 May 2004 and invited submissions from all interested parties including the PNG Waterboard and Eda Ranu, Government Departments and institutions, business houses, consumers and the general public. The Issues Paper provided an overview of the matters that the Commission considered to be vital as part of the review and the processes that the Commission used in undertaking the review.

This issues paper was followed by the release of the Draft Report which was again made available to the public for comments.

This Final Report now brings forth the final price determinations which will apply for water and sewerage prices within PNG over the five year regulatory period commencing 1 January 2005.

1.1 Timetable

Under the timetable outlined in the Issues Paper the Commission was expecting to receive all submissions by 18th July 2004. However, both PNG Waterboard and Eda Ranu were unable to provide the Commission with the appropriate level of information until the end of August. As such the review process has been conducted according to the following timetable:

Issues Paper Released	-	17 th May 2004
Release of Draft Report	-	5 th October 2004
Receipt of submissions on Draft Report	-	22 nd October 2004
Release of Final Report	-	25 th November 2004

1.2 Background to the review

The function of regulating the prices of water and sewerage services was previously performed by the Office of the Price Controller, through the Department of Treasury and the former Consumer Affairs Council.

The methodology used to set prices for water and sewerage services over the years have been applied on an *ad hoc* basis with inconsistent pricing determinations. These reviews were generally less transparent than the reviews envisaged under the *ICCC Act* and the reviews themselves were more focused on prices and not on other important factors, including:

- the protection of consumers interest;
- service standards;
- the encouragement of cost efficiencies.

However, these factors are now required under Section 21(2A) of the amended *Prices Regulation Act* and as such the Commission has been careful to consider these prices appropriately.

The Commission has already undertaken a review of the water and sewerage services provided by the PNG Waterboard and Eda Ranu,

resulting in weighted average tariff adjustments of 24% and 17% respectively for each company. However, these adjustments were granted as an interim measure only and the review did not constitute a price review as there was insufficient information from both entities.

Eda Ranu and PNG Waterboard sought respective price increases of 11 per cent and 18.8 per cent for the 2004 year. However, the Commission decided that it was inappropriate to increase prices at that stage given the lack of information and a desire to set a more formal price structure than the one which applied under the previous regulatory model. Eda Ranu argued against this decision due to what it felt was an underlying need to increase prices to ensure that costs were recovered. However, the Commission considered that the cash flow problems that Eda Ranu was experiencing did not justify for price increases. Rather, it was the Commission's view that it would not allow a general price increase due to a few large customers, primarily the departments of defence and health and the police force, not paying their bills. PNG Waterboard's proposed price rise was also refused on similar grounds. It was the Commission's decision that it would conduct a more formal review of prices for the period commencing 1 January 2005.

This review constitutes a major review of all issues relating to the provision of water and sewerage services in PNG and as such the Commission has invited submissions from all interested parties. The Commission received a number of submissions on the Issues Paper from the following organisations:

- Eda Ranu
- PNG Waterboard
- Mr Kepsey Puiye
- Mr Zurinuoc – Provincial Administrator for Morobe
- Mr Kevin Yaxley – General Manager Airways Hotel

and on the Draft Report the Commission received submissions from:

- Eda Ranu
- PNG Waterboard

The Commission has been careful to ensure that all views and comments raised in these submissions have been given appropriate consideration.

1.3 Legislative requirements

The Commission undertook the review in accordance with the amended provisions of the *Prices Regulation Act* (Ch. 320), having regard to the following:

- Sections 10, 20(A&B), 21, 25 and 32A of the amended *Prices Regulation Act, as amended*
- Confidentiality and public disclosure provisions of the Act on information received from submissions
- The current prospective outlook for the water and sewerage industry in PNG.

The water and sewerage services provided by Eda Ranu and the PNG Waterboard are declared services under Section 10 of the *Prices Regulation Act* (Chapter 320). Under the provisions of the legislation, the Commission may, by order in the National Gazette, inter alia, fix the maximum price at which the declared services may be supplied.

The ICCC Act made a number of amendments to the *Prices Regulation Act* under which the prices for water and sewerage services can be determined. In particular, the *Prices Regulation Act* has been amended in the following ways:

- Section 20A requires the ICCC to publicly notify its intention to determine a prices order under Section 21 at least 30 days in advance.
- Section 21 (2A) (*see Appendix 1*) introduced specific requirements on the ICCC in terms of the matters that it must consider when making a pricing order including encouraging greater efficiency, ensuring an appropriate rate of return, and ensuring appropriate safeguard for quality, reliability and safety of water and protecting consumers from the misuse of market power by suppliers of declared goods and services,
- Section 25A, 25B and 25C specified the process by which a review of a Pricing Order can be undertaken and specifies the deadlines that must be met, the requirement for the Commission to publish details of its decisions and the form of decision that can be taken by the Commission as a consequence of such a review,
- Section 25A (6) allows the Commission of its own volition to initiate a review.
- Section 25C(3) specifies that in response to a review, the Commission may determine to:

- Continue to operate the existing price control arrangements in their present form.
 - Vary the existing price control arrangements, or
 - Terminate the present price control arrangements.
- Section 32(A) provides for declaration of certain goods or services for price monitoring purposes as an alternative to price control.

Under a prices monitoring arrangement, if it is evident that price movements are not reflective of appropriate competitive market benchmarks, the Commission can recommend to the Minister that the relevant goods or services be declared under Section 10 & 21 for full price control purposes.

These amendments to the *Prices Regulation Act* increase the flexibility of the Commission in terms of its overall price control tasks, and allow for appropriate mechanisms to be developed and implemented that meet the objectives of the Government in terms of price control while minimizing the cost of undertaking the price control tasks, thereby ensuring that price control does not of itself create other unintended economic consequences.

1.4 Format of the review process

This review was initiated under the provisions of Section 25A (6) of the *Prices Regulation Act*. The process of the review was conducted in a public and transparent manner and in addition, key stakeholders, other interested parties and the public were invited to make submissions in regard to any issues within both the Issues Paper and the Draft Report.

As part of this process the Commission released an Issues Paper on 17th May 2004 outlining the key issues of the review; and a draft was report was released on 5th October 2004 which further defined the Commissions draft price determinations and price directions.

2. The Regulatory Process

This section sets out the Commission's approach to regulation, including a discussion on the need for regulation and the regulatory approach employed by the Commission.

This includes:

- The need to regulate;
- Eda Ranu's operating environment;
- PNG Waterboard's operating environment;
- The form of regulation; and
- The length of the regulatory period.

2.1 The need to regulate

The legislative requirements of the *ICCC Act* and amendments made to certain provisions of the *Prices Regulation Act* have prompted the need for a review to decide whether to continue, amend or terminate the current regulatory arrangements for water and wastewater. Having considered these issues, the Commission decided to conduct a review which was transparent, accountable and consistent in providing a pricing methodology that was beneficial to both consumers and the suppliers of water and sewerage services.

In the Issues Paper the Commission stated that access to clean and affordable drinking water was an important building block in the ongoing development of Papua New Guinea. As such, it was important that all Papua New Guineans who are connected to the water network are able to access this water at a price which meets two important objectives:

- To at least recover the costs of supplying this water; and
- To ensure that Papua New Guineans are able to access affordable drinking water.

Water is supplied to Papua New Guinean consumers by two water companies, Eda Ranu and the PNG Waterboard. However, the choice of water supplier is based on a consumer's location rather than a competitive market. This provides both companies with a monopoly over the areas that they service. Given the problems normally associated with the provision of services by monopoly service providers, including inefficient production and potential pricing concerns, the services provided by Eda Ranu and PNG Waterboard are regulated by the Commission.

Submissions

In its submission to the Issues Paper, Eda Ranu acknowledged the need to regulate its business operations to ensure that an efficient and affordable water supply and sewerage network was available to the citizens of the National Capital District (NCD). However, Eda Ranu sought to have the regulatory regime structured in such a way that it allowed Eda Ranu to operate independently and be insulated from non-commercial pressures and constraints. Furthermore, Eda Ranu sought certainty in terms of the agreements and the regulatory procedures into the future so that Eda Ranu could provide specific services and maintain discretion over the planning and management of the water network. Eda Ranu's concluded by requesting the Commission to apply a regulatory regime which would ensure that pricing policies could be designed to ensure adequate cost recovery so that Eda Ranu would be able to achieve a desirable level of financial independence.

PNG Waterboard stated that it also agreed with the Commission regarding the need to regulate by stating that due to the virtual monopoly which currently exists in the provision of water services there was a need to ensure that both businesses are provided with appropriate incentive to achieve efficiency gains and that these efficiencies can be passed through to consumers.

Discussion

Ultimately, the Commission is concerned with ensuring that the consumers of PNG have access to affordable drinking water and access to the sewerage network. However, the Commission is also aware of the dangers associated with prices which are not reflective of at least the efficient costs production in the delivery of both water and sewerage services. At the same time, pricing products above efficient cost recovery leads to monopoly profits for the suppliers of the services which cause significant strain on the wider economy through inappropriate allocations of resources. The need for regulation is due to the lack of a competitive market where the price mechanism provides consumers with ultimate protection from excessive charging and helps to ensure that competitors force each other to become efficient in the production and supply of goods and services.

The Commission notes that the natural monopoly position enjoyed by both Eda Ranu and PNG Waterboard presents a barrier to entry for any potential competitors. This natural monopoly position is largely derived from the relatively high initial set up costs for water and sewerage network infrastructure, which in turn results in average costs falling over time as more users connect to the service.

Traditionally, the high set up costs of water and sewerage infrastructure has discouraged its private provision and together with wider social considerations has resulted in the provision of water and sewerage services being largely the responsibility of governments. The lack of alternate suppliers and competitive pressures in any market generally results in an inefficient allocation of resources. This inefficient allocation of resources may have wide ranging impacts throughout the economy. In order to minimise the impact of any misallocation of resources, efficient cost based incentive regulation of prices has been used to provide monopoly businesses with appropriate signals to increase efficiency in production. In addition, incentive regulation seeks to provide the regulated entity with appropriate incentives to invest in infrastructure vital to the provision of regulated services.

Final Decision

Given the potential misallocation of resources associated with the monopoly provision of water and sewerage services and the needs of the consumers, the Commission considers that on balance it is appropriate to continue the regulation of water and sewerage services.

2.2 Eda Ranu's operating environment

Eda Ranu provides water and sewerage services to consumers within the PNG capital, Port Moresby. Before 1996 the National Capital District Commission was responsible to the provision of all capital works with the capital district including investment in the water and sewerage infrastructure. In 1996 a new water company, NCD Water & Sewerage Limited (trading as Eda Ranu) was created and the functions and responsibilities of water and sewerage works department were taken out of the NCDC and transferred into the new company.

Eda Ranu now provides water and sewerage services to the people of Port Moresby. The operation of the water network is based on the delivery of water from the treatment plant at Mount Eriama and distributed and reticulated through pipes into business, residential and settlements areas. Eda Ranu obtains and supplies raw water from the Laloki River at the Rouna 1-3 headpond through an agreement with PNG Power and also by pumping direct from Bomana pumping station with payment to the national Department of Environment and Conservation.

The water from Mount Eriama is treated by the Concessionaire under a build operate transfer (BOT) scheme which is referred to throughout this document as the Concessionaire arrangement. The sewerage

network collects waste from both residential and commercial properties and transfers it from these areas to the treatment ponds at Waigani Swamp for the inland areas and while sewerage for the coastal areas is discharged out at sea.

2.3 PNG Waterboard's operating environment

As noted in the Issues paper, PNG Waterboard operates across the remainder of PNG and has a number of water networks which have varying concentrations of consumers. This is highlighted in Table 2.1 which provides a summary of the relative sizes of the various water networks included in PNG Waterboard's operating market.

Table 2.1 PNG Waterboard's networks

Size of network	Regions	Relative cost to PNG Waterboard	Relative revenue to PNG Waterboard
No connections	Head Office	33%	0.6%
Less than 1000 connections	Beraina & Kwikila Branches	0.7%	0.4%
1000 to 2000 connections	Alotau, Daru, Kimbe, Kavieng, Kundiawa, Popondetta & Rabaul Branches	20%	19%
2000 to 6000 connections	Madang, Mount Hagen & Wewak Branches	25%	28%
Greater than 6000 connections	Lae Branch	20%	52%

As can be seen by comparing the relative cost of production in each area the majority of the fixed costs of supply related to the head office of PNG Waterboard are borne by consumers in the Lae Branch. However, all branches benefit from the services provided by the PNG Waterboard head office. As such, within PNG Waterboard's business there is a degree of cross subsidization between the large branches and the smaller branches.

2.4 Form of regulation

As discussed above, it is the Commission's opinion that water and sewerage services in PNG should continue to be regulated due to their natural monopoly business environments. As such the Commission has adopted a cost of service approach to determining the cost for

both Eda Ranu and PNG Waterboard, as outlined in the Issues Paper and the Draft Report.

The regulatory principles outlined in schedule 21 of the *Prices Regulation Act* provides for the Commission to apply a price path for declared services such that it reflect the efficient cost of providing declared services given the operational circumstances of providing water and sewerage services within PNG. The full objectives of the act are as follows:

- the need to protect consumers and users of the declared goods or services from misuse of market power in terms of prices, pricing policies (including policies relating to the level or structure of prices) and the standard of the declared goods or services; and
- the cost of making, producing or supplying the declared goods or services; and
- the desirability of encouraging greater efficiency in relation to making, producing or supplying the declared goods or services; and
- the need to ensure an appropriate rate of return on any investment in relation to the declared goods or services; and
- the borrowing, capital and cash flow requirements of persons making, producing or supplying the declared goods or services; and
- considerations of demand management and least-cost planning; and
- existing standards of quality, reliability and safety of the declared goods or services, and the desirability of encouraging improvements in those standards; and
- the effect any proposed order on general price inflation over the medium term; and the economic and social impact of ant proposed order; and
- any other matters the Commission considers relevant.

In order to satisfy the objectives of the Act the Commission must consider the appropriate form of price control regulation. In the Issues Paper the Commission discussed three alternative forms of price control:

- a 'total revenue' cap;
- an average revenue cap; and
- an average price cap.

The Commission indicated a preference for the use of an average revenue cap as it provided the business with the incentive to increase the number of connections on each of the networks. The Commission has received support for this approach from both Eda Ranu and PNG Waterboard. Eda Ranu has stated that it considers that a revenue cap is appropriate given its ability to control customer numbers and subsequently forecast demand for water. Meanwhile, PNG Waterboard stated that it preferred an average revenue cap for both water and sewerage, but considered that it should retain the ability to adjust individual tariff settings, which is allowed under an average revenue cap.

Under an average revenue cap regulated businesses have an incentive to reduce costs, expand services and meet growing customer demand provided the overall level of revenue that is generated on each kilolitre is not in excess of the average revenue cap. As customer numbers grow, revenues grow and thus there is less profit risk for the business than under a total revenue cap, with the amount of volatility depending upon the level of marginal costs. Each additional customer connected effectively generates the average revenue per customer regardless of the actual tariff and usage pattern of that customer whereas the marginal cost of adding a new customer to a network system is usually less than the average revenue that the new customer generates.

Average revenue caps are often used where there is a need to discourage over use of some resource on a per customer basis for environmental or other reasons, while at the same time there is a need to encourage new connections to the service as part of a program to extend the coverage of the service to new customers. Provision of water sewerage services are examples of the type of regulated service for which an average revenue cap is often applied.

Final Decision

The Commission will apply a Maximum Average Revenue cap form of regulation to Eda Ranu and PNG Waterboard for the five year regulatory period commencing on 1st January 2005.

2.5 Length of regulatory period

The length of the regulatory period is an important parameter in the regulatory model. In the Issues Paper the Commission indicated its preference for a longer regulatory period to provide the businesses with an appropriate planning horizon and opportunity to achieve efficiencies.

Submissions

Eda Ranu has supported the Commission and suggested that a five year regulatory period is a suitable period for the first regulatory period. In addition, PNG Waterboard has also agreed with the longer regulatory period, albeit with a potential trigger should the settings in the regulatory model be affected by an external event outside the control of the businesses and the Commission.

Mr Puiye has also supported the Commission's suggested regulatory period. However, Mr Puiye noted that the Commission has significant discretion under the various legislation that states that the Commission is able to 'reopen' the regulatory process if there are any abnormalities or departures from the settings outlined in the regulatory model.

