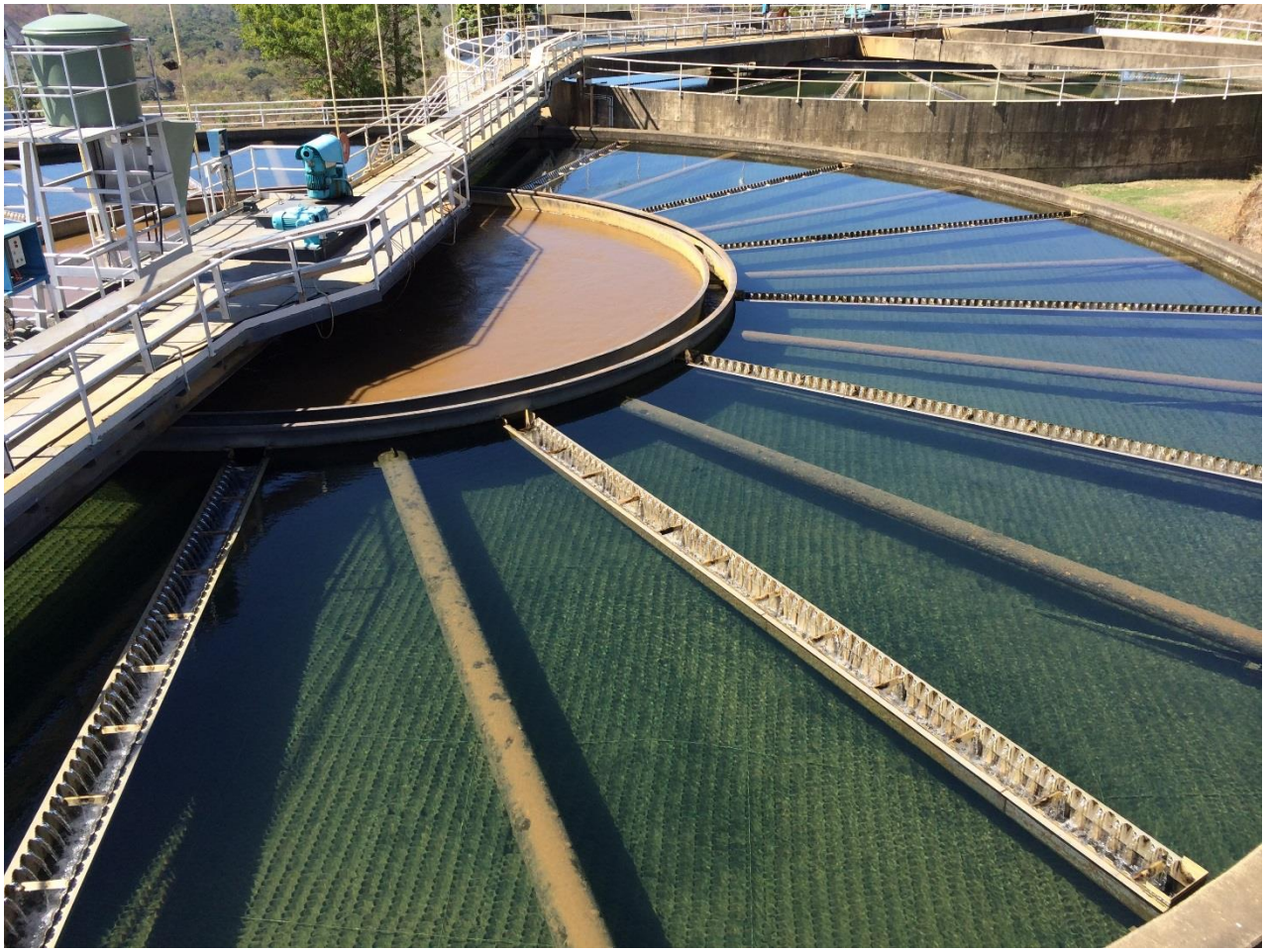
INDEPENDENT CONSUMER AND COMPETITION COMMISSION

Water and Sewerage Pricing Review



Final Report

July 2015

1. Foreword

The Independent Consumer and Competition Commission ("the Commission/ ICCC") is a statutory body established under the provisions of the *Independent Consumer and Competition Commission Act 2002* ("the **ICCC Act**"). The Commission is vested with responsibilities under the ICCC Act to promote fair trading, regulate prices of certain goods and services, protect consumers' interest and undertake other related responsibilities. Under the *Prices Regulation Act Chapter 320* ("**PR Act**"), the Commission amongst others is responsible for the regulation of prices for the water and sewerage services.

The Commission has undertaken this review in accordance with Section 25A (6) of the PR Act. These sections mandate the Commission to undertake this review in an open and transparent manner which will involve a wider stakeholder and public consultation prior to making any determination on the current pricing arrangements going forward. As part of this stakeholder consultation process, the Commission released a public notice, announcing the commencement of the water and sewerage review on March 5, 2014 detailing the various issues of relevance informing interested parties understand the review process on which submissions and comments were invited from the industry stakeholders and other interested parties.

Following this announcement, the Commission consulted all stakeholders to provide comments and submissions and also sought further data and information, especially from the two affected utilities. The submissions, comments and data provided have been invaluable in assisting the Commission in making its determinations on appropriate price paths to apply to Eda Ranu and Water PNG for the forthcoming regulatory period. A schedule of those respondents who provided submissions through different stages of this Review process is set out in Appendix 1 of this Final Report.

The Review has been aimed at assessing the 2009 Final Determinations for water and sewerage services and to determine whether or not there is a need to continue regulation of water and sewerage services, and if necessary, set new price paths to apply for the forthcoming regulatory period commencing 1 January, 2015.

This report contains the Final Determinations that will apply to the supply of water and sewerage services provided by Eda Ranu and Water PNG retrospective to 1 January, 2015 and ending in 31 December, 2019.

The following table outlines the process which the Commission has used to carry out this review

Event	Date
Release of public notice, announcing the commencement of the water and sewerage review	05th March, 2014

Received submissions and information requested from Water PNG and Eda Ranu	April 2014
Held various meetings with Eda Ranu and Water PNG	27th May to 08th October 2014
Carried out site inspections of Eda Ranu Sewerage and Water Networks in Port Moresby and Mt Erima	11th and 14th July 2014
Carried out site inspections of Water PNG's Water and Sewerage Network at Lae, Kokopo, and	12th, 14th and 16th July 2014
Release of Draft Report	08th October,2014
Held various meetings with Eda Ranu and Water PNG	08th Oct to 07th Nov 2014
Original date set for close of submissions to the Draft Report	07th November, 2014
Extended date set for close of submission to Draft Report	31st December, 2014
Release of Final Report & Prices Order	30th July, 2015

The Commission originally set the final date for submission to close as being 7th November 2014. However on the request of Eda Ranu and Water PNG, the Commission extended this to the 31st of December 2014. Consequently the release of the Final Report has been delayed to allow the Commission time to review its assessments in light of the submissions received.

For further information please contact Mr. Brian Ivosa, Executive Manager for Prices and Productivity Division on telephone 325 2144 or by fax on 325 3980 and/or via email: bivosa@iccc.gov.pg.

Copies of the Final Report can be obtained from the Commission's website at www.iccc.gov.pg.

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MR ELASTUS GERORO

Acting Chief Executive Officer

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2. Executive Summary

This Executive Summary provides an overview of the Commission's key findings and its determinations for water and sewerage prices for the period of 2015 to 2019.

The review has been carried out in an open and transparent manner. A draft report was released and stakeholders were invited to make submissions. In response the Commission received three submissions. The Commission has several meetings with both Eda Ranu and Water PNG. Both Eda Ranu and Water PNG have provided the Commission with additional information in response to various requests from the Commission. Having considered all the information provided the Commission has completed its price review of water and sewerage services. This report includes the full set determinations made by the Commission.