Discussion

The Commission is seeking to provide an environment which encourages efficient investment and provides the businesses with an opportunity to achieve efficiency gains in both operating and capital expenditure programs. The longer the regulatory period the greater is the incentive for the business to become more efficient as it provides an opportunity for the business to keep the efficiency savings for a longer period. The benefits of a long (five-year) regulatory period include:

- greater incentives for achieving increased efficiency, by allowing the businesses to retain any gains arising from cost reduction;
- a greater opportunity for forward planning by the business as revenue is relatively assured, thus increasing the certainty of the business;
- a more stable and predictable regulatory environment for the businesses, which could lower business risk and lead to better investment decisions; and
- fewer regulatory reviews and lower costs for the regulator and the interested parties.

The Commission also seeks to reduce the regulatory burden on the regulated businesses and at the same time provide a simple mechanism for adjusting prices in order to ensure that revenue is sufficient to recover efficient costs in each year of the regulatory period. However, there are some disadvantages of a longer regulatory period, including the increased potential for actual costs to either significantly increase or decrease by comparison to the costs assumed in the regulatory model.

While Eda Ranu and PNG Waterboard have given in principle support to a five year regulatory period, both have noted that there is a significant risk that the forecast costs will be quite different to actual costs towards the end of the regulatory period. PNG Waterboard has argued that it is appropriate to have an internal review mechanism to ensure that any unforeseen circumstances such as drought or currency movements are appropriately managed.

While acknowledging PNG Waterboard's comments, the Commission is hesitant to provide a mechanism which provides too much flexibility. The Commission is seeking to maintain a sufficiently rigid regulatory regime which provides both businesses with significant opportunities to outperform the regulatory settings. The Commission is in favour of maintaining these incentives.

The Commission considers that the potential benefits and savings associated with a longer regulatory period outweigh the potential benefits associated with a shorter regulatory period. However, to ensure that the potential problems associated with an unavoidable departure from the key settings in the regulatory model are minimised, the Commission has set out a cost pass through mechanism which covers the following material events:

- A change in taxation;
- A change in the capital expenditure program;
- A change in exchange rate; and
- A change in the dividend policy in special circumstances for PNG Waterboard which results in a material fall in retained earnings and an ability to cross subsidise costs.

Given the introduction of a pass through mechanism the potential costs of a longer regulatory period should be avoided.

Final Decision

The Commission has decided that the appropriate regulatory period should be five years.

3. Building-block approach

The principles articulated in the previous section and section 21 of the *Prices Regulation Act* provide the overall guidance to the Commission in its determination of costs that relate to regulated water and sewerage services. These principles require the Commission to consider the efficient cost building blocks in determining the price path. Therefore, the Commission has used the following building blocks to determine the efficient cost of providing water and sewerage services within PNG:

- Operating costs;
- Return on assets (asset base multiplied by the rate of return determined under the weighted average cost of capital); and
- Return of assets (depreciation of assets in the asset register).

As such the notional revenue requirement for a particular year in the price path can then be expressed as:

$$\text{notional revenue requirement} = \text{efficient operating cost} + \text{return on capital} + \text{return of capital}$$

where:

- Efficient operating costs include efficient operating and maintenance costs;
- Return on capital includes the return on the regulatory asset base (RAB) where the initial valuation is to be determined; and
- Return of capital is the allowance for depreciation in each year.

In determining these costs the Commission invited PNG Waterboard and Eda Ranu to provide detailed financial models of their current and projected operations. The Commission has analysed the prudence of these forecasts to ensure that the costs used in this Final Decision are those that would be borne by an efficient business providing water and sewerage services within the individual operating markets of PNG Waterboard and Eda Ranu.

3.1 Establishing the efficient cost building blocks

The Commission has used a cost building block approach to determine the notional projected revenue requirements for both water businesses in PNG. The cost building blocks comprise:

- a rate of return on the RAB, including any capital expenditure incurred during the regulatory period;
- depreciation of the RAB; and

- operating and maintenance expenditures.

Each of these building blocks is discussed below.

3.2 Regulatory Asset Base

The 'return of capital' and 'return on capital' building-block components are determined, among other things, by the value of the regulatory asset base (RAB). The RAB is usually determined in a two-step review process. The first step involves determining the appropriate value of the opening RAB. In the second step, the regulator assesses the proposed capital base over the new regulatory period, taking into account:

- the opening value of the capital base calculated in the first step of the process;
- the forecasts of capital expenditure, to determine whether they are prudent and efficient, and hence can be included in the forecast capital base for the new regulatory period; and
- forecasts of depreciation, disposals, inflation and asset redundancy (if any) over the new regulatory period.

This second step of the process is referred to as the roll forward of the RAB and is discussed in sections 3.3 and 3.4. The remainder of this section focuses on the determination of the opening RAB.

The Commission has a number of options for determining the underlying valuation of the asset bases of PNG Waterboard and Eda Ranu. These options include:

- to treat all investment to date in the water and sewerage networks as a sunk investment and thus valued at zero;
- to adopt some form of current cost replacement approach which reflects the 'cost' that would be incurred by a new entrant seeking to establish the water and sewerage business at today's costs;
- to adopt a 'depreciated historical value' assessment of the asset base; or
- to adopt some form of optimised deprival value (ODV) as a means of assessing the value of the asset to the business.

In the Issues Paper the Commission indicated that, in order to determine the opening value for the regulatory period commencing 2005, it would use the ODV approach to value the assets of the business in 2001 while rolling forward this value to include all prudent capital expenditures over the years 2001 to 2004

Eda Ranu and PNG Waterboard have agreed with the Commission's decision to value the assets under the ODV approach.

Discussion

The optimised deprival valuation (ODV) assesses the value of the asset to the business. The ODV is defined as the cost that the asset owner would incur or the revenue that the asset owner would forego were they to be deprived of the asset and its associated revenue stream. In this way it recognises not only that the likely future value of the asset is part of an ongoing business, but also that the future revenue stream would be unlikely to equate to the full replacement cost of the asset in its present form (even after some form of optimisation). The ODV approach also has the added advantage that it is a better reflection of the cost that a new entrant would pay for an asset. That is, a new entrant would only enter the market if it was satisfied that it would earn an appropriate rate of return on any capital invested.

In implementing the ODV approach, the Commission has undertaken a return on assets test (RAT) as a means of estimating the likely revenue that could be generated by the asset in its existing form. This revenue stream has then been discounted back to determine the implied value of the asset base for the purposes of the ODV assessment.

The Commission notes that, in response to the Draft Report, PNG Waterboard has proposed that the operating cash flows derived by the Commission in the Draft Report should be used to calculate the ODV of assets in year 2001 instead of the RAT estimate of the likely cash flows using the revenue scenario operative in 2001.

PNG Waterboard has stated that it considers the asset valuation is actually too low and has argued that the cash flows calculated in the Draft Report should be used in the calculation of the RAB. However, this results in a well known circularity problem whereby future cash flows which are dependent of the valuation of the asset base in the first place are the basis of the valuation of the asset basis. In calculating the revenue setting in the Draft Report the Commission avoided this problem by using the RAT which effectively drew a line in the sand and valued the assets as at 2001 under certain projections for growth in the utilisation of the assets over a 15 year period. This valuation was then updated to 2004 using the information provided by PNG Waterboard on the prudent new investment undertaken in the intervening years, and the depreciation and write off of assets over that period. Therefore, the Commission believes that the approach adopted in the Draft Paper of using a RAT to estimate the likely revenue that could be generated by the asset in its existing form remains appropriate and avoids the circularity problem inherent in the proposal made by PNG Waterboard.

The ODV approach effectively values the potential cash flows that could be generated by the assets in their existing condition. Table 3.1 sets out the Commission's assessment of the rate of return for both Eda Ranu and PNG Waterboard.

Table 3.1 Eda Ranu's and PNG Waterboard's ODV RAB 2001

Kina (K'000 nominal)	Eda Ranu	PNG Waterboard
Assumed inflation rate	8.0%	8.0%
WACC	10.0%	10.0%
Assumed growth rate	1.0%	0.0%
NPV of revenues	K340,435	K120,004
NPV of costs	K324,879	K114,570
NPV of return on assets	K15,556	K5,434

Given the Commission's growth assumptions, the RAB values of Eda Ranu and PNG Waterboard in 2001 were K15.56 million and K5.43 million respectively.

Having considered capital expenditure, indexation and depreciation for Eda Ranu and PNG Waterboard from 2001 to 2004, the Commission has rolled forward the asset bases to bring them to a 2004 value. In Table 3.2 and Table 3.3 the Commission sets out its calculation of the rolled forward of the initial RAB in 2001 to the RAB as at the end of 2004. These values are presented in 2004 kina values, and thus there is an indexation adjustment which is effectively measuring the impact of inflation on the RAB values over the period to 2004.

Table 3.2 Eda Ranu's RAB 2001 to 2004

Eda Ranu (nominal K'000)	2001	2002	2003	2004
Opening value (undepreciated)	15,556	16,733	18,241	19,486
Capex/Additions (net of capital contributions)	343	605	271	210
Indexation new assets	1,258	1,363	1,470	1,567
Depreciation for year	425	460	496	529
Closing value	16,733	18,241	19,486	20,734

Table 3.3 PNG Waterboard's RAB 2001 to 2004

PNG Waterboard (nominal K'000)	2001	2002	2003	2004
Opening value (undepreciated)	5,434	7,925	52,231	56,073
Capex/Additions (net of capital contributions)	2,346	43,943	2,519	10,597
Indexation new assets	311	2,075	2,190	2,667
Depreciation for year	166	1,712	867	1,218
Closing value	7,925	52,231	56,073	68,119

Final Decision

The Commission's final decision is that the opening value of Eda Ranu's RAB will be 20.74 million Kina. Meanwhile, the Commission's final decision is that the opening value of PNG Waterboard's RAB will be 68.12 million Kina.

3.3 Roll forward of the RAB

Having determined the RAB as at 2001 the Commission has rolled forward the RAB to ensure that all prudent capital expenditure has been included in the respective RABs. In addition, the Commission has considered the depreciation of assets over the same period and has therefore reduced the opening RAB to account for the deterioration of these assets over the period 2001 to 2004. As such, the Commission's calculation of the rolled forward RAB has ensured that all prudent capital is rolled into the RAB while depreciation and disposals, either through asset sales or write downs, have been rolled out of the RAB.

In order for the Commission to maintain the purchasing power of the assets under management it has also indexed the RAB to the rate of inflation. Thus, having calculated the RAB, the original value has been increased to determine the nominal value of the RAB in each year of the regulatory period. Therefore, the Commission has calculated rolled forward asset base having taken the following factors into account:

- Prudent capital expenditure;
- Regulatory depreciation;
- Any asset disposals; and

- Actual Inflation over the preceding regulatory period.

This does not imply that the RAB will be automatically rolled forward for all future periods. The Commission is aware that over the regulatory period there will be a certain degree of flexibility within the capital expenditure plans and departures from the forecast CPI used in the regulatory model. Further, there will be some unforeseen asset sales and write offs which will all need to be determined at the conclusion of the regulatory period. It is important that the businesses retain enough flexibility to be able to adapt to the changing needs of consumers over the five year regulatory period. As such before the beginning of the next regulatory period the Commission will reassess the actual capital expenditures over the regulatory period against a prudence test which will assess any investment decision in light of all information available at the time of the decision. In addition, the Commission will undertake a new calculation of the RAB to ensure that the RAB is rolled forward to include the most up-to-date information available.

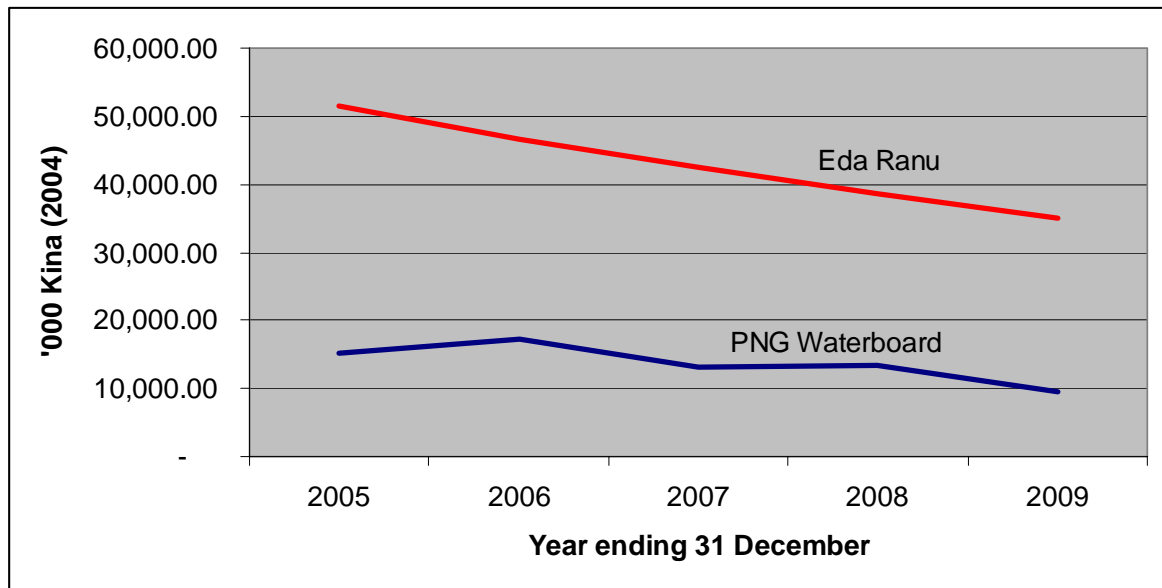
3.4 Capital expenditure program

3.4.1 Future capital requirements

A key element of the economic regulation of utilities is to ensure that there are adequate incentives in place to encourage efficient investment in capital infrastructure. Given the capital-intensive nature of water and sewerage businesses, the approach to capital expenditure regulation is therefore crucial to the price investigation process. This is further highlighted by the potential impact investment decisions can have on the ability of the business to meet its financial obligations and the prices paid by consumers.

The Commission seeks to provide an environment where the business is encouraged to invest efficiently in the network by providing an adequate rate of return on any investment without encouraging inefficient overinvestment in the network. To this end, the Commission has sought five year capital expenditure plans from each of the businesses. Chart 3.1 provides an overview of the initial projections and timing of capital works as provided by Eda Ranu and PNG Waterboard. Subsequent discussions identified the fact that some of the capital expenditure estimated by Eda Ranu was in fact part of the Concessionaire charge, and that a significant upgrade of the Port Moresby sewerage network had been omitted from these initial estimates.

Figure 3.1 Proposed capital expenditure programs of Eda Ranu and PNG Waterboard



3.4.2 Eda Ranu's proposed capital program

Eda Ranu has provided the Commission with its forward capital program for the water and sewerage networks. The capital expenditure programs for water and sewerage are set out below.

Water

Eda Ranu's current major 'capital works program' is the upgrading works undertaken by the Concessionaire. Funded through a build operate and transfer (BOT) arrangement, the project valued at over K150 million, is responsible for the upgrade to the city's trunk mains systems, reservoirs, water treatment works and raw water pipeline to meet the city's projected 2019 demand of 184 million litres per day.

The installation of the capital infrastructure will be completed in 2006. The repayment of these capital works program had been built into the monthly fee that is paid by Eda Ranu to the Concessionaire. Currently this repayment arrangement appears as an operating expense on Eda Ranu's financial statements. It is, in fact, the repayment of the 'loan' for the installation of the capital works. However, because it is paid as a recurrent operating expense, it is not included in the capital expenditure estimates on which a rate of return is calculated. The Concessionaire payment will be concluded in 2019 when the infrastructure is handed over to Eda Ranu.

Eda Ranu has identified five capital works projects, representing 17 percent of the projected capital expenditure program. They are

planned to be completed over the next five years to maintain and improve the water network, including:

- Bulk meter and measuring point chambers in the network, projected cost of K0.4 million over 5 years.
- Trunk mains valve replacement on the network, projected cost of K0.525 million over 5 years
- New pipeline extensions of the network, projected cost of K0.5 million over 5 years.
- Touguba pump station pumps replacement, new pump house and rising main, projected cost of K0.43 million
- Marine line to Napa Napa oil refinery, projected cost of K1.0 million
- Balance of works under BOT contract which includes raw water main, treatment plant upgrade, distribution trunk mains laying, reservoirs pipe work upgrading and telemetry, projected cost of K50 million.

Sewerage

Eda Ranu has identified four major projects, representing the remaining 82 per cent of the capital program, to upgrade and improve the sewerage network, including:

- Sewerage pump station perimeter fencing, projected cost of K0.15 million
- Stanley Esplanade pump station upgrade, projected cost of K0.6 million
- Network extension at Touguba and Ela Makana, projected cost of K0.6 million
- Port Moresby sewerage upgrading project – projected cost of K245 million over four years.

Additional Works: Under additional works, Eda Ranu has proposed building an office complex for K2.5 million. This expenditure is not included in the RAB and as such does not earn a rate of return from the water or sewerage business.

Discussion

Eda Ranu is currently undertaking a continuing upgrade of its water treatment works at Mount Eriama and has plans to completely refurbish the existing sewerage network. This represents a major upgrade to the existing infrastructure and is being undertaken with

the assistance of the Japan International Cooperation Agency (JICA). The average annual capital expenditure over the forthcoming regulatory period is K43 million (2004 Kina). This is a significant increase in Eda Ranu's capital expenditure program compared to that over the past four years which has been, on average, K0.4 million (2004 Kina) per annum. However, it is important to note that Eda Ranu's historical capital expenditure program excludes the investment in water treatment plant at Mount Eriama as this plant is effectively funded by way of a monthly charge by the Concessionaire which covers both the operating costs for the facility and a return on and of the investment in the facility (discussed in the operating costs section below).

In the Draft Report, the Commission noted that Eda Ranu had provided the Commission with information regarding the JICA study of the sewerage network. However, the Commission had been unable to study, in detail, the findings of the report and therefore was unable to determine whether or not the capital expenditure is indeed a prudent business expense. In addition, the Commission noted that the funding arrangements of this major project had not yet been finalised and that there was therefore some doubt in regard to the timing of the project. As such, the Commission considered that including this project in the capital program immediately carried a significant risk that the expenditure would not be undertaken until much later in the regulatory period. The Commission has since received more information from Eda Ranu regarding this project. The Commission is satisfied that Eda Ranu's proposed capital program satisfies the requirement for prudent expenditure and that the capital program will be executed over the regulatory period as proposed.

Final Decision

Having received additional information from Eda Ranu in relation to the Port Moresby sewerage upgrading project, the Commission is satisfied that this capital expenditure is a prudent business expense and will therefore be included in the final decision. Table 3.4 sets out the Commission's allowances in regard to Eda Ranu's forward capital expenditure program.

Table 3.4 Eda Ranu's capital expenditure program

Year ending 31 December (nominal K'000)	2005	2006	2007	2008	2009
Commission's Final Decision on Eda Ranu's capital expenditure program	56,440	56,440	56,440	56,440	56,600

3.4.3 PNG Waterboard's proposed capital program

PNG Waterboard has also provided the Commission with its detailed five year capital plan, which includes project costs and the various

towns which the investment will take place over the regulatory period. PNG Waterboard's capital program is set out below.

Water

Pipeline extensions and upgrades of the reticulation network in the eleven main urban town areas within the PNG water network are expected over the next four years beginning 2005, including:

- Lae (K2.4 million)
 - Madang (K2.27 million)
 - Wewak (K11.47million)
 - Mt Hagen (K5.08 million)
 - Daru (K3.53 million)
 - Alotau (K2.96 million)
 - Kimbe (K1.55 million)
 - Kundiawa (K0.55 million)
 - Kavieng (K2.1 million)
 - Kokopo (K0.84 million)
 - Popondetta (K3.36 million)
-
- Upgrades are also forecasted for the reticulation mains in Kwikila, Bereina and Mutzing at a total projected sum of K1.05 million over the next four years.
 - New branch projects in Lorengau (K0.05 million), Kerema (K5.67 million), Mendi (K18.63 million) and in Wabag (K7.56 million) for the next four years.

Sewerage

- Upgrade and general maintenance, including pond rehabilitation of the treatment plant in Lae – projected costs K2.15 million over three years
- Expansion of the sewerage network throughout Mt Hagen – projected cost K0.55 million over three years
- Installation of a sewerage treatment plant and upgrade of the sewerage network throughout Popondetta – projected costs K0.47 million over four years.
- Installation of a water treatment plant in Mt Hagen - projected costs not provided, however project is to be funded by the ADB.
- Installation of the sanitation treatment plant in Madang – projected costs not provided, however project is to be funded by the ADB.
- Design and construction of sewerage network and treatment plant for Alotau - projected costs not provided, however project is to be funded by the ADB.

Discussion

The Commission welcomes PNG Waterboard's expansion into new areas. The need to invest in these areas is great and the Commission

encourages PNG Waterboard in its efforts to deliver clean, affordable water to Papua New Guineans in non urban areas. However, the Commission is seeking to better understand the funding arrangements under which these projects are being financed. Where this investment is a grant rather than a loan, the Commission considers that this investment should not be rolled into the RAB. This capital is not funded by the PNG Waterboard and is not repaid by either PNG Waterboard or its consumers. Therefore capital grants have been excluded from the RAB and as such they do not earn a rate of return and are not included in the calculation of tariffs. However, where PNG Waterboard enters into a loan arrangement with organisations such as the Asian Development Bank (ADB), the Commission is committed to ensure that the cost of these loans is adequately included in the calculation of tariffs. It is important to note that the terms and conditions of the loans are commercial arrangements between PNG Waterboard and the lending institution. The Commission is not a party to these arrangements but seeks to determine the appropriate tariff arrangements through ensuring that PNG Waterboard (and Eda Ranu) is able to achieve a commercial rate of return on investment in the water and sewerage networks.

To this end the Commission sought additional information from PNG Waterboard regarding the funding arrangements and importantly whether or not projects are funded from aid money such as grants from international agencies or are funded through loan instruments such as from the ADB. In discussions with the Commission PNG Waterboard has reported that all capital expenditure will be funded through either a loan instrument or from retained earnings instruments.

Final Decision

Table 3.5 sets out the Commission’s allowances in regard to PNG Waterboard’s forward capital expenditure program.

Table 3.5 PNG Waterboard’s capital expenditure program

Year ending 31 December (nominal K’000)	2005	2006	2007	2008	2009
Commission’s Final Decision on PNG Waterboard’s capital expenditure program	16,822	20,106	16,336	17,627	13,382

3.4.4 Leakage

Water leakage is a major economic issue for Eda Ranu and PNG Waterboard. Leakage on both networks is comparatively high and represents a large economic loss to Eda Ranu and PNG Waterboard. The Commission seeks to provide a strong incentive to Eda Ranu and PNG Waterboard to target this issue with appropriate action. Eda Ranu has reported to the Commission that its network leakage factor is above 30 per cent. Given that the International Water Supply

Association suggests that leakage should be below 20 per cent, Eda Ranu's level of leakage seems very high by comparison.

Losses from leakages are commonly due to the poor condition of water mains. However, other common factors in water leakage include: mains pressure, local climate and topography, the age of the water distribution system, the type of mains used and soil types. Reducing water leakage to zero would be almost impossible and prohibitively expensive. However, Eda Ranu and PNG Waterboard need to find a balance between the cost of reducing leakage and the value of water saved.

The Economic Level of Leakage (ELL) is the level of leakage at which it would cost more to make further reductions than to produce the water from another source. The ELL will vary between Eda Ranu and PNG Waterboard and will fluctuate over time. It comprises a variety of factors, ranging from new technology being introduced over time to total overall demand for water. If Eda Ranu and PNG Waterboard were operating at the ELL it would result in operating efficiency and a minimizing of the cost of services for customers.

In the Draft Report, the Commission strongly encouraged Eda Ranu and PNG Waterboard to follow their UK counterparts in water leakage management. Network losses from water leakage provide a significant drain on the companies' resources and established leakage management procedures would help negate a large proportion of these losses.

The Commission expects that both Eda Ranu and PNG Waterboard will be able to make significant reductions in the level of leakages which will result in both companies being able to significantly reduce operating costs. The Commission has set Eda Ranu a leakage reduction target of 2 per cent per annum which should result in the level of leakage falling from 32 per cent to 22 per cent over the regulatory period. The Commission has set a leakage reduction target of 1 per cent per annum for PNG Waterboard. The Commission has considered the consequential reductions in operating costs will be similar in magnitude.

In response to the Draft Report, EDA Ranu has outlined its commitment to reduction of leakage as reflected in its existing 3 year contractual arrangement with JCV-Bristol Limited, a joint venture operation between Bristol (UK) and JC-KRTA in regard to non-revenue water reduction. Phase 2 of the program to reduce leakage began in February 2004. When the term of the contract expires in 2006, Eda Ranu expects that up to 30 million litres per day of non-revenue water will be saved.

The Commission continues to encourage both Eda Ranu and PNG Waterboard to discuss the various leakage reduction programs.

3.5 Depreciation

Depreciation of the RAB can be viewed in two ways. Depreciation can be considered as the reduction in the value of capital assets in the current year. The alternative approach is that depreciation is considered as the means for allocating the capital over the expected life of the capital assets. Depreciation is therefore the amount of the capital allocated to the operation of the water and sewerage networks for that year. The decision on the amount of capital to be returned to the business through depreciation is tied directly to the valuation placed on the business.

Both Eda Ranu and PNG Waterboard have agreed with the Commission regarding the methodology for calculating depreciation with Eda Ranu stating that it currently uses the same methodology in its annual accounts process. Eda Ranu's and PNG Waterboard's calculation of depreciation is set out in Table 3.6.

Table 3.6 Depreciation

Year ending 31 December (2004 Kina '000)	2004	2005	2006	2007	2008	2009
Depreciation Eda Ranu	2,323	2,015	1,862	1,701	1,533	1,400
Depreciation PNG Waterboard	7,200	6,680	6,733	6,682	6,641	6,506

Eda Ranu and PNG Waterboard have included the following asset classes in its assessment of depreciation costs:

- Buildings, civil works;
- Vehicles, plant and equipment;
- Fixtures and furniture; and
- Water and sewerage infrastructure.

Discussion

There is an important distinction to be made between regulatory depreciation and depreciation used for tax purposes. Depreciation used by the Commission in estimating the cost building blocks is normally calculated using a straight-line approach. By this method the Commission aims to ensure that there is an appropriate cash flow for firms to continually invest in the network. Depreciation for taxation purposes is used by firms to ensure that tax liabilities are appropriately managed. The Commission notes that the two types of depreciation are unlikely to be the same.

The Commission has used the straight line approach to depreciation to ensure that the cost of the asset is appropriately spread over the life of the asset. The Commission considers that the use of straight

line depreciation is consistent with regulatory precedent in other international jurisdictions, is transparent and is simple to apply.

While the Commission and the two water businesses have used the same depreciation methodology, the Commission has used different asset lives to those used by the businesses. Consequently, the Commission's calculation is different from the depreciation schedules proposed by the two businesses. The Commission has used an average asset life of 35 years for existing assets and 70 years for new assets. The Commission considers that this appropriately spreads the depreciation costs of the assets over the length that the assets, on average, are likely to be in service and therefore capable of generating a rate of return.

In its submission in relation to the Draft Report, PNG Waterboard expressed the view that asset lives are likely to be lower than those proposed by the Commission because, in comparison to developed countries, the longevity of assets in PNG is likely to be lower for various reasons such as climate, public behaviour and lower levels of maintenance. The PNG Waterboard proposed that an average asset life of 30 years for all assets is more reasonable.

While noting the concerns of the water business in regard to asset lives, the Commission does not believe that there is evidence that average asset lives are lower in PNG than in developed countries. Therefore, the Commission considers that it is appropriate to continue using the lives assumed in the Draft Report. However, the Commission is happy to discuss the appropriate asset lives at the next review should either Eda Ranu or PNG Waterboard be able to provide evidence that the average asset lives are substantively different from those assumed in this final decision.

Final Decision

The Commission considers that it is appropriate to retire the amount of capital returned to the firm via tariffs as determined in this final decision. Therefore, the Commission will roll the RAB forward over the regulatory period by retiring capital as determined in the calculation of regulatory depreciation set out in Table 3.7 below. In doing this it is important to note the Commission has used an average asset life of 35 years for existing assets and 70 years for new assets to calculate depreciation.

Table 3.7 Regulatory depreciation

Year ending 31 December (2004 Kina '000)	2005	2006	2007	2008	2009
Depreciation Eda Ranu	1,009	1756	2448	3088	3680
Depreciation PNG Waterboard	2,009	2,253	2,476	2,669	2,832

3.6 Indexation

The Commission is proposing to maintain the real underlying value of the RAB by increasing it year by year on the basis of inflation. This ensures that the real value of any investment made by Eda Ranu and PNG Waterboard is maintained over the life of the asset. The Commission has based its calculation of the inflation over the forthcoming regulatory period on an assumed inflation rate of 8 per cent.

Roll Forward of Initial RAB

Having set the initial RAB for Eda Ranu the Commission's calculation of the rolled forward RAB is set out in Table 3.8.

Table 3.8 Roll forward of the initial RAB – Eda Ranu

Year ending 31 December (nominal Kina '000)	2005	2006	2007	2008	2009
Opening value	20,734	80,167	143,230	210,303	281,624
Capex/Additions (net of cap cons)	56,600	56,440	56,440	56,440	56,440
disposals/assets written off	Nil	Nil	Nil	Nil	Nil
Depreciation	1,089	2,049	3,083	4,201	5,408
Indexation	3,923	8,671	13,716	19,082	24,787
Closing value	80,167	143,230	210,303	281,624	357,444

Having set the initial RAB for PNG Waterboard the Commission's calculation of the rolled forward RAB is set out in Table 3.9.

Table 3.9 Roll forward of the initial RAB – PNG Waterboard

Year ending 31 December (nominal Kina '000)	2005	2006	2007	2008	2009
Opening value	68,152	88,929	114,326	137,342	163,031
Capex/Additions (net of cap cons)	16,822	20,106	16,336	17,627	13,382
disposals/assets written off	Nil	Nil	Nil	Nil	Nil
Depreciation	2,170	2,628	3,119	3,631	4,161
Indexation	6,125	7,919	9,800	11,692	13,578
Closing value	88,929	114,326	137,342	163,031	185,830

3.7 Return on capital

Once the RAB has been established the Commission must determine a rate of return which is then multiplied by the RAB to determine the revenue required to meet the cost of capital of each regulated firm. Regulators around the world have traditionally favoured the Weighted Average Cost of Capital or WACC methodology to determine the rate of return for regulated entities. The WACC methodology has been developed from the capital asset pricing methodology (CAPM) to form a reasonable basis for the regulatory cost of capital.

The cost of capital for a particular project is the minimum expected rate of return on investment required by providers of debt or equity for that particular project. As such the WACC is the cost of debt payable to creditors and the cost of equity payable to shareholders weighted by the relevant gearing ratio.

For equity investors, the cost of equity capital has two components:

- an explicit opportunity cost such as dividend payments; and
- an implicit opportunity cost in the form of an expected cash equivalent gain in share price.

The expected return to debt investors (the cost of debt) is in the form of interest payments and the amortisation of any difference between the market value of debt and its face value.

The Commission has received support from Eda Ranu, PNG Waterboard and Mr Puiye regarding the use of the WACC methodology to determine the cost of capital. Eda Ranu has stated that a rate of return in the range of 6 to 8 per cent of annual sales turnover is appropriate, while PNG Waterboard recommended that a return of 5 per cent on capital was appropriate to keep tariffs at an affordable level. The Commission notes that while both businesses have supported the use of the WACC methodology, neither company has provided the Commission with the methodology used to determine the rates of return brought forward.

3.6.1 Calculating the WACC

The simplest formula for the WACC calculation is presented in equation (1) below:

$$WACC = R_e \times \frac{E}{V} + R_d \times \frac{D}{V} \quad (1)$$

where,

- R_e is the nominal post-tax cost of equity;
- R_d is the nominal post-tax cost of debt;

- E is the total equity;
- D is the total debt; and
- V is debt plus equity.

The WACC is therefore the sum of the returns to debt and equity, weighted by the share of debt and equity in the total value of the business.

The WACC calculation is affected by taxation, which requires equation (1) to be modified as follows:

$$Post-taxWACC = \frac{R_e \times (1-t)}{1-t} \times \frac{E}{V} + R_d \times (1-t) \times \frac{D}{V} \quad (2)$$

where t is the tax rate.