The Commission has made the following determinations;

- The Commission will continue to regulate the prices that Eda Ranu and Water PNG may charge.
- The Commission has changed the form of regulation from a Maximum Allowable Revenue construct to a Maximum Average Price construct. This provides a natural incentive for both water companies to grow their customer numbers and their volumes.
- The Commission has used the building block method to establish and measure the costs of both companies.
- The Commission has assessed the operating expenditures of both Eda Ranu and Water PNG. Some costs, particularly labour costs, have been increasing at rates which are far higher than inflation. In the Commission view, this is unsustainable and customers cannot afford it. Nor can Eda Ranu or Water PNG demonstrate any improved level of service as a result of this increased spending. Consequently the Commission has taken steps to limit further increases. The Commission has also set in place service level measurements which provide a linkage between the price customers pay and the level of service. The rationale for this linkage is that if costs are going to be higher, then service providers need to also deliver higher levels of service.
- In the Commission's view both Eda Ranu and Water PNG need to continue to improve the way they use their resources. This will involve continuing to make better use of their staff, controlling and managing their spending and seeking to reduce costs where-ever they can. Any spending should only be carried out where the benefits to customers exceed the costs of the activity.
- The Commission has introduced a Service Performance Premium into the price path. The MAP (maximum average price) charged each year will be determined by the service performance of the previous year. Each year the price will be calculated using the following formula;

$$MAP_{(Y=1)} = (MAP_{(y=0)} - SP_{(y=0)}) \times (1 + CPI \quad + X) + SP_{(y=1)} \times (1 + CPI) \; + OverUnderAdj$$

Where;

$MAP_{(Y=1)}$ = the Maximum average price in the current year

$MAP_{(y=0)}$ = the Maximum average price in the previous year

CPI = the CPI adjustment based upon the inflation in the previous year

$X\ Factor$ = the X factor

$SP_{(y=0)}$ = the Service Price Premium for the previous year

$SP_{(y=1)}$ = the Service Price Premium in the current year

$OverUnderAdj$ = the adjustment to reflect the over or under recovery of the Maximum average price for the previous year.

- The Commission has set pricing parameters for each company.

Table 1: Pricing parameters set by the Commission

	Eda Ranu	Water PNG
2015 Water MAP (Maximum Average Price) – Kina per kilolitre	3.43	6.32
2015 Sewerage MAP (Maximum Average Price) – Kina per kilolitre	1.11	2.23
2015 Water Service Performance Premium – Kina per kilolitre	0.59	0.45
2015 Sewerage Service Performance Premium – Kina per kilolitre	0.18	0.25
X Factor	Negative 4.21%	Positive 0.47%

This means that average prices have changed by the following amounts.

Initial Water Average Price Change	Negative 18%	Positive 21%
Initial Sewerage Average Price Change	Positive 5%	Positive 47%

- The Commission has placed some constraints upon the price which both Eda Ranu and Water PNG may charge domestic customers. Under no circumstances can a domestic customer be charged a minimum monthly charge or access fee. Instead they can only be charged for the actual quantity of water or sewerage used as determined by their water meter.
- For both Eda Ranu and Water PNG customers, a defined quantity will be charged at a lower price. This price will not be subject to any X factor adjustment, or CPI adjustments or Service Performance Premium adjustment over the regulatory period.

Table 2: Defined quantity charged at a lower price

	Eda Ranu	Water PNG
Initial Quantity Per Month	35 kilolitres	20 Kilolitres
Maximum Water Price	0.30	0.30
Maximum Sewerage Price	0.10	0.10

In 2017 the Commission will carry out a review of these price points.

- The Commission has pre-approved capital spending for minor works and made provision for these in the price path. Eda Ranu did not propose any major capital works be carried out over the next regulatory period. Water PNG had a list of proposed work, but most of this was to be funded by gifting. So only the gap between gifted funding and the proposed work was covered in the price path. The Commission has determined that either Eda Ranu or Water PNG can apply to the Commission during the regulatory period to have their prices adjusted to cover the cost of major capital projects. The projects must comply with the criterion specified by the Commission.

  The Commission has decided migrating both Eda Ranu and Water PNG from a price order under the PR Act onto regulatory contracts under the ICCC Act. The Commission will use these contracts to apply the prices described in this report. The timing of the migration is yet to be decided. Until this migration occur both Eda Ranu and water PNG will continue to be regulated under the Prices Regulation Act.

Eda Ranu Outsourcing Contract Arrangements

- The Commission has determined that it is not obligated to accept the contractual arrangements which the shareholders of regulated entities enter into, even if the shareholder is the Government. Instead the Commission must only consider what the reasonable costs would be for an efficient commercial entity.
- The Commission has carefully considered the contract arrangement between Eda Ranu and PNG Water Ltd and made the following determinations.
  - This contract will end in June 2019 before the regulatory period finishes. The Commission would expect to be consulted before any major new contract is signed because it will have a material impact upon the price which Eda Ranu's customers must pay.
  - The Commission has included the costs of the contract payments which Eda Ranu pay PNG Water Limited but has made some adjustments to them. These adjustments include.
    - Bulk water payments were converted into a fixed annual charge plus a variable charge that depends upon the volume of water produced.

        - Finance rates were adjusted to reflect the WACC used in this report, rather than the rate used when the contract was set up.
        - K109 million of capital assets paid for in 2006 under the facilities fee were included in the regulatory asset base to calculate a cost of capital and recovery of capital.
        - K50 million spent in 2006 under the facilities fee was excluded from the price path. The Commission considered that some of this spending was really just a finance arrangement for operating costs. K20 million of this was excluded because Eda Ranu did not provide any explanation for it.
    - The Commission has determined that when the Commission carries out the pricing review in 2019, no amount should be included in the price path for the cost of the Water Treatment Assets. This is because the customers of Eda Ranu have already fully paid for these assets.
- The Commission has also built in targets for Eda Ranu to reduce its water losses over the regulatory period. The price path has been adjusted to reflect the reduced water treatment costs that will result from achieving these targets.

Table 3: Eda Ranu water loss targets set by the Commission

	Current	2015	2016	2017	2018	2019
Loss Targets	56%	48%	41%	35%	30%	25%

- The Commission has estimated reasonable costs for customer service and has used these costs to set the price path rather than using the contractual arrangement which Eda Ranu have entered into with JC-KRTA.

Water PNG Cross Subsidies

- In the 2019 price review, the Commission expects to carry out a more in depth review of the cost of cross subsidies between customers in different geographic areas on Water PNG's network. Water PNG should accept this report as advance warning of the Commission expectations for 2019. At that time Water PNG will be expected to be able to separate its assets and its direct operating costs by geographic area and to provide this information to the Commission in a timely manner.
- The Commission is generally concerned about the sustainability of Water PNG's business model as it expands its services into an increasing number of smaller communities with very small numbers of customers and high unit costs.

Service Level Premiums

- The Commission has determined a methodology to link service performance to the prices which customers pay. The performance of each company each year will determine its MAP for the following year.
- The service measures to be used to set the Service Performance Premium will be as follows;

Table 4: Service measures used in the Service Performance Premium

Performance Measure	Weighting % of Total
Water Breaks per 1000 rateable properties	10%
Unplanned Interruptions per 100 km of water main	10%
% Water service restored within 5 hours	20%
Water Incidents per 1000 rateable properties	40%
Sewage Overflows per 100 km of main	5%
Sewage Overflows to customer property per 1000 connections	5%
Sewerage Discharge Test Failures	10%

- Both companies have agreed to work together to establish a consistent approach to measuring the above set of performance measures.
- Each company must separately present a report to the Commission by June 30th 2015 explaining how it will implement the performance measures and how it will independently verify the results. If these measures are not implemented to the Commissions satisfaction by the beginning of 2016, then the service premium will be set at zero.

3. Introduction

The Commission has undertaken this review and made appropriate determinations which are beneficial to both consumers and the participants in the water and sewerage Industry, being guided by the provisions of the PR Act, and in particular Section 21(2A). This Review process was undertaken in a transparent and accountable manner.

3.1. Background to 2009 Final Determinations

The 2009 Final Determinations for water and sewerage services in PNG were made through a similar review process. Having considered the rationale for regulation, the Commission decided that it was necessary to continue to regulate water and sewerage services under Section 21 of the PR Act whereby it set the rates for water and sewerage services.