The return on debt (Rd) is normally calculated by adding a debt margin to the risk free market rate. Usually the debt margin is based on industry norms and the risk free rate has been based on the international risk free rate defined below.

The return on equity (Re) is normally calculated by application of the capital asset pricing model (CAPM). This approach is widely used by commercial businesses and regulators throughout the world.

The CAPM formula is presented in equation (3) below:

$$R_e = R_f^{International} + \beta \times (R_m - R_f) \quad (3)$$

where,

- Rf international is the risk free rate;
- β is a measure of the correlation between an asset's risk and that of the overall market;
- Rm is the market rate of return; and
- Rf is the risk free rate in PNG.

The Rf international is determined as follows:

$$Rf_{international} = [(1 + R_f) / (1 + USA_{CPI}) \times (1 + PNG_{CPI}) \times (1 + CRP) - 1]$$

where

- Rf is the risk free rate in the USA;
- USA CPI is the inflation rate in the USA;
- PNG CPI is the inflation rate in PNG; and
- CRP is the country risk premium assigned to PNG.

The Rf international is used due to the lack of an appropriately traded government bond in PNG, that is a 10 year government bond. The Commission has used the 10 year USA bond rate plus an allowance for country risk premium and an adjustment which removes the implied USA inflation and adds back the PNG inflation. This approach has been used by the Commission to imply a risk free rate of 12.9 per cent.

In effect, the CAPM formula says that the return on equity for a particular business is the difference between the market return and the risk free rate. The margin (and hence the equity beta (β_e)) reflects how risky the business is, compared with the rest of the market.

While the risk free rate is generally observable in the market, the difference between the market return and the risk free rate (also known as the market risk premium) generally reflects the long-term returns on equity in the market. The equity beta (β_e or the relative degree of risk of the business compared to the market as a whole) can itself be calculated in various ways. The Commission prefers to use the Monkhouse formula, which is presented in equation (4) below.

$$\beta_e = \beta_a + (\beta_a - \beta_d) \times \left(1 - \frac{R_d}{(1 + R_d) \times t} \right) \times \frac{D}{E} \quad (4)$$

Where β_a is the correlation between return to assets of the business and the market (known as the asset beta), and β_d is the correlation between return to debt and debt generally in the market (known as the debt beta).

Decisions about the underlying parameters within the Monkhouse formula will result in the calculation of an equity beta range for the investigation. The calculated equity beta range will form the basis of the calculation for the WACC range.

Given these equations for the calculation of the WACC, the Commission has to make choices about a range of parameters used in the calculation. These include:

- Taxation
- CPI
- Debt margins
- Market risk premium
- Equity beta
- Gearing ratio.

The other variables in the equations are either calculated, such as the risk free rate, or known with some certainty from the business.

3.6.2 Taxation

Traditionally, the Commission has adopted a statutory tax rate in the calculation of the WACC. In the past the Commission considered that this provided the business with the appropriate incentive to minimise taxes. Furthermore, given the relative cost and the level of intrusion associated with the calculation of an effective tax rate the Commission has been reluctant to alter its position from using the statutory tax rate.

The Commission has not been provided with any comment from external parties on this issue. The Commission's preference is to use a statutory tax rate of 30 per cent.

3.6.3 Debt margins

The debt margin represents the percentage margin above the risk free interest rate associated with debt. It reflects the risks in the regulated business's ability to pay back debt. The debt margin is related to current market interest rates on corporate bonds, the maturity of the debt on issue, the assumed capital structure and the credit rating. All other things being equal, higher credit ratings should result in a business having a lower required debt margin.

Regulated utilities can be generally characterised as low risk, with strong steady cash flows. This makes them relatively low risk compared with other non-regulated businesses. Internationally, regulators have used debt margins between 0.8 and 1.65 per cent.

The PNG Waterboard commented that the Commission's initial proposal of a debt margin which ranged between 0.8 to 1.65 per cent above the risk free rate was too low. However, the PNG Waterboard recognised that this outcome was unlikely to affect its business as the PNG Waterboard was a government owned business and thus was able to secure capital at lower interest rates from aid agencies.

The Commission has used a debt margin of 2 per cent.

3.6.4 Market risk premium

The MRP is an estimate of the additional return needed by investors to invest in a diversified equity portfolio relative to the risk-free rate.

The Commission notes that Australian regulators have traditionally adopted a MRP of 6 per cent, while U.K regulators have tended to use a MRP that has been 5 per cent or less. This difference in MRP between the regulators in both countries is expected, as the U.K and

Australian have differing financial markets. Table 3.10 illustrates the approach taken by the various regulatory institutions in Australia and the United Kingdom.

Table 3.10 MRP—Australian and United Kingdom Regulatory Decisions

Regulatory body	Industry	MRP
ICRC (1999) ACT (Australia)	Water and wastewater, electricity distribution	5.0–6.0%
ICRC (2000) ACT (Australia)	Gas	5.0–6.0%
OTTER (2001) TAS (Australia)	Gas distribution	6.0%
ACCC(2002) National (Australia)	Gas transmission	6.0%
ESCV (2003) Victoria (Australia)	Gas distribution	6.0%
OTTER (2003) TAS (Australia)	Electricity distribution	6.0%
IPART (2004) NSW (Australia)	Electricity (final report)	5.0–6.0%
ICRC (2004) ACT (Australia)	Electricity final decision	6.0%
ICRC (2004)ACT (Australia)	Water final decision	6.0%
ICRC (2004) ACT(Australia)	Gas distribution draft decision	6.0%
OFWAT (2004) (UK)	Water & Sewerage Draft decision	4% - 5%
OFWAT (2000) (UK)	Water & Sewerage Final decision	3% - 4%
OFWAT (1994) (UK)	Water & Sewerage Final decision	3% - 4%

The PNG Waterboard commented in their submission to the Commission that the MRP of 6 per cent was too low for a regulated entity that is not state owned. In its response to the Issues Paper, PNG Waterboard commented that the “low” MRP would not have a detrimental effect on its business because it is a government owned entity.

Eda Ranu stated in its response to the Issues Paper that the 6 per cent MRP was also too low for operating in the National Capital District, and proposed that an 8 per cent MRP be considered by the Commission.

The Commission has decided for the purposes of this Final Decision that using a market risk premium of 6 per cent is appropriate to balance the risks of investing in equities relative to the risk free rate. A market risk premium of 6 per cent is also consistent with Australian regulatory decisions.

3.6.5 Equity beta

Estimating the equity, asset and debt betas for a firm which is not publicly traded is somewhat problematic for the Commission. This comes as a result of CAPM's reliance on market data to assess the implied risk associated with an individual company. However, these issues can be addressed through the use of benchmark firms which provide a comparison of the risk associated with similar investments in the market place.

The CAPM uses the portfolio theory of finance which classifies risks into two types of risk: systematic risk and specific risk.

Systematic risk: is the non-diversifiable risk (which cannot be eliminated by an investor by holding a well diversified portfolio) that a businesses faces as a result of exposure to certain factors in the market and the economy as a whole. Such factors are inflation, levels of economic growth, taxation rate increases and rises in interest rates. Systematic risk is often caused by socio-economic and political events and in CAPM is measured by the equity beta.

Specific risk: is the residual risk unique to the entity or to a small group of companies that forms a subset of the market. Specific risks are not considered in estimating WACC as they can be minimised by holding a diversified portfolio.

Under the CAPM, the only component of risk that is priced by investors into returns (via the equity beta) is systematic risk. This is because the CAPM assumes that investors will hold diversified portfolios of assets rather than single asset because diversification reduces risk and it assumes that there are no transactions costs. Systematic risk is the only risk that matters since it cannot be eliminated through diversification. The equity beta is a measure of an asset's systematic risk relative to a market portfolio of assets such as the All Ordinaries Index on the Australian stock market. In this context, risk is defined by the extent to which returns of a particular listed stock co-vary with the returns of the market overall.

While the equity beta is the market's expectation of risks, as expectations cannot be observed, conventional practice is to estimate the future from historical equity beta values. The equity beta is generally measured by statistical regression of the observed historical returns of a company against returns on a market index. The market portfolio has an equity beta of 1.0. An equity beta greater than 1.0 implies that the returns on a stock are, on average, more volatile, and hence the stock is more risky, than the market, whilst an equity beta of less than 1.0 implies the reverse.

Equity betas derived from stock market observations represent equity betas, which also reflect the degree of financial gearing of the

company. The gearing level is a key determinant of financial risk and a higher level of gearing produces a higher equity beta. Consequently, it is not possible to compare the equity betas of different companies without having regard to the gearing levels of the different companies for which equity betas are being observed. In comparison, asset betas are not affected by the gearing of the entity under review. Accordingly, it is asset betas that should be compared for the purposes of benchmarking risk. However, as only the equity beta is directly observable, the asset beta must be derived from equity betas. Further, the observed equity beta implies an asset beta for a given gearing ratio. As such the equity beta must be de-leveraged to estimate an un-gearred asset beta.

A conventional approach to assigning a value to the business' equity beta is to look at market evidence in order to benchmark the firm's equity beta relative to similar companies. However, as there is very limited information regarding traded water companies the Commission has been guided by regulatory decisions and its own judgement in determining the appropriate equity beta.

Given this analysis, the Commission considers that the appropriate asset betas for the companies are as follows:

PNG Waterboard - 0.35

Eda Ranu - 0.35

Having applied the Monkhouse formula described above the Commission has set the re-leveraged equity beta equal to 0.754.

3.6.6 Gearing ratio

The gearing ratio is defined as the ratio of debt to total capital. This ratio provides the necessary weightings used in the construction of the final WACC. It is standard regulatory practice in other jurisdictions to adopt a financial structure deemed to an efficient structure given the risks faced by the business rather than actual ratio faced by the regulated entity. This ensures that the business is not rewarded for inefficiency in its capital structure.

In its submission to the Commission the PNG Waterboard proposed a 1:2 ratio of debt to equity or 33.3 per cent debt to 66.67 per cent equity. PNG Waterboard stated that this structure would allow their business to borrow funds to the extent of twice its equity from the aid agencies to fund its future expansion. The WACC formula results in a higher return on equity compared to debt and as such the lower the debt to equity gearing ratio the higher the rate of return calculated by the WACC. As such the Commission considers that PNG Waterboard's gearing ratio would provide an incentive to the firm to maintain an inefficient capital structure. The Commission has

therefore used a gearing ratio of 60 per cent debt to 40 per cent equity in the calculation of the WACC on the basis that an efficient company would source an appropriate level of funds from debt because it is cheaper than funds sourced from equity. It is important to note that this does not prevent either Eda Ranu or PNG Waterboard from holding a lower ratio of debt to equity. However it does prevent consumers from paying extra for an inefficient gearing ratio.

Given that the Commission is attempting to provide both PNG Waterboard and Eda Ranu with the appropriate incentives to become more efficient in its operations, 60 percent debt to 40 percent equity has been used in the calculation of the WACC.

Final Decision

Given the discussion of the parameters above the Commission has determined that the appropriate WACC for Eda Ranu and PNG Waterboard is 10 per cent pre tax real. Table 3.11 provides a summary of the parameters used by the Commission in determining the WACC.

Table 3.11 Parameters used in the calculation of the WACC

Parameter	Value
Nominal Risk Free Rate	12.86%
Real Risk Free Rate	4.50%
Inflation Rate	8.00%
Cost of Debt Margin over rf	2.00%
Nominal pre-tax cost of debt	14.86%
Real pre-tax cost of debt	6.35%
Market Risk Premium	6.00%
Corporate Tax Rate	30.00%
Effective Tax Rate for Equity	30.00%
Gearing (D/V)	60.00%
Debt Beta	7.0%
Asset Beta	35.0%
Equity Beta	75.4%
Post-tax nom return on equity	17.38%
Post-tax real return on equity	8.69%
Nominal Vanilla WACC	15.87%
Real Vanilla WACC	7.29%
Post-Tax Nominal WACC	13.19%
Post-Tax Real WACC	4.81%
Pre-Tax Nominal WACC	18.85%
Pre-Tax Real WACC	10.05%

PNG Waterboard has indicated that it considers that 5 per cent is appropriate in terms of a rate of return on its assets. However, the Commission notes that this does not factor in the costs of debt

whereas the WACC calculated by the Commission does. At the same time the Commission notes that PNG Waterboard sought a much higher asset base which would have resulted in a significantly higher return. That is, while the Commission has used a higher rate of return, the actual return proposed by PNG Waterboard and the Commission is approximately equal.

Eda Ranu's proposed rate of return was based on 8 per cent of revenues. The Commission considers that it is more appropriate to calculate the rate of return on physical capital invested in the network, that is pipes and other infrastructure which vital in the delivery of water services. Further, the Commission notes that using Eda Ranu's calculation of a rate of return the outcome is again approximately equal to the Commission's calculation of the rate of return in terms of the actual Kina involved.

In both cases the Commission has set out a framework which will allow all prudent investment to be rolled into the RAB and as such capital invested in the networks will earn an appropriate rate of return, as calculated by the WACC methodology, over the existing and future regulatory periods.

3.8 Operating costs forecasts

In developing the cost build-up used in the calculation of the total revenue requirement, operating costs are a significant factor. Operating costs are incurred by the business immediately and, therefore, both businesses require an offsetting amount of revenue to ensure continued operation of the water and sewerage network. In determining the operating costs that are to be built into the regulatory model, the Commission must balance the needs of the business to fund operational activities with the needs of consumers by ensuring operating expenditures are at efficient levels.

In a competitive environment, industry-wide efficiencies in operating costs are passed through to consumers at roughly the same time as they occur, driving prices down in the short term. In a monopoly situation, there is usually a lag between when operating efficiencies are made and when they are passed through to consumers. This lag often relates to the length of a regulatory control period and creates an incentive to the business, as any cost savings made represent increased profits which can be retained by the business. In determining the efficient level of operating expenditure, the Commission must consider the commercial incentives to achieve operating efficiencies relevant to water and sewerage services and the interest of consumers in benefiting from cost savings over the regulatory period.

Operating and maintenance expenditure covers a wide range of water and sewerage activities, including:

- Operating and maintaining the bulk water storage and transfer system;
- Operating and maintaining water treatment facilities and the water reticulation network;
- Operating and maintaining the sewerage collection and treatment facilities;
- Handling fault calls from customers, repairing assets, restoring water supply, and containing sewer spills;
- Handling complaints about the quality and reliability of supply, and communicating with customers on distribution matters;
- Reading meters and recording customers' consumption;
- Undertaking customer billing activities;
- Managing the company and its relations with external stakeholders; and
- Providing information technology systems to support corporate planning, financial management and human resource management functions.

Against these requirements for funding, the Commission must establish an efficient level of operating expenditure for both businesses over the next regulatory period that can, in turn, be incorporated into the regulatory model for determining cost reflective revenue requirements.

3.8.1 Eda Ranu

The Draft Report outlined Eda Ranu's five year forecast of operating costs provided to the Commission. These forecasts are set out in Table 3.12.

Table 3.12 Eda Ranu's operating costs – Draft Report

Year ending 31 December (Kina '000 2004)	2005	2006	2007	2008	2009
Total Concessionaire fees	33,792	34,015	35,680	33,818	32,137
Total Direct costs	8,568	8,568	8,568	8,568	8,568
Total Labour costs	4,538	4,538	4,538	4,538	4,538
Total miscellaneous costs	5,993	5,993	5,993	5,993	5,993
Total	52,891	53,113	54,778	52,917	51,236

EDA Ranu has subsequently provided the Commission with revised operating cost forecasts, as set out in Table 3.13. These forecasts

include pumping costs, a key item of expenditure for the business which was not included in the Commission's allowance for operating expenses in the Draft Report.

Table 3.13 Eda Ranu's operating costs – Revised

Year ending 31 December (Kina '000 2004)	2005	2006	2007	2008	2009
Total Concessionaire fees	40,605	43,611	42,711	41,230	39,883
Other	14,501	14,501	14,501	14,501	14,501
Total	55,106	58,112	57,212	55,731	54,384

3.8.2 PNG Waterboard

PNG Waterboard has provided the Commission with a five year forecast of operating costs as set in Table 3.14

Table 3.14 PNG Waterboard's Operating Costs

Year ending 31 December (Kina '000 2004)	2005	2006	2007	2009	2009
Total Direct costs	5,265	5,265	5,265	5,265	5,265
Total Labour costs	9,091	9,091	9,091	9,091	9,091
Total miscellaneous fees	6,063	6,075	6,005	5,939	5,886
Total operating costs	20,419	20,432	20,361	20,296	20,243

3.8.3 Forecasting methodology

The Commission notes that both Eda Ranu and PNG Waterboard have used expenditure in the previous years and adjusted for inflation to forecast costs for the following years. The Commission has discounted these forecasts back to ensure that all operating costs have been expressed in 2004 Kina. Where appropriate, the Commission has then made some adjustments to these real operating cost to ensure that they are efficient given the circumstances of both PNG Waterboard and Eda Ranu.