Based on this decision, a five year regulatory price path was set for Eda Ranu and Water PNG which have been in force from 1 January 2010 to 31 December 2014. As part of this key Final Determination, the Commission adopted a hybrid form of price control formula whereby a total revenue cap, or a Maximum Allowable Revenue ("**MAR**"), was established which was linked to the revenue requirements of the business. An Additional Allowable Revenue ("**ARR**") was also provided for where actual volumes exceeded forecast volumes by more than 5%.

Under this approach, the business was able to recover its fixed costs even if there was a fall in demand (in kilolitres). However the business was provided with the incentive to undertake further investment and connect new customers through the additional revenue it could earn per customer. This was particularly relevant for Eda Ranu in 2009 when there was an expectation that should the proposed LNG project proceed, then there could have been a significant increase in demand above what was forecast.

The business was able to adjust its tariffs within individual customer groups provided the total revenue earned from the business did not exceed the MAR. The MAR was capped each year based on CPI+/-X formula. ARR from new connections in each year was to be based on any new customer connections greater than 5% above the forecast connections provided by the business for each of year of the regulatory period, 1st January 2010 to 31st December 2014.

3.2. Comments about the Draft Report

Provision of information

Around the world regulators generally face the problem of asymmetry of information available between regulators and those who they regulate. In other words, the regulated entity knows far more about its business than the regulator does. Furthermore the regulated entity often has no incentive to provide this information to the regulator. In PNG the regulated entity is required by law to provide the Commission with the information needed to fulfil its regulatory functions.

However it is not practical for the Commission to revert to the courts every time a regulated entity refuses to provide information.

In the Draft Report the Commission outlined its proposed determination based upon the information it had received. There were a number of areas where the Commission asked for specific responses and further information. It was expected that both parties would understand that it was in their best interests to provide this information in order to ensure that better outcomes were achieved than those that were proposed in the Draft Report.

The Draft Report should therefore be seen as a step in the process of developing a regulated price path. While the Draft does reflect the Commissions intentions for the final determination, it is always assumed that further information will be provided which will alter the final outcomes.

Financial Viability

In discussions with Eda Ranu following the release of the Draft Report, the Commission became concerned about the ongoing financial viability of Eda Ranu should the Draft Report proceed in its then current form. The Commission must take into account a regulated entities legitimate commercial interests, as well as protecting the interests of consumers. To the best of its knowledge the Commission had fully considered Eda Ranu's legitimate commercial interests in the Draft Report based upon the information it processed at that time.

The Commission therefore evaluated Eda Ranu' cash-flow requirements including its current debt position. The Commission found that Eda Ranu would be able to continue to cover all its operating costs, but would not be fully covering the cost of depreciation. The effect of this would be that Eda Ranu would be able to continue to operate and pay its bills, but in some cases it might struggle to support new investment or replacement of assets.

Consequently the Commission has taken a more lenient position in this final report. This has including a larger portion of the contractual payments which Eda Ranu makes to PNG Water Limited. The cost of bulk water supply was increased and the administrative charge which was excluded in the Draft has been included in the Final Determination.

The Service Performance price premium for 2015 was also set so as to give Eda Ranu breathing space, to prepare itself for the future. While the evidence suggests that Eda Ranu's current performance would give them a much lower premium, the Commission has set it as 80% of the full available amount for the first year of the regulatory period.

Spreadsheets

Following the release of the Draft Report, the Commission provided both Eda Ranu and Water PNG with copies of the spreadsheets it had used to assess the value of assets, the level of operating expenditure and the building block models used to calculate the proposed MAPs. In total 3 spreadsheets were given to each party. The Commission then met with both parties on multiple occasions to help them to understand these spreadsheets.

In a letter to the Commission Eda Ranu wrote;

> *"We have earlier advised the Commission that the financial model provided are defective as the worksheets are linked to external sources that have not been made available to us. In the spirit of transparency, we request that the full financial models without any missing links be provided to us by the Commission. We regret that despite imposing a deadline for our response, the Commission has not provided us working set of financial models. This has placed us in a rather difficult position in providing a credible response.*
>
> *Notwithstanding the lack of a working model, we have attempted to assess the impact of the X-factor…. "*[1]

In response to this the Commission wrote back to Eda Ranu as follows;

> *"We further advise that we have given you all the financial models and that on three occasions we have shown you how to use them. The models initially had a problem with the linkages between the models and were later rectified and the building block, operating cost and Regulated Asset Base (RAB) models were loaded onto a memory drive (flash drive/stick) and given to your Policy Research & Strategic Planning Manager. The links were rectified on 24 October 2014. We also ran through the models with other Eda Ranu personal and an officer from JCKRTA Consulting Group (PNG) Ltd and again linked the models onto their computer and explained how to set the X factor. "*

The Commission notes that Water PNG was given similar support to understand the economic models and that it appears that Water PNG had no issue with them.

In any case both Eda Ranu and Water PNG had full visibility of the inputs used by the Commission. All the calculations used to calculate X factors and the MAP were included in the models.

The Service Performance Premiums

It became apparent following the release of the Draft Report that both Eda Ranu and Water PNG had not understood that the Commission was proposing to include an additional amount in the maximum average price for Service Performance. The Commission took this as an indication that the Draft Report did not explain the service performance premium clearly enough. The Commission has tried to make this clearer in the Final Report.

3.3. Legal Requirements

The Commission has undertaken this review under Section 25A (6) of the PR Act. The purpose of the review was:

[1] Eda Ranu *Response to Independent Consumer and Competition Commission (ICCC) Water and Sewerage Price Review Oct 2014 Draft Report*, Letter to ICCC, 28th November 2014, Page 2

- To determine whether or not regulation is still required for water and sewerage services, and
- If regulation is still required for water and sewerage services, to determine the form of those regulations and if necessary,
- To establish a new price path for a new regulatory period.

In carrying out this review the Commission has had regard to;

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

3.4. Format of the Review Process

The review has encompassed considerations of all issues relating to the provision of water and sewerage services. As part of this review, the Commission invited the public and the stakeholders of Eda Ranu and Water PNG to make submissions. The Commission has also proactively gathered information from Eda Ranu and Water PNG and has compiled this report.

The review followed the process outlined below.

1. Requested information from Eda Ranu and Water PNG.
2. Wrote and published a draft report.
3. Stakeholders' made submissions to the Commission based upon the discussion and the issues raised by the Commission in the Draft Report.
4. The Commission considered the issues raised by submissions.
5. Further information was sort from Eda Ranu and Water PNG.
6. A final report is published (This report).
7. The determinations in the Final Report will be used to regulate the water and sewerage industry for the next regulatory period.

4. Rationale For Regulation

Eda Ranu only operates in the National Capital District ("NCD") and in some of the nearby rural villages in the Central Province while Water PNG provides services to the towns in the rest of the provinces in the country except for Gulf, Eastern Highlands, Southern Highlands Province and the Autonomous Region of Bougainville. Hence, Eda Ranu and Water PNG do not compete with each other as they are operating in different geographical locations and have a natural monopoly status in each of their respective operating environments.

While the Commission notes the natural monopoly status of each of the water companies, it has also considered other relevant issues to ascertain whether or not there are any possibilities of competition occurring in this industry. These issues are as follows;

- Entry of new players into the market;
- Degree of countervailing power; and
- Availability of other means of water supply.

The Commission has considered each of the above issues and is of the view that there is no competition. Nor is there any likelihood of new entrants in the market given the nature of barriers to entry. This is due to;

- the high capital-intensive characteristics of the industry,
- vertical integration of the businesses and
- the high sunk costs required to set up an independent competing network.

In addition, there is little or no countervailing powers held by most customers.

In some instances, customers can choose to install water storage tanks and collect water from the roof of their building. This provides a price cap for Eda Ranu and Water PNG. If customers can collect water themselves at a lower cost than what Eda Ranu or Water PNG charge, then presumably they would choose this alternative. However in many instances customers will not have the option to collect their own water. In some instances the Commission did observe that customers in smaller centres were collecting their own water. This appeared to be principally because Water PNG's network was unreliable.

Some customers will also have alternatives to using Eda Ranu's or Water PNG's sewerage systems. In fact only a small portion of Water PNG's customers do use their reticulated sewerage systems and Water PNG do not universally offer sewerage services in every area where they supply water. Alternatives for customers include, installing septic tank systems and pit toilets. The Commission notes that the Government is developing policies to improve the level of sanitation in PNG, and that there is an expectation that Water PNG and Eda Ranu will play a key role in this.

However for many customers, particularly those living in apartments or those living in the centre of the larger centres, alternatives to using the reticulated service offered by Eda Ranu and Water PNG will be expensive.

Bottled water also provides a limited form of competition in the niche market such as hotels, offices, conferences and meeting venues for direct consumption. But, for use of water for other purposes there is no competition provided to Eda Ranu and Water PNG. Water PNG in its submission to the Commission commented that it had no objection to ICCC's continuing to regulate water and sewerage tariff of PNG.

The Commission has concluded that both Eda Ranu and Water PNG are monopoly suppliers and there is little or no opportunity for anyone to compete against them. And consequently the Commission had determined that it will continue to regulate the price of both water and sewerage services.

The National Research Institute made the following comments in its submission in support of this.

> *"Economic regulation in the water and sewerage industry is necessary because regulatory oversight ensures that monopoly water supplier do not overprice water services or fail to meet service quality standards. "* [2]
>
> *"The distribution of water and transportation of sewerage along network of pipes and sewers respectively resembles characteristics of a natural monopoly. The high capital costs especially the sunk cost related to infrastructure projects and the immobility of the developed assets do act as barriers to entry into this market. The potential for direct competition along the utility network is often deemed uneconomical".* [3]

4.1. Third Party Access

The National Research Institute also made the following comments;

> *"In spite of the limited scope, competition could introduce along the distribution network through employment of common carriage or third party access. Third-party access allows an interested operator to undertake, for example, procurement, treatment, or retail supply of water to a final customer, whilst harnessing the essential infrastructure facilities of the Water PNG or Eda Ranu. … It would be fitting to include a discussion on third party access in the Final Determination. Note, however that any reforms in State-owned Enterprises that would allow competition in utilities service provision*

[2] NRI, Re: Release of Draft Report – Water & Sewerage Review, Letter to ICCC, 13th November 2014.
[3] NRI, *Submission to ICCC on Pricing and Regulatory Review on Water and Sewerage Services*, November 2014, Page 2.

are a matter of public policy subject to Governments' prerogative and should be… [corrected] ruled out at this stage." [3]

The Commission thought this idea was very interesting. As the role of the Commission is to encourage competition, the Commission would naturally support any initiative which would promote competition.

The Commission has no official position on the idea and is neither promoting it nor arguing against it. However the Commission makes the following observations;

- Physically the concept of third party access could be implemented. The volume of water added to the network and removed from the network by a third party provider could be measured and pricing could be established for the use of the pipes.
- Structurally there are two options;
    1. A wholesale model where the incumbent wholesales access to their network but continues to compete at retail.
    2. The incumbent could be split into a network owner and a retailer who operate in an arm's length relationship.
- The Commission's analysis indicates that the water mains themselves are the most expensive part of the water network. Catchment and water treatment costs were generally less than 10% of network and direct costs. So the immediate benefits of third party access to lower costs may not be material enough to out-weight the cost of implementation.
- Overheads are also a large portion of total operating costs. Competition could drive cost efficiencies for the portion of overheads which were related to the retail operation. However presumably the rest of the existing overheads would remain with the network portion of the business and would not be subject to competition. Retail competition would also drive additional customer acquisition and sales costs, which would need to be covered by the price.
- Retail competition would be likely to result in more customers being connected to the network and increased water consumption. In some instances this may place increased pressure on current resources. But could also lead to improved consumer utility.
- A new entrant may tend to cherry pick the profitable customers and leave the incumbent with the less profitable customers. This would be a particular issue for Water PNG who are tasked with building networks for new unprofitable communities. Existing cross subsidies may get competed away and this may ultimately result in higher prices for smaller communities.
- Retail competition might drive some innovation in the market. In particular a competitor may identify a new way of serving hard to serve customers, like those in settlement areas.
- Illegal use of water does create a level of risk. If water is lost or stolen then whose water is it? The cost of this could be shared among all parties. However the owner of the pipes is in the best position to address the issue.

- With the current outsourcing contract arrangement which Eda Ranu have with PNG Water Limited there is asymmetry of risk. PNG Water Limited get paid for any water that goes into the network, but have no responsibility for delivering to customers. Third party access has the potential to make a third party accountable at both ends of the network.

The Commission has merely noted the above, and has no official position on this idea.

Final Determination:

The Commission will continue to regulate the prices of water and sewerage for the next regulatory period.

5. Length of Regulatory Period

The Commission has previously discussed the options of adopting a 10 year vs a 5 year price path. 10 year price paths were established for regulated entities such as PNG Power, Telikom PNG, Post PNG and PNG Ports Corporation by the Government after a major review into all the State Owned Entities in 2000 and 2001. It was noted during that review, that service delivery of these businesses was found at that time to be substantially substandard due to poorly maintained infrastructure and continued underinvestment. This had resulted in a situation where a lot of work on statutory, regulatory and operational reforms was needed to improve these businesses. Part of that reform established the 10 year regulatory price path for these businesses to provide regulatory certainty in terms of price adjustments and hence revenue flows to enable the businesses to plan and conduct their affairs with greater predictability going forward. However, the Commission noted at that time that a price path of 10 years may be too long and may create significant variances between the actual and forecast costs, particularly in the PNG operating environment.

Since this time the Commission has generally held the view that a period of no more than 5 years is appropriate. A five year period is considered to provide a degree of certainty to the regulated entity, in terms of their revenue projections, while still providing a protection to the consumer should corrections be required.

Water PNG in its submission said that it agrees with continuing to use a 5 year price path[4].

The National Research Institute made the following comments in its submission.

> "*The ICCC has outlined positive outcomes including certainty to regulated utilities and protection to consumer in support of that proposal but there is less emphasis on associated costs. A discussion of both the potential benefits and cost of this approach is necessary to correct this imbalance.*

It is compelling to point out the challenges that are likely to arise when the ICCC embarks on the 5 year regulatory period. While the list is not exhaustive, notable challenges include:

- *Potential inaccuracies in the necessary data used in the determination process;*
- *How to ensure that those outcomes and obligation identified at the beginning of the regulatory period are delivered as and when expected; and*
- *Any unforeseen circumstances that may significantly affect costs and revenue."*[5]

The Commission interprets these comments are not arguing for either a shorter or longer regulatory period, but merely that the Commission should provide more discussion to support its decision. The Commission makes the following observations.

- There are trade-offs between the costs and benefits of having more frequent reviews.

[4] Water PNG, Comment on Draft the Report for Reviewing Water and Sewerage Tariff for the Period 2015 - 2019, 25th November 2014.
[5] NRI, Submission to ICCC on Pricing and Regulatory Review on Water and Sewerage Services, November 2014, Page 3.

- Pricing reviews carry a cost for both the regulator and the regulated entity. They consume limited Commission's resources, particularly when the Commission is required to carry out price reviews for multiple industries simultaneously. They also require the regulated entity to invest resources answering questions, collecting data and making submissions.

- More frequent price reviews may result in more frequent industry change.

- Time is required both to implement changes and to allow the benefits of any changes to be captured. For example the Commission expects that some considerable effort will be required by both Eda Ranu and Water PNG to put the new service performance measures in place. Once they are in place the Commission expects that some time will be required to see service level improvements. If too many changes are made too frequently then incentives may be ineffective, because the regulated entity will expect them to change again before they have any effect.

- The Commission generally seeks to create consequences for non-delivery of obligations. For example, if the service performance measures specified in this current review are not put in place then prices will decrease.

- Inaccuracies in the data are a frequent problem for any regulator. If mistakes are made then a longer regulatory period will have the disadvantage that all stakeholders will be affected by the error for longer. The Commission takes a number of steps to avoid or find errors before determinations are finalised. This includes asking for submissions on draft reports and sharing financial models with regulated entities, to check that both parties agree with calculations and results.