PNG Waterboard has submitted to the Commission that the operating expenditures set out in the Commission's Draft Report, which were based on the numbers provided by PNG Waterboard, were inappropriate given the absence of end of year adjustments (primarily for staff entitlements) in the base year used by the Commission. As such PNG Waterboard has suggested that the Commission use the audited accounts from the financial years 2001, 2002 and 2003 to determine the appropriate base for PNG Waterboard's operating expenditure. Table 3.15 provides a summary of the costs incurred by PNG Waterboard in these years and a comparison with the Commission's allowance in the Draft Report.

Table 3.15 PNG Waterboard's Operating Costs

Year ending 31 December (K'000 2004)	2001	2002	2003	2004 (As in the Draft Report)
Operating Costs	23,720	23,992	21,407	18,299

PNG Waterboard has argued that by applying a simple average over the three most recent years, the overall operating costs required to operate its various water networks is around K23 million. However, it is important to note that cost have fallen significantly between 2002 and 2003. As can be seen this is significantly higher than that set out in the Commission's Draft Report (K18.3 million). PNG Waterboard has proposed that an appropriate operating cost base should be K22 million in 2004. Having considered the approach proposed by PNG Waterboard and noting concerns outlined in the Draft Report regarding PNG Waterboard's forecasting methodology, the Commission has accepted K22 million as the base for 2004.

After the Commission applies the methodology outlined in the Draft Report regarding operating efficiencies and leakage savings, combined with the reduction in operating costs as a result of the revenue collected from external investment vehicles the revised operating costs for PNG Waterboard would be as set out in Table 3.16.

Table 3.16 PNG Waterboard's Operating Costs

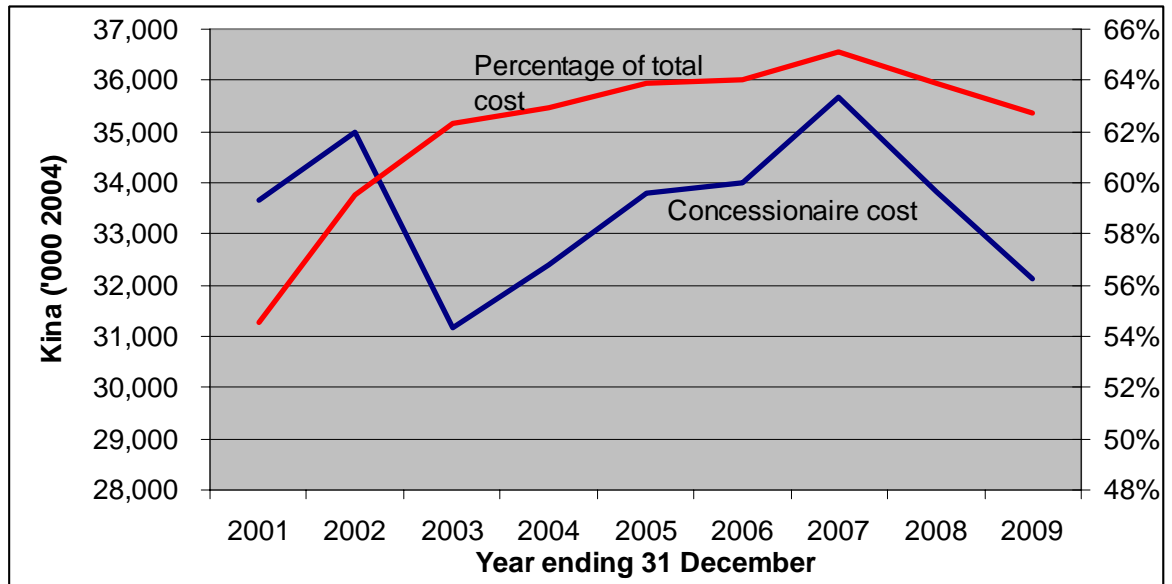
Financial year ending 31 December (K'000 2004)	2004	2005	2006	2007	2008	2009
Operating costs before any adjustment	22,000	22,000	22,000	22,000	22,000	22,000
Operating expenditure	20,000	19,900	19,600	19,400	19,200	19,000

3.8.4 Concessionaire arrangements

As part of its commitment to upgrade the existing water infrastructure of Port Moresby, Eda Ranu has entered into a concession arrangement with an external party. Under these arrangements the water treatment plant has been funded under a Build Operate Transfer Scheme (The BOT scheme). This BOT scheme has resulted in the treatment plant effectively being funded over 20 years despite the assets having a 70 year life span. As such the BOT scheme has placed significant restrictions on Eda Ranu's ability to internally fund any new capital works and on Eda Ranu's short term cash flow. However, subject to the structure of the BOT not being altered over the course of the regulatory period, the Commission has proposed to

treat the cost of this scheme in the same manner as an operating cost. The forecast costs of the scheme are set out in figure 3.2 below.

Figure 3.2 Concessionaire cost for Eda Ranu



The relative growth of the BOT scheme in terms of the total operating expenditure is Eda Ranu's single biggest expense. The Commission notes that Eda Ranu has suggested changing the scope of the Concessionaire agreement to focus on identifying leakages throughout the system. The Commission is supportive of this initiative, especially since Eda Ranu has highlighted in its submission that the current level of leakage is estimated to be above 30 per cent. Projected savings from this leakage program have been included in the Commission's calculation of Eda Ranu's efficient operating costs outlined below.

3.8.5 Head office costs

The Commission is concerned that PNG Waterboard has reported a relatively high cost associated with the management of the water and sewerage networks. While understanding the particular circumstances of PNG Waterboard, which, in reality, runs a disconnected network throughout PNG, the Commission notes that total head office costs represent around 34 per cent of total operating costs.

The Commission notes that PNG Waterboard derives a significant proportion of revenues from external activities of the head office. These include:

- earnings on investment, including earnings from holding Government bonds and other external investments (these

investments have averaged around K3.5 million in 2004 dollars over the past three years);

- compliance income from miscellaneous services associated with the operation of the water and sewerage networks;
- grants from the PNG Government and AusAid; and
- other miscellaneous service provided by PNG Waterboard.

In order to appropriately account for revenue from these external services, the Commission has excluded these revenues and costs from the operating costs provided by PNG Waterboard. This ensures that consumers are not required to pay for services already funded out of other operating activities. Therefore, the Commission has excluded K2 million (in 2004 Kina) in expenditure in each year of the regulatory period. In its submission in response to the Draft Report, PNG Waterboard indicated agreement with this approach to head office revenues and costs.

Given the capital intensive nature of operating a water network, the Commission recognises the importance of PNG Waterboard having access to such investments to supplement its working capital requirements. As such the Commission considers that the investments in other activities are prudent components of the operation of PNG Waterboard and provide a valuable revenue stream to the business. Further, the Commission recognises the need for PNG Waterboard to earn revenue from operating profits for two reasons:

- To ensure that the business has the required collateral to secure long term funding arrangements; and
- As a way to fund working capital throughout the year.

This revenue has also provided PNG Waterboard with the opportunity to insulate consumers from potential price shocks associated with unforeseen price rises as the return on these investments has traditionally increased in line with inflation. In this way, the Commission considers that this excess capital provides an important mechanism for PNG Waterboard to manage its exposure to the risks associated with a dramatic increase in inflation. In effect, the returns earned by PNG Waterboard have provided a subsidy to the users of PNG Waterboard's network. The opportunity for PNG Waterboard to provide this subsidy is directly related to the dividend policy which, in effect, allows PNG Waterboard to retain profits which would otherwise be returned to the shareholder (the PNG Government). Should the current dividend policy be changed and these earnings are no longer retained by the business, the Commission would expect to see a significant price shock in the order of 2.4 per cent across all tariff classes on PNG Waterboard's tariff menu.

3.8.6 Regulatory costs

The Commission considers that the cost of this regulatory review is an important component of the overall costs of running an efficient water and sewerage network. As such the Commission has included an additional K100,000 for each water business for the cost of this review. This includes the costs borne by the Commission in undertaking this review process. The direct costs incurred by the Commission will be passed directly onto consumers in the form of an additional K100,000 in the total operating cost build-up. As such, the Commission will be invoicing both Eda Ranu and PNG Waterboard the costs incurred in this review process.

PNG Waterboard expressed support for this approach in its submission in response to the Draft Report.

3.8.7 Expected operating efficiencies

In accordance with the Commission's objective to adopt a cost building block approach to determine the revenue requirements of each business, the PNG Waterboard and Eda Ranu provided financial information pertaining to their operating costs.

Most utility companies possess a natural monopoly which shields them from competition. This, in turn, does not encourage the utility companies to be as efficient as possible in their operations, as any inefficiencies in operating costs are passed through to consumers in the form of higher tariffs.

Being aware of this elementary fact, the Commission, after assessing the operating costs of both water companies, decided to apply a 1.0 per cent efficiency factor to their operating costs, compounding yearly over the 5 year regulatory period.

In most cases, the Commission accepted the costs presented to it by the water companies. However, the Commission believes that there is scope for both water companies to become more efficient in the following areas:

- **Billing:** the Commission expects that both businesses will be able to outperform the setting in the regulatory model by collecting additional revenue in line with higher than forecast billing collection efficiency.
- **Leakages from the network:** leakages represent unrecoverable costs that the businesses incur. A major improvement in the maintenance of the water infrastructure will reduce these costs. In the case of Eda Ranu, the Commission expects that leakages could be progressively reduced by 2 per cent per annum over the regulatory period, thus resulting in a reduction of the

concessionaire costs. At the same time, the Commission expects that PNG Waterboard will be able to reduce leakages from the network by 1 per cent per annum.

- Reducing the cost base: during its assessment of PNG Waterboard's costs, the Commission noted that the headquarters operating costs seemed unreasonably high, and believes that there is potential to see a more efficient operation for PNG Waterboard in this area.

The Commission is aware of the need for the water companies to recover the costs associated with the business and, at the same time, expects both Eda Ranu and PNG Waterboard to become more cost efficient in their operations by applying the efficiency factor and as a result of regulatory incentives.

Final decision

The Commission believes that the forecasts of operating costs provided by both businesses do not reflect the efficient costs of providing water and sewerage services to customers. Therefore, the Commission has prepared its own forecast of reasonable costs based on the following:

- The application of a 1.0 per cent efficiency factor;
- The reduction of costs associated with the provision for bad debts;
- Reduction in operating costs as leakages from the network are reduced
- The reduction of costs for revenues generated outside the water businesses; and
- The removal of any implied assumptions for CPI, which will be included in the regulatory model through the application of the CPI + X model.

The Commission believes that the level of expenditure provided is sufficient for both Eda Ranu and PNG Waterboard to continue to provide services at or above current levels (noting that the Commission has sought further information regarding the exact service standards that both businesses are achieving). Furthermore, the Commission expects that Eda Ranu and PNG Waterboard should be able to achieve significant efficiencies through the minimisation of leakage throughout the network. This is particularly true for Eda Ranu as leakage represents additional costs in terms of the concessionaire arrangement. The Commission's operating cost estimates for both Eda Ranu and PNG Waterboard are set out in Table

3.17 below. These forecasts have been used in the calculation of the total revenue requirement as set out in the following section.

Table 3.17 Eda Ranu's and PNG Waterboard's Operating Costs

Financial year ending 31 December (Kina 2004)	2005	2006	2007	2008	2009
Eda Ranu's proposed operating expenditure – revised	55,106	58,112	57,212	55,731	54,384
Commission's operating expenditure allowance for Eda Ranu	55,061	57,822	56,777	55,151	53,659
Difference	45	290	435	580	725
PNG Waterboard's proposed operating expenditure – revised	22,000	22,000	22,000	22,000	22,000
Commission's operating expenditure allowance for PNG Waterboard	19,900	19,600	19,400	19,200	19,000
Difference	2,100	2,400	2,600	2,800	3,000

The significant difference between PNG Waterboard's proposed operating expenses is due primarily to the exclusion of the K2 million excluded as part of the revenue from other investments referred to in the section above. The other major driver of the difference between the proposed and allowed operating expenditure is related to the over provision of sundry costs which are also discussed above.

3.8.9 The cost building blocks

Having reviewed and made decisions on the various cost components, as outlined in the previous sections, the Commission has used the cost building blocks set out in Tables 3.18 and 3.19 to determine Eda Ranu's and PNG Waterboard's total revenue requirement for their respective businesses over the next regulatory period.

Table 3.18 The Commission's cost building blocks—PNG Waterboard

Year ending 30 June (2004 Kina '000)	2005	2006	2007	2008	2009
Operating expenditure	19,900	19,600	19,400	19,200	19,000
Depreciation	2,009	2,253	2,476	2,669	2,832
Return on fixed assets (pre-tax)	7,272	8,713	9,989	11,039	11,871
Total revenue requirement	29,181	30,566	31,865	32,908	33,703

Table 3.19 The Commission’s cost building blocks—Eda Ranu

Year ending 30 June (2004 Kina '000)	2005	2006	2007	2008	2009
Operating expenditure	55,061	57,822	56,777	55,151	53,659
Depreciation	1,009	1,756	2,448	3,088	3,680
Return on fixed assets (pre-tax)	4,671	9,576	14,032	18,079	21,747
Total revenue requirement	60,741	69,155	73,257	76,318	79,086

This total revenue requirement includes revenue from the following sources:

- general fixed and volumetric charges
- bulk water sales
- miscellaneous fees and charges.

The Commission considers that the total revenue requirement are sufficient to allow both Eda Ranu and PNG Waterboard to continue to provide services at existing or improved levels while at the same time allowing the water and sewerage networks to generate appropriate returns.

3.8.10 Calculating an X factor

An objective of incentive regulation is to provide the regulated business with the incentive to become more efficient. This incentive arises from the fact that initial revenues or prices and the adjustment mechanism are set at the beginning of the regulatory period and any efficiency gains achieved in the form of cost reductions over the period of the price direction can be retained by the regulated business. Under CPI plus X incentive regulation, the regulator determines an X factor.¹ The X factor is the real change in either prices or revenue each year.

The X factor could be a constant value over the course of the regulatory period or a different value each year. Alternatively, there could be an initial adjustment (referred to as a P_0 adjustment) followed by a different X factor in subsequent years. If the X factor is to be the same for each year, the regulator needs to decide how the total revenue requirement is to be ‘smoothed’ over the period in order allow the use of a stable X factor.

¹ CPI refers to the inflation rate. The X factor can be positive or negative. The greater the X factor is, the greater the reduction in prices. If the X factor is negative the business’s revenue or prices are permitted to increase by an amount greater than the CPI.

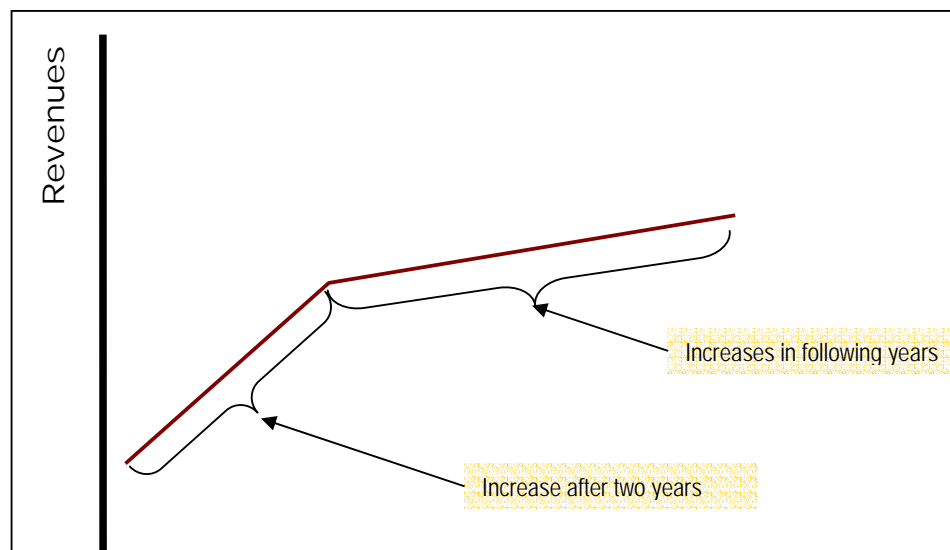
Given the magnitude of the X factors involved in this case, and the desirability of providing customers with stable price paths, the Commission believes that to the extent possible, a constant X factor for each year of the regulatory period is appropriate. The Commission has determined the X factor by smoothing the revenues so that the Net Present Value of revenues over the period is equal to the Net Present Value of the costs over the regulatory period.