- Provision can be made for unforeseen circumstances. For example this price review has made provision for major unplanned capital expenditure. Also the Commission can make adjustments to prices during the course of a regulatory period if major unforeseen events do occur.

On balance the Commission is still of the view that a five year regulatory period is a good balance between the costs and benefits or more frequent or longer regulatory periods.

The Commission has determined that it will continue to use a five year price path for water and sewerage services. This means that the next regulatory period will commence on 1 March 2015 and end on 31 December 2019.

Final Determination:

The Commission has adopted a five year price path for water and sewerage services. The regulatory period will commence on 01st January 2015 and end on 31st December 2019.

6. Legislative Context for Regulation

6.1. Current Legislative Context of Regulation

The water and sewerage services are currently regulated under Section 10 and 21 of the PR Act. In accordance with these provisions, the Commission is mandated to set the maximum prices for water and sewerage services provided by the two public entities; Eda Ranu and Water PNG.

In 2009, there were initial discussions between the Commission and the two service providers regarding the possibility of moving them from the existing arrangement on to a Regulatory Contract under the ICCC Act. However, no decision was made and the Commission continues to regulate the entities with same approach.

6.2. Existing Regulatory Arrangement

Under the current arrangement consistent with Section 21 of the PR Act, the Commission sets the maximum tariff of water and sewerage services at the price path based on the formula CPI+/-X factor. Under Sections 25A (1), 25A (5) and 25B of the PR Act, the Commission is mandated to carry out a review either on its own volition or by a request from the producers/supplier(s) of the goods or services, or from the Minister responsible. The legislation also allows either party, the Minister or the regulator, to intervene in the regulatory process as and when necessary. This can be done with or without the consent of the service providers. Intervention involves conducting a review of the pricing orders set by the Commission. If such a situation were to occur, this could be viewed as disruptive and detrimental to service providers and due to the uncertainty created and consequential implications to the overall operations of the service providers, as a going concern.

This experience was faced by Eda Ranu when at the request of the Minister; the Commission reviewed its price path and amended it for the remainder of the 2004 to 2009 regulatory period.

Regulatory Contract Arrangements and its Benefits

The Regulated Entities that are regulated using regulatory contracts currently are PNG Power, Motor Vehicle Insurance Ltd (MVIL), Post PNG and PNG Ports. The regulatory arrangements that apply to these Regulated Entities are set out in detail in a Regulatory Contract that has been prepared for each of the Regulated Entities. These Contracts specify;

- the service standard requirements,
- the price path that will apply to the Regulated Entities over an agreed period,
- situations under which the price can be varied or modified,
- the Pricing Principles that are to be applied in reviewing that price path at some future date,
- the capital expenditure requirements, and

- the penalties that they will be required to pay if they fail to meet these requirements which are built into the price path and form the basis of the Contract.

The Regulatory Contracts are constituted under the provisions of the ICCC Act and offer a number of advantages to consumers, the regulated entities and to the wider PNG economy over the previous form of regulation. Importantly, the advantages offered to the Regulated Entities are that the Contract provides a degree of certainty as to the way in which maximum prices and minimum service standards are to be set and the price path that will apply over a period of time. The price path is set in such a way as to encourage greater efficiency by allowing them to plan their investment and efficiency improvements to achieve higher standards of service delivery than under the one off price setting as was characterised by the old pricing arrangements under the Prices Regulation Act.

Currently, a Regulatory Contract exists between the regulated entities and the Commission, which is binding upon the regulated entities and the Commission. These Contracts came into effect in 2002 and are scheduled to run for five to ten years between the Commission and the entities.

The Regulatory Contract provides a form of agreement and commitment between the regulated entities and the Commission in relation to Commission's approach and approval of movements in future price path for these entities and the achievement of certain service standards and capital expenditure targets by them. The Regulatory Contracts are very similar in nature to what is referred to in other countries as 'pricing direction' or a 'tariff order'.

It provides the rules and parameters within which the regulator can act in the future, and in doing so will provide a degree of protection to the regulated entities from perverse behaviour by the regulator. It also provides the basis upon which consumers can have a degree of confidence that the regulated business will meet its obligations in terms of agreed service standards.

Advantages of moving Eda Ranu and Water PNG on to the Regulatory Contract

The regulatory contract is intended to have the following benefits:

- The price path will be set in such a way that will encourage greater efficiency, at the same time, allowing them to plan their investment and efficiency improvements in such a way that they achieve over time a higher level of efficiency and standard of service delivery;
- It will also provide a degree of long term investment certainty and confidence because the price path will be tied to their capital expenditure requirements over the life of their regulatory contract. It provides increased certainty for recovery under the price path;

- Any decision to review or amend the price path will be based on a mutual agreement between the regulator and the regulated entity.

- The regulator cannot act on its own outside the rules specified in the Contract and neither can the regulated entity. There are strict statutory timelines for any approval or disapproval of tariff.

- The contract can be used to define service standard requirements, performance measurement and reporting requirements for the regulated entity

Eda Ranu, in its submission has no objection of it being migrated to a regulatory contract; however Water PNG made some comments that migrating to regulatory contracts cannot be rushed. Water PNG commented that "*technical regulation should fall within a different legislative framework and that the ICCC may not be the best party to administer technical aspects of the provision of water and sewerage services"*. Thus, Water PNG submits that all parties should await the outcome of the WASH (Water Sanitation and Hygiene) policy before migrating the water entities to regulatory contracts.

The Commission generally prefers the use of regulatory contracts where monopoly service providers are being regulated. The Commission has therefore decided that while it will continue to regulate both Eda Ranu and water PNG using a price order in the short term. It will migrate them both to regulatory contracts at some time within the next regulatory period.
Before this occurs, regulatory contracts will need to be written separately for both Eda Ranu and Water PNG. The Commission expects that extensive discussions will be required with both parties before these contracts can be finalized and put in place. The new regulatory contracts will implement the price paths which are defined in this report.

Final Determination:

Water and Sewerage services will continue to be regulated under Section 10 and 21 of the PR Act for the next regulatory period commencing 1st January 2015.

7. Current Issues

There are a number of issues which the Commission would like to address as part of this review.

Effectiveness of Regulation

There is a general concern about the performance of State Owned Enterprises in PNG. There is a perception that while prices go up in real terms each year, the performance of these organisations does not improve. This raises questions about the effectiveness of regulation and whether or not it is achieving the desired outcomes. As part of this review the Commission wants to evaluate the effectiveness of regulation on both Eda Ranu and Water PNG.

There are several possible causes of poor performance:

- An ineffective regulatory regime,
- Poor compliance with regulatory requirements,
- Poor performance by management,
- Poor incentives for management, and
- Other Constraints which limit a company's ability to perform.

Maximum Allowable Revenue

In the last review the Commission changed the pricing arrangement away from a maximum average price (MAP) to maximum allowable revenue (MAR) construct. It is therefore appropriate to evaluate the effect of this change and whether or not it should remain in place.

Service Level Measurement

Currently Eda Ranu and Water PNG each have a different set of service level measures. The Commission wishes to evaluate these and to see if they are appropriate, relevant and effective measures of each organisations performance. The Commission is concerned that service level performance should be closely linked to the price that each organisation is able to charge.

Regulatory Asset Base Assessment

The last two reviews have simply rolled forward the previous regulatory asset base (RAB). This means that any mistakes or wastage built into the original numbers are still being charged to customers. The Commission feels therefore that it is appropriate to assess the value of the assets currently in place to ensure that the RAB values used to calculate prices fairly reflect the investment required to provide the current level of service.

Spending on non-core infrastructure

There is a general perception that while State Owned Enterprises may or may not be performing well, their staff are generally well looked after with good salaries, generous

allowances and good cars. The Commission wants to ensure that the level of spending is optimised to ensure that each organisation spends its available funds appropriately on maintaining and expanding its network infrastructure to provide for the needs of its customers as well as ensuring it can attract and retain good staff.

To assess operating costs the Commission wants to focus more upon the outputs delivered by the business rather than just accepting the accounting inputs as measures of cost.

8. Forecast Demand

Both Eda Ranu and Water PNG submitted actual customer numbers and water and sewerage sales volumes for the years 2009 to 2013 and forecast numbers out until 2020.

The Commission has taken the following approach to calculate what sales volumes would be if growth continues as it has over the previous 4 years. The Commission has;

1. Used the previous five years of actual customer numbers for each customer type to calculate an average customer growth rate for each customer type.
2. Divided actual volumes by actual number of customers for each customer type to calculate an average volume usage per customer for each customer type.
3. Used actual average usage per customer information to calculate an average growth rate for average usage per customer for each customer type.
4. Applied average growth rates for customer numbers to forecast future customer numbers.
5. Applied average growth rates for average usage per customer to forecast average usage per customer for each customer type for future years.
6. Multiply number of customers by average usage for each customer type to forecast total volume for each customer type for future years

To illustrate, this means that rather than just inflating total volume by some % per year, a model has been used to multiple volumes by average usage per customer. Changes in total volumes can then be understood as being driven either by more customers connecting to the network or by existing customers using more water (or producing more sewerage).

8.1. Eda Ranu Forecast Demand

Eda Ranu provided actual volumes and customer numbers as shown in the following tables. The numbers provided by Eda Ranu broke domestic volumes into Low Covenant and High Covenant classifications. The Commission understands that Low Covenant and High Covenant is an old pricing classification which Eda Ranu no longer uses. So the Commission has added together Low Covenant and High Covenant and have referred to these customers as Domestic.

Table5: Eda Ranu Actual Billed Water Volumes

(million kilolitres)	2009	2010	2011	2012	2013
Non Domestic	8.2	8.3	9.8	9.4	9.4
Domestic	4.5	4.9	4.9	5.0	5.3
Schools and Approved Institutions	0.7	0.8	0.9	0.9	0.9
Government and Statutory	8.6	9.2	9.5	9.8	9.5
Total Water Volume	22.0	23.1	25.1	25.0	25.0

Table 6: Eda Ranu Actual Billed Sewerage Volumes

(million kilolitres)	2009	2010	2011	2012	2013
Non Domestic	7.4	7.4	8.7	8.4	8.4
Domestic	4.3	4.6	4.7	4.7	5.0
Schools and Approved Institutions	0.3	0.3	0.4	0.4	0.4
Government and Statutory	6.1	6.4	6.9	7.2	7.0
Total Sewerage Volume	18.1	18.8	20.6	20.6	20.7

Table 7: Eda Ranu – Number of Water Customers

	2009	2010	2011	2012	2013
Non Domestic	3,304	3,348	3,417	3,502	3,610
Domestic	10,914	11,117	11,197	11,278	11,365
Schools and Approved Institutions	55	57	57	59	59
Government and Statutory	1,033	1,033	1,030	1,030	1,028
Total Water Customers	15,306	15,555	15,701	15,869	16,062

Table 8: Eda Ranu – Number of Sewerage Customers

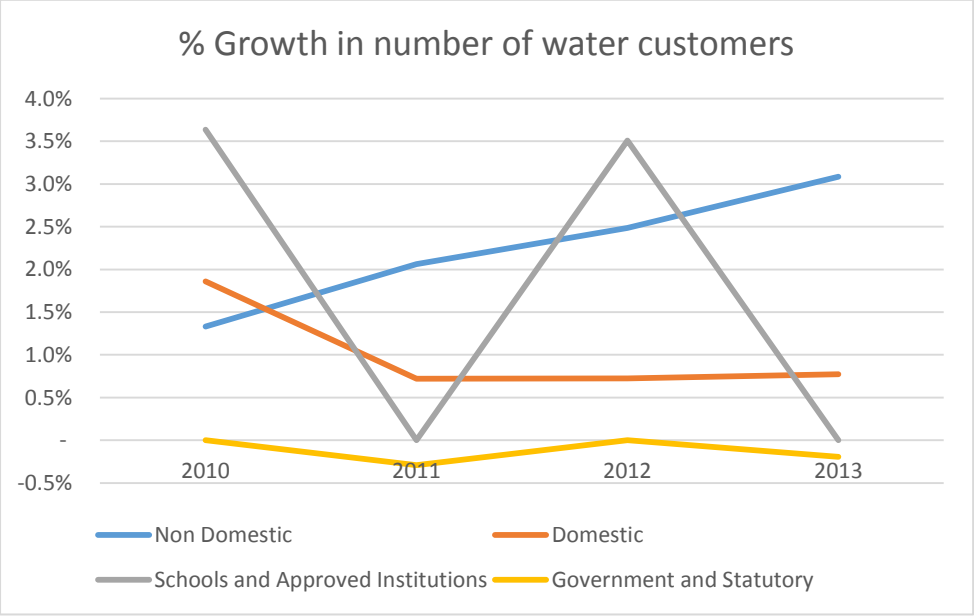
	2009	2010	2011	2012	2013
Non Domestic	2,957	2,974	3,029	3,097	3,182
Domestic	10,210	10,397	10,479	10,521	10,573
Schools and Approved Institutions	41	42	42	43	43
Government and Statutory	976	976	973	974	973
Total Sewerage Customers	14,184	14,389	14,523	14,635	14,771

It is interesting to note, that while two thirds of the customers are domestic, non-domestic and government customers use 75% of the water.

Eda Ranu assumed growth rates for both customer numbers and total volumes of 3% across all customer types. In the Commissions view, this is unlikely. The Commission would not expect the number of Government connections and schools to be growing at this rate. So the Commission has taken a more granular approach and used the actual average growth rates for each customer type.

The following Chart shows the growth rate in customer numbers over the last four years.

Figure 1: Percentage growth in number of customers

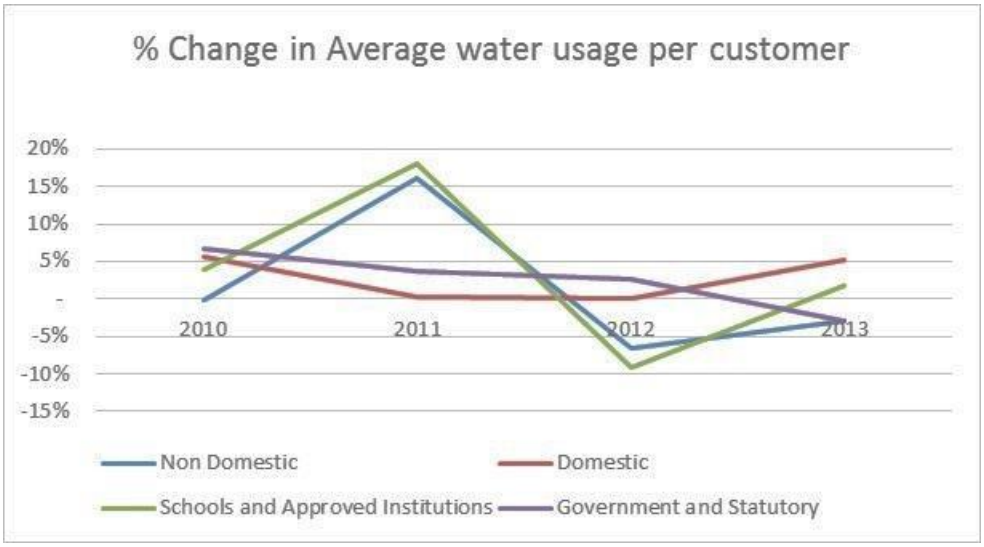


From this the following observations can be made

- There were no new schools in 2011 and 2013.
- The growth in non-domestic customer numbers is accelerating.
- The growth in domestic customers has stabilised at about 0.7%.
- The number of government connections appears to be declining slightly.

The following chart shows the % change in average water usage per customer.

Figure 2: Percentage change in average water usage per customer



Average water usage per customer for both non-domestic and schools has fluctuated wildly. The Commission invited Eda Ranu to provide an explanation as to why this might be, but

Eda Ranu did not respond. The Commission has therefore used the average growth rates of average water usage per customer shown in the following table.