3.8.11 Determination of the X factor

The Commission has analysed both PNG Waterboard's and Eda Ranu's financial positions in arriving at a decision on the appropriate X factors of the period. Through this analysis the Commission has considered that Eda Ranu's concurrent financial position requires an immediate adjustment of price to ensure that it is able to meet all its financial obligations from a cash flow perspective. As such the Commission has decided to apply two significant adjustments to prices of CPI + 11 and CPI + 10 per cent for each of the first two years of the regulatory period. This increase in prices and revenues will allow Eda Ranu to stabilise its current position which after deficits in five of the past six years can be best described as precarious. Figure 3.3 sets out the shape of Eda Ranu's revenues over the regulatory period.

The Commission considers that this will allow Eda Ranu adequate opportunity to achieve a sustainable financial outcome. However, the Commission would have preferred to phase these increases in more smoothly over the regulatory period. Furthermore, the Commission is making these adjustments on the proviso that Eda Ranu not expect that the Commission will continue to allow such significant price adjustments in future regulatory periods.

Figure 3.3 Eda Ranu's allowable increases



Having analysed PNG Waterboard's financial position the Commission has decided to apply a smoothed X factor over the regulatory period. Table 3.20 provides Eda Ranu and PNG Waterboard with their appropriate X factors on the basis of this Final Decision and the revenue requirements summarised in Tables 3.18 and 3.19. In determining the appropriate X factors to apply to Eda Ranu's tariffs the Commission has considered that there will be growth in connections throughout each tariff class of 2.75 per cent, this is in line with Eda Ranu's estimates. In determining the appropriate X factor to apply to PNG Waterboard's tariffs the Commission has considered that there will 2.75 per cent growth in connections, which is higher than the 1 per cent forecast by PNG Waterboard. However, the Commission has increased the growth in line with its expectation that PNG Waterboard proposed capital expenditure program will result in higher than forecast growth in connections on the network.

Table 3.20 Eda Ranu's and PNG Waterboard's X factors

Year ending 31 December	2005	2006	2007	2008	2009
Eda Ranu	CPI + 11.0%	CPI + 10.0%	CPI + 5.0%	CPI + 5.0%	CPI + 5.0%
PNG Waterboard	CPI + 7.8%	CPI + 7.8%	CPI + 7.8%	CPI + 7.8%	CPI + 7.8%

4. Pricing issues

Eda Ranu and PNG Waterboard have unique pricing structures reflecting historical factors including water supply shortages and the ability of consumers to pay for water and sewerage services.

This section discusses the key aspects for both Eda Ranu's and PNG Waterboard's pricing structure focusing on the lifeline tariff and the high level of theft throughout both networks.

The Commission is very concerned at the level of theft on both water networks operated throughout PNG from illegal connections. In addition to this theft, the Commission notes that the unfunded water entitlements for traditional land owners are placing significant cost pressure on both water networks. In Port Moresby these types of connections account for around 30 per cent of total water produced. As such this consumption represents a significant cost to both Eda Ranu and PNG Waterboard which must be met by all paying consumers.

4.1 The lifeline tariff

There are generally considered to be two types of demand for water. Firstly, there is the demand for water for the purposes of cooking, cleaning, drinking and general hygiene. These activities have a number of wider public benefits, including those associated with the lower health costs which arise from access to clean drinking water. The demand for this indoor-use water is generally considered to be non-discretionary, in that every person requires a certain amount of water irrespective of any external factor, including price.

The second type of water demand is that used for recreational and business purposes. This includes water used to cultivate gardens, wash cars, fill swimming pools, and water golf courses. The demand for this water is generally considered discretionary.

It is important that water pricing options are flexible enough to ensure that the first type of water, that is, the non discretionary water is available to all Papua New Guineans at a reasonable price considering the relative incomes of consumers and the need to recover the total cost of providing the water reticulation service.

A 'lifeline' tariff is provided so that residents are able to access affordable drinking water. Eda Ranu offers a lifeline tariff to low covenant houses within Port Moresby on the assumption that lower income groups will reside in these dwellings and have limited ability to pay full price for the water consumed. Meanwhile, PNG

Waterboard provides a relatively low rate for consumption of water less than 12 kilolitres per month and steadily increases its prices as consumption increases. The PNG Waterboard model provides an opportunity for all consumers to access the lifeline tariff irrespective of housing type.

If the prices are too high, some form of community service obligation or subsidy may be required to ensure that both Eda Ranu and PNG Waterboard are able to recover the costs associated with the water consumed. This could in part be funded by the PNG Government, although the Government's ability to fund such support may be limited.

It is important that both Eda Ranu and PNG Waterboard are encouraged to increase the number of billable connections but at the same time are not provided with an incentive to encourage over or excessive consumption by those already on the network as paying customers. The Commission therefore considers that PNG Waterboard's tariff structure, which has an inclining block tariff, is appropriate and provides an appropriate balance between the need to ensure that consumers are able to access affordable water while at the same time are not encouraged to consume excessively.

At the same time the Commission considers that the access to the lifeline tariff outlined in Eda Ranu's pricing structure most likely provides the very poor adequate access to affordable water. However, it is the Commission's preference that Eda Ranu investigate the use of an inclining block tariff for the reasons outlined above.

However, the Commission considers that it is appropriate that consumers are afforded adequate protection from significant and sudden price increases. As such the Commission has built into the price direction a review for the impacts of price changes on consumers, with a particular focus on consumers requiring assistance to meet their basic consumption needs.

4.2 Illegal Connections and Settlements

In spite of the lifeline tariffs in place there is still significant water theft through illegal connections to both Eda Ranu's and PNG Waterboard's water networks. One conclusion could be that water prices are simply too high for those consumers with unpaid for use and illegal connections. The issue of unpaid for use and illegal connections is one of major concern to the Commission and both Eda Ranu and PNG Waterboard.

Illegal connections have a very direct and damaging impact upon the operations of the businesses through the loss of sales revenues, which results in the inability of the water company to recover the costs

associated with providing the water and sewerage services. In addition, the loss from unpaid for, and theft, of water results in higher prices for other users of the network as the fixed cost of supply, which are traditionally high in the water industry, are spread over fewer billable units of consumption. The net effect is that returns to the water company are reduced and the scope for potential future investment in water infrastructure is limited as a result of weak cash flows arising from the rising costs of the service and lower demand for billable water.

The difficult question of how to address the illegal connections and the widespread theft from the water networks by the settlements was raised with the Commission during the early stages of the review process. At the heart of the matter is the fact that the water industry is unable to recover the costs associated with the water that has been illegally obtained unless these costs are spread across consumers who do pay for these services.

These settlements began to appear in Port Moresby in the early 1980's as a result of urban drift, which saw the slow and progressive migration of rural people to the urban areas seeking employment. Throughout the years these settlements were given tacit official encouragement to connect to the Eda Ranu's water distribution network. This unofficial approval of connections appears to be continuing.

In the case of Eda Ranu, which inherited the current water infrastructure from the NCDC, the majority of settlements are located along the major water pipelines which channel water from the reservoirs via the Rouna pumping station to Port Moresby. The settlements tap into these pipelines to service their needs. As a result the water pressure is reduced and certain areas of downtown Port Moresby lack sufficient water pressure for their consumption needs. At the same time the costs to Eda Ranu is immense, Eda Ranu having already incurred the cost to acquire the water under the concessionaire agreement. However, Eda Ranu is unable to recover the costs of supply from the illegal settlements and as such consumers who do pay are expected to pay for the short fall.

Currently, the supply that is illegally obtained from the networks by the settlements is estimated to be in the vicinity of 25-30% of the total water supplied by Eda Ranu.

To address this issue, the Commission has essentially only two options. It can either increase the tariff to all consumers who pay their water charges and who are not illegally connected, or it can reduce the revenue that Eda Ranu can collect by the amount of the unpaid water bills and value of the water taken through illegal connections. A decision to increase the water tariffs to allow the recovery of costs from those that pay (about 40% of the population do not even receive a bill) would provide a direct subsidy from legally

connected customers of the water network to those who illegally access the water. This would result in the inflation of prices for some users and a considerable saving for other users. A decision to refrain from allowing Eda Ranu to recover these costs of delivering its water services would ultimately result in the financial distress of the total Eda Ranu business, with the possible loss of the reliability of service to all water consumers.

The Commission is seeking to determine the efficient costs of both Eda Ranu and PNG Waterboard to ensure that each business is provided with the appropriate incentives to deliver water and sewerage services at efficient prices. However, where these prices are distorted by the relatively high incidence of theft on the network the Commission is left with little choice but to pass the cost of the theft on to consumers who are already paying for water, which results in less than efficient prices for individual consumers. If the Commission allowed prices to reflect only the cost of delivering metered water it would result in both Eda Ranu and PNG Waterboard under-recovering the true costs of supply. The potential that this creates for the loss of services across the whole network would represent a far greater loss to the nation, and thus is to be avoided if at all possible.

Through its examination of Eda Ranu's financial records, the Commission has estimated that if Eda Ranu were to recover its appropriate costs from unpaid water bills and illegal connections, the average tariff would be 52 toea less per kilolitre for the year 2004 than currently applies.

Table 4.1 Cost of illegal connections

Cost\Year	2004	2005	2006	2007	2008	2009
Fixed & Variable costs (K'000)	53,907	61,848	76,403	91,516	108,052	125,405
Av price per kilolitre sold	2.59	2.89	3.47	4.05	4.65	5.26
Av price per kilolitre if full recovery from all users	2.07	2.31	2.78	3.24	3.72	4.20
Average cost of illegal water use	0.52	0.58	0.69	0.81	0.93	1.05

4.3 Differential pricing for PNG Waterboard

PNG Waterboard has an extensive network of infrastructure in PNG which provides water and sewerage services to consumers, all of which are located outside of the capital Port Moresby. The Commission considered the introduction of differential pricing throughout PNG Waterboard's customer base in different parts of the country in the Issues Paper. The rationale for differential pricing is

that it would more accurately reflect the actual cost of providing the water and sewerage services in the various regions. Table 4.2 provides a summary of the various districts within each business' geographical area of operation, including the number of connections in each location.

Table 4.2 PNG Waterboard Geographical area of operations & number of connections

Company	Geographic regions	Connections
Eda Ranu	Port Moresby	30,000
PNG Waterboard	Lae	> 6000
	Mt Hagen, Madang, Wewak, Rabaul	2000 – 6000
	Alotau, Daru, Kimbe, Kundiawa, Popondetta, Kavieng	1000 – 2000
	Kwikila, Bereina, ENBZI	< 1000

As can be seen by comparing Eda Ranu and PNG Waterboard's geographic regions, PNG Waterboard operates in a completely different environment to Eda Ranu. Even within PNG Waterboard's own area of operation, there is a high degree of variability with branches ranging in size from very low (with less than 1000 connections) to extremely high (with over 6,000 connections). Given this variability the Commission raised the possibility of introducing differential pricing throughout PNG Waterboard's operating area. However, the Commission did not receive any support for the introduction of differential pricing. Therefore, the Commission has not explored the issue any further.

In response to the Draft Report PNG Waterboard has commented that it is currently investigating the use of differential pricing. The Commission notes that there is not an official proposal to amend the pricing structure at this stage. However, the Commission would expect that any such proposal from PNG Waterboard would be accompanied with a full disclosure of the costs and benefits associated with the movement to a new pricing structure and also a statement on the various impacts on all consumer types. The introduction of new tariffs would also require this accompanying documentation so that the Commission could consider the full impacts on consumers before granting approval to the changes.

4.4 Water vending

In PNG Waterboard's original submission to the Commission seeking a price increase for 2005 the concept of water vending was discussed.

PNG Waterboard's water vending concept was in response to concerns regarding the unchecked and widespread practice of illegal connections, especially in areas which exhibited no clear or well defined household boundaries such as settlements and some urban areas particularly. To rein in this practice, the PNG Waterboard proposed the introduction of a water vending scheme in those areas where there has traditionally been problems in terms of illegal connections.

The water vending concept in principle involves the supply of bulk water to a water vendor within a community, who would in turn retail the water to the wider community. The water purchased by the vendor would be supplied at an approved tariff set by the Commission. In turn, the vendor would then be permitted to retail the water at a predetermined price to allow for the recovery of costs and provide a return for the service.

The Commission noted that there were a number of advantages and disadvantages with the water vending concept, as set out in Table 4.3.

Table 4.3 Water vending advantages and disadvantages

Advantages	Disadvantages
Potentially addresses illegal connections	Diseconomies of scale may result in relatively high prices
Potentially improves collection efficiency	Potential market power of the vendor
Potentially improves system knowledge of leakages	Potential market power of the vendor
Ensures access to water infrastructure in existing areas where water is potentially available and potentially introducing water infrastructure into new areas	Existing illegal connection (Settlements)
It is a relatively low cost scheme.	

In its submission in response to the Draft Paper, PNG Waterboard noted that it will explore the possibility of experimenting with a suitable water vending model in one of its settlement areas. Based on the experience gained through this exercise, it would then seek approval from the Commission for an appropriate tariff for the bulk water purchased by the vendor.

The Commission also notes that Eda Ranu operates a similar scheme through its filling stations and would encourage PNG Waterboard to investigate this model should it pursue the possibility of water vending.

5. Related Issues

Access to clean, affordable drinking water is a vital step in the ongoing development of PNG. There are a number of social and health related benefits to accessing enough water for cooking, cleaning and basic hygiene requirements. In addition, there are further benefits associated with the long term economic development of PNG which are directly linked to the management of water resources. These benefits are often described by economist as positive externalities. They arise from the benefits which occur in secondary markets which cannot be directly quantified. As such, it important to recognise that water is at the same time an economic and a social good and that the management of water resources has important development, economic and environmental implications. This section discusses these important interrelationships, their impacts on PNG, and importantly the impact that these relationships have on the costs of managing the water network.

5.1 Social

As noted by the Commission in its April 2003 review of water and sewerage prices, access to water and sewerage services represents an essential service throughout PNG, particularly to that part of the population residing in cities and major towns. It is desirable that all Papua New Guineans, wherever they reside, have access to potable water of an appropriate standard and access to appropriate sewerage collection and treatment facilities. However, this is currently not possible due to geographical constraints. The Commission notes that the capital expenditure plans submitted by each business address the potential extension of the current networks into new areas.

The positive externalities discussed above often accrue in the form of social benefits. These benefits include reduction in water born diseases, which results in reduced pressure on the public health system. Indeed there are numerous international and national water quality standards with which both Eda Ranu and PNG Waterboard are required to observe and comply. However, the Commission recognises that compliance with these standards is costly. As such, the Commission accepts that compliance with these standards is an important cost driver in each business' total efficient costs. The Commission seeks to provide the appropriate incentives to ensure that these service standards are met at the least cost to the PNG economy.

In the April 2003 review of prices for water and sewerage charged by PNG Waterboard and Eda Ranu the Commission noted that the imposition of health standards carried significant costs. Further, the

Commission noted that on its preliminary analysis there was insufficient return generated by PNG Waterboard to fund service quality and other health standards.

As such the Commission made an allowance for prices to increase by greater than the inflation rate to ensure that both PNG Waterboard and Eda Ranu were provided with sufficient revenue to cover these costs.

5.2 Service Standards

In the Issues Paper the Commission sought comments from interested parties regarding Eda Ranu's and PNG Waterboard's performance in terms of customer service. Through the submission process the Commission's consumer protection unit was called into a dispute between a customer and one of the water and sewerage businesses regarding the accuracy of a meter reading. Through this process the Commission noted that there needs to be a more consistent and transparent process by which customer disputes are resolved. An important aspect to this process is the need to strike an appropriate balance between the need of both PNG Waterboard and Eda Ranu to make a profit and therefore sustain their businesses, and the needs of consumers. As such the Commission has measured and is favourably disposed towards the need for both businesses to develop a global customer contract which would apply to all customers so that both the business and the customer is aware of their respective rights.