Table 9: Average annual % change in water usage per customer

Non Domestic	1.6%
Domestic	2.8%
Schools and Approved Institutions	3.6%
Government and Statutory	2.5%

Eda Ranu does not measure actual volumes of sewerage for billing, but rather assumes that for every kilolitre of water consumed the customer also produces one kilolitre of sewerage. For this reason sewerage volumes and usage rates are simply a function of water usage rates. It should be noted however that not all customers who have a water connection also have a sewerage connection. So the total volume of sewerage will not be the same as the total volume of water.

Applying these average growth rates produces the following forecast volumes.

Table 10: Forecast water volumes

(Kilolitres 000's)	2015	2016	2017	2018	2019
Non Domestic	9,943	10,326	10,724	11,137	11,566
Domestic	5,521	5,735	5,958	6,189	6,430
Schools and Approved Institutions	938	990	1,044	1,102	1,162
Government and Statutory	9,686	9,915	10,150	10,391	10,637
Billed Water Volume	26,087	26,966	27,876	28,818	29,794

Table 11: Forecast sewerage volumes

(Kilolitres 000's)	2015	2016	2017	2018	2019
Non Domestic	8,860	9,180	9,510	9,853	10,208
Domestic	5,174	5,357	5,547	5,743	5,947
Schools and Approved Institutions	370	381	393	405	417
Government and Statutory	7,245	7,498	7,761	8,033	8,314
Billed Sewerage Volume	21,649	22,416	23,211	24,034	24,886

The Commission has used these volumes to estimate some operating costs and for the purpose of setting the price path. Theses demand figures will be referred to in the rest of this report as the Regulatory Demand Volume.

The Commission invited Eda Ranu to comment on this forecast, but Eda Ranu did not provide any formal response.

Final Determination:

The Commission has determined to use the forecasted volumes for water and sewerage to estimate operating costs and for the purpose of setting the price path for Eda Ranu.

Million Kilolitres	**2015**	**2016**	**2017**	**2018**	**2019**
Total Water Volume	26,087	26,966	27,876	28,818	29,794
Total Sewerage Volume	21,649	22,416	23,211	24,034	24,886

8.2. Water PNG Forecast Demand

Water PNG provided the Commission with the actual billed volume numbers shown in the following tables. Water PNG classify its customers as follows

- Step 1 – Customers who use 12 kilolitres per month or less
- Step 2 – Customer who use more than 12 kilolitres per month.

Table12: Water PNG – Actual Water Volumes

(Million kilolitres)	**2009**	**2010**	**2011**	**2012**	**2013**
Step 1	0.6	0.7	0.7	0.8	0.8
Step 2	14.1	14.3	14.0	13.3	13.0
Total Water Volume	14.7	15.0	14.6	14.1	13.8

Table 13: Water PNG – Actual Sewerage Volumes

(Million kilolitres)	**2009**	**2010**	**2011**	**2012**	**2013**
Step 1	0.04	0.02	0.04	0.05	0.05
Step 2	4.90	4.78	4.81	5.56	5.98
Sludge Tankers	0.24	0.00	0.00	0.01	0.01
Total Sewerage Volume	5.2	4.8	4.9	5.6	6.0

Table 14: Water PNG – Number of Water Customers

	2009	**2010**	**2011**	**2012**	**2013**
Step 1	10,217	10,557	12,481	13,371	12,993
Step 2	15,309	15,079	14,449	13,871	14,137
Total Water Customers	25,526	25,636	26,930	27,242	27,130

Table 15: Water PNG – Number of Sewerage Customers

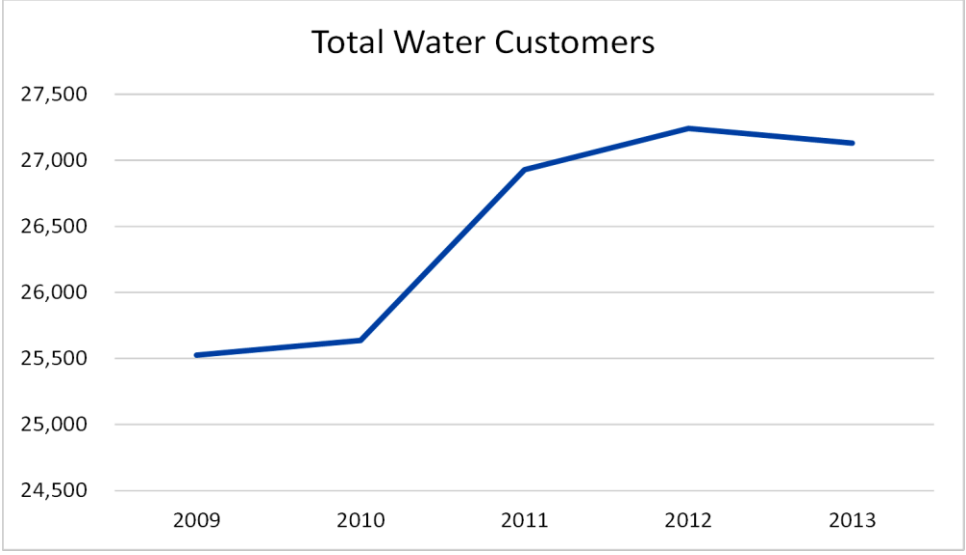
	2009	2010	2011	2012	2013
Step 1	508	545	675	805	783
Step 2	1,933	1,979	2,052	2,214	2,199
Total Sewerage Customers	2,441	2,524	2,727	3,019	2,982

The Commission makes the following observations

- The number of sewerage customers is substantially lower than the number of water customers because Water PNG does not offer sewerage services in many of the areas they operate.
- 40% of water customers used less than 12 kilolitres
- 95% of water volume is used by customers who use more than 12 kilolitres

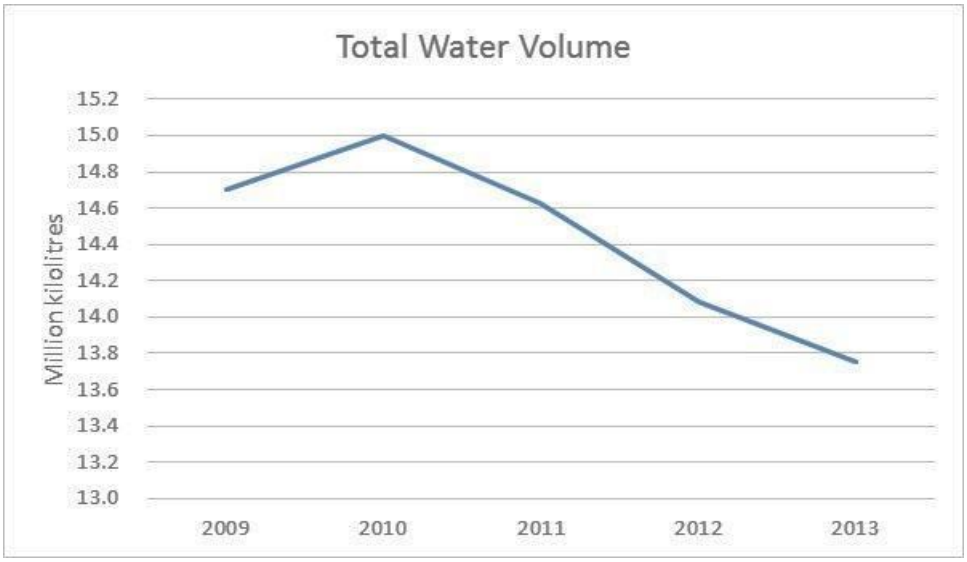
The following chart shows the change in the number of customers over the past five years. From this it can be seen that the number of customers has not grown consistently. The Commission does not know if the big increase in 2011 is due to building new network in a new area, or if this is new customers connecting in existing served areas.

Figure 3: Water PNG – Number of customers



The following change shows that overall water volumes have declined.