The Customer Contract should specify the following types of information:

- Who is covered by the contract – for example the customer, Eda Ranu's and PNG Waterboard's employees and contractors
- What is covered by the contract – for example access to the customer's property.

It should also detail water supply specifics, such as flow rates, drought and emergency response plans and water quality. Meanwhile, in terms of sewerage supply it should provide specific responses to situations arising from sewage spills, sewer blockages and interruption of service. The following issues should also be covered in the Customer Contract:

- Bill Payment – all aspects of the bill payment process should be covered including details of when payments are due, payment methods and collection cycles.
- Restriction of Services – conditions should be outlined for when, for any reason (such as non-payment), water and sewerage services need to be restricted.

- Meters – all meter-related issues need to be stated and the subsequent responsibilities of specific parties defined. These include: installation, access to meters, meter testing and readings, maintenance of meter, tree removal and building work by the customer.
- Construction Works – the conditions where any necessary planned construction work conducted by either business, such as street/property restoration, safety fencing and lighting should be outlined.
- Entry onto customer's property – procedures and restrictions for when the water businesses requires entry onto a customer's property should be detailed.
- Enquiries, Complaints and Dispute Resolutions – the businesses should list the procedures and policies regarding enquiries, complaints and dispute resolutions. These include: phone/written enquiries, complaints review, billing disputes, record of complaints and customers' rights to compensation.

In developing this customer contract the Commission expects that Eda Ranu and PNG Waterboard will consult with key customer advocates. The Commission expects that both Eda Ranu and PNG Waterboard will have developed these consumer contracts by the end of the 2005 year and will only approve the annual price adjustment if the businesses are able to provide the Commission with the terms and conditions of the contract by that time.

In addition, the Commission seeks to identify appropriate penalties and to introduce to ensure that both Eda Ranu and PNG Waterboard to deliver services to an appropriate level. The Commission will work with both Eda Ranu and PNG Waterboard to determine an appropriate mechanism which provides both services providers the appropriate incentive to deliver services. This may include a mechanism whereby revenues may be taken from each business if they do not deliver services to an appropriate standard. The Commission aims to work with both companies to develop this mechanism so that it can be introduced as part of the 2007 price adjustment process. This mechanism will be referred to as the service standard mechanism.

5.3 Economic

Water is an important economic good in the Papua New Guinean economy. As such the Commission is aware that any increase in the price of water has the potential to impact on the overall movement of prices as measured by the CPI and the price of other goods and

services. While the impact of water tariffs upon inflation is minimal², the Commission notes that there are indirect impacts on inflation which are more likely to result in increasing pressure on inflation. This pressure is largely due to the number of businesses which use water in the production of other goods and services, that is, where water is an important factor in the overall costs of production. This is likely to be the case in a number of sectors within the PNG economy including the hotel, food processing and manufacturing sectors, such as soft drink production and breweries.

5.4 Environmental

In addition to the traditional economic and social issues associated with water pricing, the Commission notes the increasing importance of environmental issues in the provision of water and sewerage services. These environmental issues include the provision and treatment of wastewater, and in particular the ocean outfalls which are dotted along the PNG coastline and along the rivers throughout PNG. Furthermore, the Commission notes that the potentially high environmental costs of damming additional waterways should not be ignored in the assessment of the costs and benefits of any major new infrastructure works. It is important that appropriate conservation measures be adhered to so as to minimise consumers' potential impacts on the environment.

Sewerage is currently collected and treated by both Eda Ranu and the PNG Waterboard to at least a primary treatment level. The majority of PNG Waterboard's sewerage is then discharged into a nearby river or the ocean. Meanwhile, Eda Ranu currently treats the majority of collected sewerage at its inland ponds at Waigani Swamp. Waigani acts as a natural tertiary treatment plant by breaking down any remaining wastes via biodegradation. The remaining sewerage not discharged at Waigani Swamp is collected and pumped out to sea along various ocean outfall pipelines.

There is an ongoing need to upgrade the standard of sewerage treatment and to commit longer term capital funding to address this issue. The Commission notes that as part of the capital expenditure program being proposed by Eda Ranu, there will be a significant upgrading of the sewerage treatment facilities for Port Moresby, resulting in a direct benefit to the environment. The Commission has approved the funding of this capital works project for purposes of setting the regulatory price path. Similarly the Commission has accepted proposals from the Waterboard for new capital expenditure

² The Commission's analysis has suggested that 10 percent increase in the price of water and sewerage charges would result in an increase in the PNG CPI of 0.112 percent.

on sewerage and related treatment facilities as part of the capitals expenditure allowance that has been built into the current price path. The Commission believes that these decisions have been responsible and consistent with its obligation to consider the wider environmental impact of its decisions.

Appendix 1

Final price direction – Eda Ranu

This appendix contains the Commission's final price direction in respect of water and sewerage services for the five-year period commencing 1 January 2005 to 31 December 2009.

1. Period of direction

The provisions below will apply to the five-year period 1 January 2005 to 31 December 2009. A new price direction will be made to apply from 1 January 2009.

2. Services to be regulated

The following services will be regulated by the Commission and the prices for these services will be subject to the formulas and other arrangements set out in clauses 3 to 7 below:

- the provision of water services by Eda Ranu (including the availability of supply) to domestic commercial and industrial premises
- the provision of sewerage services by Eda Ranu (including the availability of supply) to domestic commercial and industrial premises
- miscellaneous monopoly services provided in relation to both the water and sewerage network provided by Eda Ranu

3. Average revenue control for water services and sewerage services

3.1 Water services

Eda Ranu must set prices for year t such that the reasonably forecast maximum average revenue per kilolitre received from the provision of water services ($MAR\ Water_t$) complies with the following formula:

$$MAR\ Water_t \leq (1 + (CPI + X_t)) * MAR\ Water_{t-1}$$

where X_t is as follows:

Year t	X_t
2005	11 per cent
2006	10 per cent
2007	5.0 per cent
2008	5.0 per cent
2009	5.0 per cent

MAR Water₂₀₀₄ = K2.10 per kilolitre

For each other year t

$$\text{MAR Water}_t = \frac{\sum^n (\text{Forecast sales volumes}_t * \text{proposed tariffs}_t)}{\text{Forecast sales}}$$

where:

- there are n customer classes and revenue from the following sources is included in the calculation of MAR Water t
- general fixed and volumetric charges
- miscellaneous services
- MAR Watert-1 is the allowed (not actual) MAR Water calculated for year t-1
- CPI_t for the 12 month period ending on 30 June in Regulatory Year t is calculated as follows:

$$\text{CPI}_t = \frac{\text{CPI March}_{t-1} + \text{CPI June}_{t-1} + \text{CPI Sept}_{t-2} + \text{CPI Dec}_{t-2}}{\text{CPI March}_{t-2} + \text{CPI June}_{t-2} + \text{CPI Sept}_{t-3} + \text{CPI Dec}_{t-3}} - 1$$

where:

PNG CPI for a Quarter is the All Groups, Weighted Average CPI for Urban Areas excluding Drinks, Tobacco and Betel Nut published by the National Statistics Office;

PNG CPI (Sept, t-2) is the PNG CPI for the Quarter ending on 30 September in calendar year t-2;

PNG CPI (Dec, t-2) is the PNG CPI for the Quarter ending on 31 December in calendar year t-2;

PNG CPI (March, t-1) is the PNG CPI for the Quarter ending on 31 March in calendar year t-1;

PNG CPI (June, t-1) is the PNG CPI for the Quarter ending on 30 June in calendar year t-1;

PNG CPI (Sept, t-3) is the PNG CPI for the Quarter ending on 30 September in calendar year t-3;

PNG CPI (Dec, t-3) is the PNG CPI for the Quarter ending on 31 December in calendar year t-3;

PNG CPI (March, t-2) is the PNG CPI for the Quarter ending on 31 March in calendar year t-2; and

PNG CPI (June, t-2) is the PNG CPI for the Quarter ending on 30 June in or calendar year t-2.

For the purposes of this clause 3.1, water services includes the provision of water services by Eda Ranu (including the availability of supply) to domestic, commercial and industrial premises.

3.2 Sewerage services

Eda Ranu must set prices for year t such that the reasonably forecast maximum average revenue per property received from the provision of sewerage services (MAR Sewerage_t) complies with the following formula:

$$\text{MAR Sewerage}_t \leq (1 + (\text{CPI} + X_t)) * \text{MAR Sewerage}_{t-1}$$

Where X_t is as follows:

Year t	X_t
2005	11 per cent
2006	10 per cent
2007	5.0 per cent
2008	5.0 per cent
2009	5.0 per cent

MAR Sewerage₂₀₀₄ = K0.48 per Kilotitre

For each other year t

$$\text{MAR Sewerage}_t = \frac{\sum^n (\text{Forecast sales volumes}_t * \text{proposed tariffs}_t)}{\text{Forecast sales}}$$

where:

- there are n customer classes and revenue from the following sources is included in the calculation of MAR Water t:
- general volumetric and fixture-based charges
- MAR Sewerage_{t-1} is the allowed (not actual) MAR Sewerage calculated for year t-1
- CPI is as defined in clause 3.1.

4. Side constraints

The Commission has decided that it is not appropriate to apply side constraints. However, the Commission would expect that any individual price increase that was over the increases allowed in the average revenues as set out in section 3 would be accompanied with a full disclosure of the impacts on affected consumers. That is where the price for a tariff is increased by greater than the CPI + X allowance set out in section 3 a full impact assessment would be required. If the Commission is not satisfied that the price increase is within the principles outlined in this decision (that is efficient cost recovery and consumer protection from monopoly pricing) it will reserve the right to disallow the proposed price increases.

The introduction of new tariffs requires a full disclosure of the costs and benefits associated with the new tariff and also a statement on the various impacts on all consumer types affected. This accompanying documentation must be provided to the Commission so that it can consider the full impacts on consumers before granting approval to any such changes. If the Commission is not satisfied the introduction of a new tariff is within principles outlined in this decision (that is efficient cost recovery and consumer protection from monopoly pricing) it will reserve the right to disallow the proposed changes to the pricing structure.

5. Price approval process

5.1 Eda Ranu submission

On or before 1 November each year (for 2004 this will be on or before 1 December) Eda Ranu must provide the following to the Commission:

- proposed tariffs for the services which are subject to the MAR price controls in clause 3 of this price direction
- information to demonstrate to the Commission that the proposed tariffs comply with the requirements of clauses 3 and 4 of this price direction including:
 - Eda Ranu's calculation of CPI_t
 - Eda Ranu's forecast of the number of water and sewerage properties in year t
 - Eda Ranu's forecast of the volume of water to be sold in year t by tariff band
 - Eda Ranu's forecast of the volume of sewerage to be sold in year t by tariff band
 - Eda Ranu's forecast of the number of miscellaneous services to be provided
- a description of the assumptions underlying the forecasts including justification for the relevant assumptions adopted
- the total revenue that Eda Ranu anticipates to collect in year t from water services and sewerage services
- the calculation of MAR_t for water services and sewerage services
- a customer impact statement to be prepared in a format to be determined by the Commission
- any other information specified by the Commission that the Commission reasonably requires to assess whether the proposed tariffs comply with this price direction. This may include an independent assessment of whether the forecasts provided by Eda Ranu are reasonable. In such a case the terms of reference for the independent assessment will be specified by the Commission while the costs of the assessment will be borne by Eda Ranu.

5.2 Commission consideration

The Commission will advise Eda Ranu prior to 1 December:

- whether the tariffs proposed under clause 5.1 comply with this price direction and, if they do not comply, the reason that they do not comply. These reasons may include that the Commission does not believe the forecasts provided are reasonable; or
- that the Commission has been unable to determine whether the proposed tariffs comply with this price direction and, if so, what information the Commission requires from Eda Ranu in order to form an opinion regarding whether they comply.

If the Commission does not provide advice to Eda Ranu by 1 December in accordance with this clause 5.2 the proposed tariffs will be deemed to comply with this price direction.

5.3 Eda Ranu resubmission

If the Commission has advised Eda Ranu that the tariffs do not comply or has sought additional information from Eda Ranu, Eda Ranu must resubmit revised tariffs or additional information to the Commission by a date to be specified by the Commission.

Within 20 business days of receiving revised tariffs or information from Eda Ranu the Commission will advise Eda Ranu whether the revised tariffs comply with the price direction or what additional information the Commission requires from Eda Ranu in order to form an opinion as to whether they comply or not.

If the Commission has advised Eda Ranu that the tariffs do not comply or requires further additional information the provisions of this clause 5.3 will continue to apply until the Commission approves the tariffs as complying with this price direction.

5.4 Non-compliance

If by 1 January Eda Ranu has not proposed tariffs to the Commission or the Commission has not approved the proposed tariffs then:

- if $(CPI_t + X_t) > 0$ prices for the relevant water or sewerage services will not change on 1 December
- if $(CPI_t + X_t) < 0$ the Commission may change the tariffs for the relevant water or sewerage services on 1 December by $(CPI_t + X_t)$.

These tariffs will remain in place until the Commission approves tariffs proposed by Eda Ranu consistent with the provisions of this price direction.

6. Pass-throughs

6.1 Pass-through events

Eda Ranu may, when submitting proposed tariffs to the Commission in accordance with clause 5.1, seek to incorporate in proposed tariffs the effects of pass-through events.

A pass-through event is an event that has occurred or is reasonably anticipated by Eda Ranu to occur that satisfies the materiality test in clause 6.5 and is either:

- a change in taxes event;
- an act of terrorism;
- major natural disaster; or
- an augmentation event.

6.2 Change in taxes event

A change in taxes event is:

- a change in the way or rate at which a relevant tax is calculated (including a change in the application or official interpretation of a relevant tax); or
- the removal of a relevant tax or imposition of a new relevant tax.

which in each case occurs on or after 1 April 2004 and satisfies the materiality test in clause 6.5.

Relevant taxes are any tax, rate, duty, charge or levy or other like or analogous impost that is imposed by or payable directly or indirectly by Eda Ranu to any authority of the PNG Government, including goods and services tax but excluding:

- Income tax
- Stamp duty, financial institutions duty, bank account debits tax or similar taxes or duties
- Penalties and interest for late payment relating to any tax
- Any tax which replaces the taxes referred to above, where 'tax' includes any rate, duty, charge or other like or analogous impost.

6.3 Acts of terrorism or a major natural disaster

A terrorism or major natural disaster event is an act of terrorism or a major natural disaster (including but not limited to fire, flood or earthquake) which results in costs which are substantially different to those reasonably foreseen by the Commission and Eda Ranu and incorporated in this price direction.

6.4 Augmentation event

An augmentation event occurs where Eda Ranu is required to fund or contribute to the funding of a major augmentation to Eda Ranu's water supply that was not included in the costs reasonably foreseen by the Commission and Eda Ranu and incorporated in this price direction.

6.5 Materiality test

The effect of the change in taxes event, terrorism or major natural disaster event and augmentation event must be such that the annualised cost incurred by Eda Ranu or forecast to be incurred as a result of the event occurring is at least K1 million (in 2004 Kina terms) in any one year above the costs reasonably foreseen by the Commission and Eda Ranu and incorporated in this price direction.

The annualised cost in any one year is equal to the amount of additional operating expenditure incurred in that year plus 15 per cent of the additional capital expenditure incurred in that year.

6.6 Submission by Eda Ranu

Any submission made by Eda Ranu in relation to clause 6.1 must include the following information:

- Details of the pass-through event concerned
- The date the pass-through event occurred
- The estimated financial impact of the pass-through event on Eda Ranu and the basis on which this impact has been calculated (including supporting documentation where relevant)
- The pass-through amount proposed by Eda Ranu in relation to the pass-through event
- The basis on which the pass-through event is to apply.

6.7 Assessment by the Commission

If the Commission receives a submission under clause 6.1 the Commission must decide whether the pass-through event specified in the statement will occur, occurred or is continuing. If the Commission decides that the pass-through event will occur, occurred or is

continuing the Commission must decide the pass-through amount and the basis on which the pass-through amount is to apply. Prior to making these decisions the Commission may seek additional information from Eda Ranu.

The Commission must notify Eda Ranu in writing of its decision under this clause by 1 December or within 20 business days of receiving additional information from Eda Ranu, whichever is later. If the Commission does not notify Eda Ranu of its decision by these dates the Commission is deemed to have approved Eda Ranu's proposed pass-through amount and the basis on which Eda Ranu proposes it will apply.

6.8 Factors the Commission will consider

In deciding the pass-through amount and the basis on which the pass-through amount is to apply in accordance with clauses 6.8 the Commission must ensure the financial effect on Eda Ranu associated with the pass-through event is economically neutral. The Commission must also have regard to the matters set out in the *Independent Competition and Consumer Commission Act 2002*.

6.9 Commission may initiate pass-through

If a pass-through event occurs and Eda Ranu is likely to be affected by the event but does not give the Commission a submission under clause 6.1 the Commission may decide on a pass-through amount (which may be a negative amount) and the basis on which the pass-through amount is to apply. In doing so the Commission:

- may seek information from Eda Ranu in relation to the pass-through event and the pass-through amount
- must notify Eda Ranu in writing of the pass-through amount, the basis on which the pass-through amount is to apply, and the reason for the Commission's decision.

6.10 No effect on compliance

A pass-through amount applied by Eda Ranu is not taken into account in deciding whether proposed tariffs comply with clauses 3 and 4 of this price direction.

7 Service standard mechanism

To be introduced in 2007 price adjustment mechanism. In 2005, Eda Ranu is to prepare and release a Customer Contract , this Contract to be developed in consultation with customers and the Commission. Failure to introduce a Customer Contract by 31 December 2005 will result in the Commission refusing to allow any price adjustment from 1 January 2006. By the end of 2007, the Commission in consultation with Eda Ranu will develop a service standard mechanism to be applied for the remaining three years of the price direction. Failure to introduce such a mechanism will result in the Commission withholding approval for any price increase from 1 January 2008.

Appendix 2

Final price direction – PNG Waterboard

This appendix contains the Commission's final price direction in respect of water and sewerage services for the five-year period commencing 1 January 2005 to 31 December 2009.

1. Period of direction

The provisions below will apply to the five-year period 1 January 2005 to 31 December 2009. A new price direction will be made to apply from 1 January 2010.

2. Services to be regulated

The following services will be regulated by the Commission and the prices for these services will be subject to the formulas and other arrangements set out in clauses 3 to 7 below:

- the provision of water services by PNG Waterboard (including the availability of supply) to domestic, commercial and industrial premises
- the provision of sewerage services by PNG Waterboard (including the availability of supply) to domestic commercial and industrial premises
- miscellaneous monopoly services provided by PNG Waterboard

3. Average revenue control for water services and sewerage services

3.1 Water services

PNG Waterboard must set prices for year t such that the reasonably forecast maximum average revenue per kilolitre received from the provision of water services (MAR_{Water_t}) complies with the following formula:

$$MAR_{Water_t} \leq (1 + (CPI + X_t)) * MAR_{Water_{t-1}}$$

where X_t is as follows:

Year t	X_t
2005	7.8 per cent
2006	7.8 per cent
2007	7.8 per cent
2008	7.8 per cent
2009	7.8 per cent

MAR Water₂₀₀₄ = K1.54 per kilolitre

For each other year t

$$\text{MAR Water}_t = \frac{\sum^n (\text{Forecast sales volumes}_t * \text{proposed tariffs}_t)}{\text{Forecast sales}}$$

where:

- there are n customer classes and revenue from the following sources is included in the calculation of MAR Water_t
 - general fixed and volumetric charges
 - miscellaneous services
- MAR Water_{t-1} is the allowed (not actual) MAR Water calculated for year t-1
- CPI_t for the 12 month period ending on 30 June in Regulatory Year t is calculated as follows:

$$\text{CPI}_t = \frac{\text{CPI March}_{t-1} + \text{CPI June}_{t-1} + \text{CPI Sept}_{t-2} + \text{CPI Dec}_{t-2}}{\text{CPI March}_{t-2} + \text{CPI June}_{t-2} + \text{CPI Sept}_{t-3} + \text{CPI Dec}_{t-3}} - 1$$

where:

PNG CPI for a Quarter (q) is the All Groups, Weighted Average CPI for Urban Areas excluding Drinks, Tobacco and Betel Nut published by the National Statistics Office;

PNG CPI (Sept, t-2) is the PNG CPI for the Quarter ending on 30 September in calendar year t-2;

PNG CPI (Dec, t-2) is the PNG CPI for the Quarter ending on 31 December in calendar year t-2;

PNG CPI (March, t-1) is the PNG CPI for the Quarter ending on 31 March in calendar year t-1;

PNG CPI (June, t-1) is the PNG CPI for the Quarter ending on 30 June in calendar year t-1;

PNG CPI (Sept, t-3) is the PNG CPI for the Quarter ending on 30 September in calendar year t-3;

PNG CPI (Dec, t-3) is the PNG CPI for the Quarter ending on 31 December in calendar year t-3;

PNG CPI (March, t-2) is the PNG CPI for the Quarter ending on 31 March in calendar year t-2; and

PNG CPI (June, t-2) is the PNG CPI for the Quarter ending on 30 June in calendar year t-2.

For the purposes of this clause 3.1, water services includes the provision of water services by PNG Waterboard (including the availability of supply) to domestic, commercial and industrial premises but excludes reuse, trade waste services and miscellaneous services.

3.2 Sewerage services

PNG Waterboard must set prices for year t such that the reasonably forecast maximum average revenue per kilolitre received from the provision of sewerage services (MAR Sewerage_t) complies with the following formula:

$$\text{MAR Sewerage}_t \leq (1 + (\text{CPI} + X_t)) * \text{MAR Sewerage}_{t-1}$$

Where X_t is as follows:

Year t	X_t
2005	7.8 per cent
2006	7.8 per cent
2007	7.8 per cent
2008	7.8 per cent
2009	7.8 per cent

MAR Sewerage₂₀₀₃₋₀₄ = K0.49 kilolitres

For each other year t

$$\text{MAR Sewerage}_t = \frac{\sum^n (\text{Forecast sales volumes}_t * \text{proposed tariffs}_n)}{\text{Forecast sales}}$$

where:

- there are n customer classes and revenue from the following sources is included in the calculation of MAR Water t:

- general fixed and fixture-based charges
- MAR Seweraget-1 is the allowed (not actual) MAR Sewerage calculated for year t-1
- CPI is as defined in clause 3.1.

4. Side constraints

The Commission has decided that it is not appropriate to apply side constraints. However, the Commission would expect that any individual price increase that was over the increases allowed in the average revenues as set out in section 3 would be accompanied with a full disclosure of the impacts on affected consumers. That is where the price for a tariff is increased by greater than the CPI + X allowance set out in section 3 a full impact assessment would be required. If the Commission is not satisfied that the price increase is within the principles outlined in this decision (that is efficient cost recovery and consumer protection from monopoly pricing) it will reserve the right to disallow the proposed price increases.

The introduction of new tariffs requires a full disclosure of the costs and benefits associated with the new tariff and also a statement on the various impacts on all consumer types affected. This accompanying documentation must be provided to the Commission so that it can consider the full impacts on consumers before granting approval to any such changes. If the Commission is not satisfied that the introduction of a new tariff is within principles outlined in this decision (that is efficient cost recovery and consumer protection from monopoly pricing) it will reserve the right to disallow the proposed changes to the pricing structure.

5. Price approval process

5.1 PNG Waterboard submission

On or before 1 November each year (for 2004 this will be on or before 1 December) PNG Waterboard must provide the following to the Commission:

- proposed tariffs for the services which are subject to the MAR price controls in clause 3 of this price direction
- information to demonstrate to the Commission that the proposed tariffs comply with the requirements of clauses 3 and 4 of this price direction including:
 - PNG Waterboard's calculation of CPI_t
 - PNG Waterboard's forecast of the number of water and sewerage properties in year t

- PNG Waterboard's forecast of the volume of water to be sold in year t by tariff band
- PNG Waterboard's forecast of the volume of sewerage to be treated in year t by tariff band
- PNG Waterboard's forecast of the number of miscellaneous services to be provided
- a description of the assumptions underlying the forecasts including justification for the relevant assumptions adopted
- the total revenue that PNG Waterboard anticipates to collect in year t from water services and sewerage services
- the calculation of MAR_t for water services and sewerage services
- a customer impact statement to be prepared in a format to be determined by the Commission
- any other information specified by the Commission that the Commission reasonably requires to assess whether the proposed tariffs comply with this price direction. This may include an independent assessment of whether the forecasts for year t are reasonable. In such a case, the terms of reference for the independent assessment will be specified by the Commission while the costs of the assessment will be borne by PNG Waterboard.

5.2 Commission consideration

The Commission will advise PNG Waterboard prior to 1 December:

- whether the tariffs proposed under clause 5.1 comply with this price direction and, if they do not comply, the reason that they do not comply. This reason may include that the Commission does not believe the forecasts provided are reasonable.

or

- that the Commission has been unable to determine whether the proposed tariffs comply with this price direction and, if so, what information the Commission requires from PNG Waterboard in order to form an opinion regarding whether they comply.

If the Commission does not provide advice to PNG Waterboard by 1 December in accordance with this clause 5.2 the proposed tariffs will be deemed to comply with this price direction.

5.3 PNG Waterboard resubmission

If the Commission has advised PNG Waterboard that the tariffs do not comply or has sought additional information from PNG Waterboard,

PNG Waterboard must resubmit revised tariffs or additional information to the Commission by a date to be specified by the Commission.

Within 20 business days of receiving revised tariffs or information from PNG Waterboard the Commission will advise PNG Waterboard whether the revised tariffs comply with the price direction or what additional information the Commission requires from PNG Waterboard in order to form an opinion as to whether they comply or not.

If the Commission has advised PNG Waterboard that the tariffs do not comply or requires further additional information the provisions of this clause 5.3 will continue to apply until the Commission approves the tariffs as complying with this price direction.

5.4 Non-compliance

If by 1 December PNG Waterboard has not proposed tariffs to the Commission or the Commission has not approved the proposed tariffs then:

- if $(CPI_t + X_t) > 0$ prices for the relevant water or sewerage services will not change on 1 January
- if $(CPI_t + X_t) < 0$ the Commission may change the tariffs for the relevant water or sewerage services on January 1 by $(CPI_t + X_t)$.

These tariffs will remain in place until the Commission approves tariffs proposed by PNG Waterboard consistent with the provisions of this price direction.

6. Pass-through events

6.1 Pass-through events

PNG Waterboard may, when submitting proposed tariffs to the Commission in accordance with clause 5.1, seek to incorporate in proposed tariffs the effects of pass-through events.

A pass-through event is an event that has occurred or is reasonably anticipated by PNG Waterboard to occur that satisfies the materiality test in clause 6.5 and is either:

- A change in taxes event
- An act of terrorism
- Major natural disaster
- A change in dividend policy

or

- An augmentation event

6.2 Change in taxes event

A change in taxes event is:

- a change in the way or rate at which a relevant tax is calculated (including a change in the application or official interpretation of a relevant tax)

or

- the removal of a relevant tax or imposition of a new relevant tax, which in each case occurs on or after 1 December 2004 and satisfies the materiality test in clause 6.6.

Relevant taxes are any tax, rate, duty, charge or levy or other like or analogous impost that is imposed by or payable directly or indirectly by PNG Waterboard to any authority of the PNG Government, including goods and services tax but excluding:

- income tax or capital gains tax
- stamp duty, financial institutions duty, bank account debits tax or similar taxes or duties
- penalties and interest for late payment relating to any tax
- any tax which replaces the taxes referred to above, where 'tax' includes any rate, duty, charge or other like or analogous impost.

6.3 Acts of terrorism or a major natural disaster

A terrorism or major natural disaster event is an act of terrorism or a major natural disaster (including but not limited to fire, flood or earthquake) which results in costs which are substantially different to those reasonably foreseen by the Commission and PNG Waterboard and incorporated in this price direction.

6.4 Augmentation event

An augmentation event occurs where PNG Waterboard is required to fund or contribute to the funding of a major augmentation to PNG Waterboard's water supply that was not included in the costs reasonably foreseen by the Commission and PNG Waterboard and incorporated in this price direction.

6.5 Materiality test

The effect of the change in taxes event, terrorism or major natural disaster event and augmentation event must be such that the annualised cost incurred by PNG Waterboard or forecast to be

incurred as a result of the event occurring is at least K1 million (in 2004 Kina terms) in any one year above the costs reasonably foreseen by the Commission and PNG Waterboard and incorporated in this price direction.

The annualised cost in any one year is equal to the amount of additional operating expenditure incurred in that year plus 15 per cent of the additional capital expenditure incurred in that year.

6.6 Submission by PNG Waterboard

Any submission made by PNG Waterboard in relation to clause 6.1 must include the following information:

- details of the pass-through event concerned
- the date the pass-through event occurred
- the estimated financial impact of the pass-through event on PNG Waterboard and the basis on which this impact has been calculated (including supporting documentation where relevant)
- the pass-through amount proposed by PNG Waterboard in relation to the pass-through event
- the basis on which the pass-through event is to apply.

6.7 Assessment by the Commission

If the Commission receives a submission under clause 6.1 the Commission must decide whether the pass-through event specified in the statement will occur, occurred or is continuing. If the Commission decides that the pass-through event will occur, occurred or is continuing the Commission must decide the pass-through amount and the basis on which the pass-through amount is to apply. Prior to making these decisions the Commission may seek additional information from PNG Waterboard.

The Commission must notify PNG Waterboard in writing of its decision under this clause by 1 April or within 20 business days of receiving additional information from PNG Waterboard, whichever is later. If the Commission does not notify PNG Waterboard of its decision by these dates the Commission is deemed to have approved PNG Waterboard's proposed pass-through amount and the basis on which PNG Waterboard proposes it will apply.

6.8 Factors the Commission will consider

In deciding the pass-through amount and the basis on which the pass-through amount is to apply in accordance with clauses 6.7 the Commission must ensure the financial effect on PNG Waterboard associated with the pass-through event is economically neutral.

6.9 Commission may initiate pass-through

If a pass-through event occurs and PNG Waterboard is likely to be affected by the event but does not give the Commission a submission under clause 6.1 the Commission may decide on a pass-through amount (which may be a negative amount) and the basis on which the pass-through amount is to apply. In doing so the Commission:

- may seek information from PNG Waterboard in relation to the pass-through event and the pass-through amount
- must notify PNG Waterboard in writing of the pass-through amount, the basis on which the pass-through amount is to apply, and the reason for the Commission's decision.

6.10 No effect on compliance

A pass-through amount applied by PNG Waterboard is not taken into account in deciding whether proposed tariffs comply with clauses 3 and 4 of this price direction.

7 Service standard mechanism

To be introduced in 2007 price adjustment mechanism. In 2005, the Waterboard is to prepare and release a Customer Contract, this Contract to be developed in consultation with customers and the Commission. Failure to introduce a Customer Contract by 31 December 2005 will result in the Commission refusing to allow any price adjustment from 1 January 2006. By the end of 2007, the Commission in consultation with the Waterboard will develop a service standard mechanism to be applied for the remaining three years of the price direction. Failure to introduce such a mechanism will result in the Commission withholding approval for any price increase from 1 January 2008.

Appendix 3

Section 21 (2A) of the Prices Regulation Act

When making an order under Subsection (1), the Commission shall have regard to

- (a) the need to protect consumers and users of the declared goods or services from misuse of market power in terms of prices, pricing policies (including policies relating to the level or structure of prices) and the standard of the declared goods or services; and
- (b) the cost of making, producing or supplying the declared goods or services; and
- (c) the desirability of encouraging greater efficiency in relation to making, producing or supplying the declared goods or services; and
- (d) the need to ensure an appropriate rate of return on any investment in relation to the declared goods or services; and
- (e) the borrowing, capital and cash flow requirements of persons making, producing or supplying the declared goods or services; and
- (f) considerations of demand management and least-cost planning; and
- (g) existing standards of quality, reliability and safety of the declared goods or services, and the desirability of encouraging improvements in those standards; and
- (h) the effect any proposed order on general price inflation over the medium term; and the economic and social impact of any proposed order; and
- (i) any other matters the Commission considers relevant.

Appendix 4

List of Submissions

Issues Paper :

- Eda Ranu
- PNG Waterboard
- Kepsey Puiye
- Mr Zurinuoc
- Kevin Yaxley

Draft Report:

- Eda Ranu
- PNG Waterboard