Figure 4: Water PNG – Water Volumes



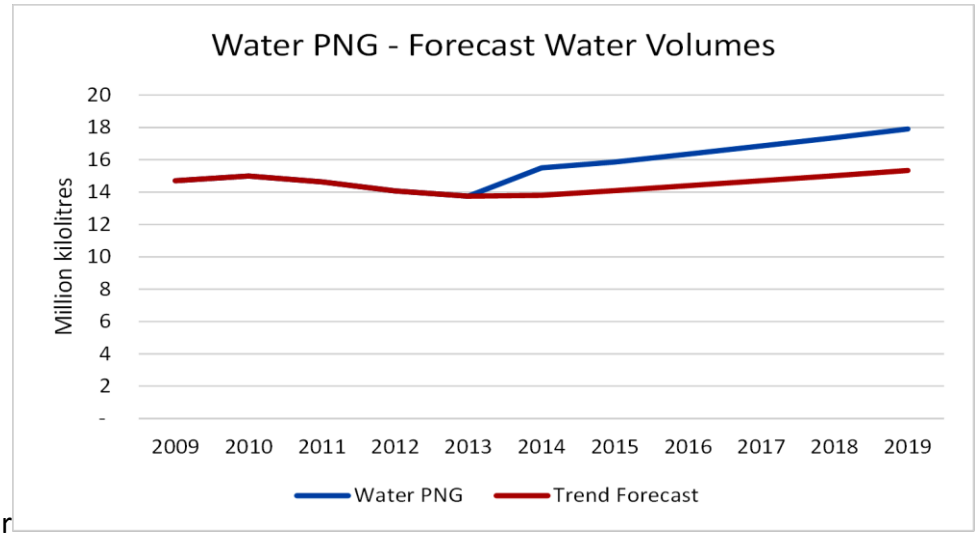
The decline in water usage has been driven by a decline in larger customers and a decline in average usage rates.

Table16: Water PNG – % change in average water usage

	2010	2011	2012	2013
Step 1	24%	-23%	8%	-0%
Step 2	3%	2%	-1%	-4%

Water PNG in its submission[4] to the Commission has budgeted for a 13% increase in volume in 2014 and 3% growth for the years following. The Commission suspect that this is unrealistic and are proposing a more conservative forecast based upon the trend of the last five years.

Figure 5: Water PNG – Proposed forecast in water volumes



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The Commission notes that if Water PNG do succeed in achieving its budgeted increase in water consumption, then it will be financially better of under the pricing construct determined by the Commission in this report.

In response to this forecast, Water PNG noted the Commission's different approach from its own with the following comment.

> *"Water PNG has forecasted the demand at the rate of about 3% per annum on the previous year's estimate. ICCC has forecast the demand for water supply and sewage volumes at 2.2% and based on the average growth rate in (i) number of accounts, (ii) consumption per account for different categories of customers in the past years".* [4]

Water PNG provided no insight as to why its own forecast might be more reliable than the Commission's. Therefore the Commission has decided to use the following volume forecast as the Regulated Demand figures for the next five years.

Table 17: Water PNG – Proposed Regulated Demand

(Million kilolitres)	**2015**	**2016**	**2017**	**2018**	**2019**
Total Water Volume	14.09	14.39	14.70	15.02	15.35
Total Sewerage Volume	6.36	6.50	6.64	6.79	6.94

Final Determination:

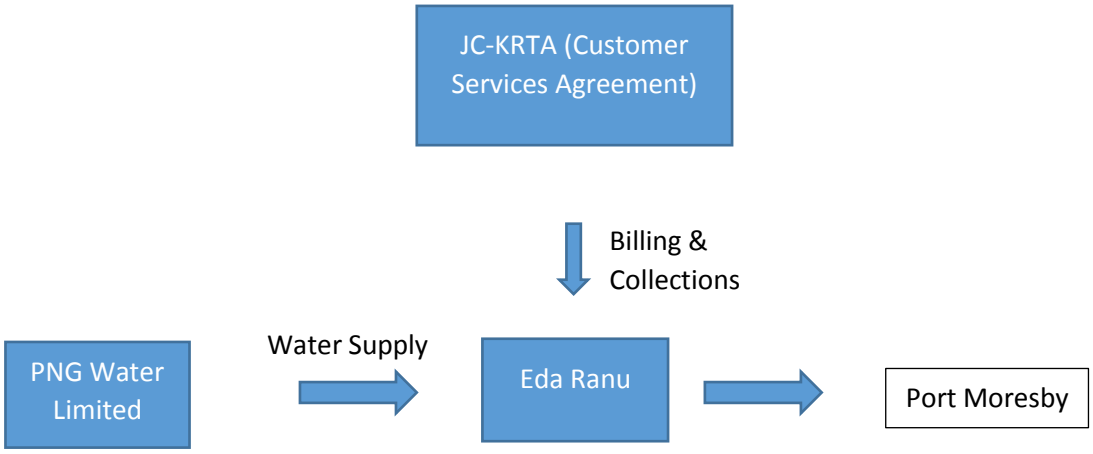
The Commission has determined to use the forecasted volumes for water and sewerage to estimate operating costs and for the purpose of setting the price path for Water PNG.

Million Kilolitres	**2015**	**2016**	**2017**	**2018**	**2019**
Total Water Volume	14.09	14.39	14.70	15.02	15.35
Total Sewerage Volume	6.36	6.50	6.64	6.79	6.94

9. Operating Expenditure

9.1. Eda Ranu Outsourcing

Eda Ranu's treatment of water is done under a concessionaire arrangement with PNG Water Limited.



In a letter to the Commission Eda Ranu made the following comments about its outsourcing arrangements;

> *"Eda Ranu entered into a Concession Agreement in a Build Operate and Transfer (BOT) arrangement with PNG Water Ltd who is the Concessionaire.*
>
> *The Concessionaire has completed construction works of a mutually agreed infrastructure development program and is currently responsible for production of treated water sold in bulk by the Concessionaire to Eda Ranu who then distributes and retails potable water to the consumers in Port Moresby. This arrangement entered into in 1997 will continue to run till the end of the Concession Period in June 2019. Our billing and collection services have been out-sourced to JC-KRTA Consulting Group (PNG) Ltd under a separate Consumer Services Agreement (CSA) that runs from November 1996 till October 2018.*
>
> *Both contractual arrangements are legally binding. Eda Ranu … and the state as the shareholder… after careful consideration had chosen to venture into this public private partnership for capital infrastructure development through private sector funding in order not to burden the national budget. The decision was made against the background of higher affordability of the capital city to bear the cost of water service on a user pay basis."*[6]

[6] Eda Ranu, *Draft Report by Independent Consumer and Competition Commission (ICCC) on Water and Sewerage Review 2014*, Letter to ICCC, 17th November 2014.

The Commission notes that PNG Water Limited and JC-KRTA are related in some way but does not understand the exact nature of the relationship. However the Commission notes that

- The same person represented and answered questions for both PNG Water Limited and JC-KRTA on behalf of Eda Ranu.
- Eda Ranu presented and categorised its operating cost information as though payments to PNG Water Limited and JC-KRTA were to the same entity.

Acceptance of contracts

In the Draft Report the Commission made the overall observation that the contract between Eda Ranu and PNG Water Limited was not one that a commercially efficient organisation would enter into. The view was arrived at based upon an analysis of the underlying costs of providing the services covered by the contract. At that time Eda Ranu had not provided the Commission with a copy of the contract documentation.

Based upon this view, the Commission decided not to accept the outsourcing payments at face value, but instead to attempt to analyse the underlying costs.

In response to this Eda Ranu wrote the following in a letter to the Commission.

> "*The Commission is reminded Section 21(2A)(e) of the Prices Regulation Act (Chapter 320) requires the Commission to have regard to "the borrowing, capital and cash flow requirements of persons, making, producing or supply the declared goods or services". Accordingly, the Commission is not at liberty not to include contractual payment obligations of Eda Ranu in the price path, particularly when the shareholder had entered into the contractual arrangements after receiving professional advice on the legal, technical and financial perspectives".*[6]

Following on from this letter Eda Ranu refused to provide any further information as confirmed from the following communication to the Commission.

> *"Please be informed that Eda Ranu and its BOT Partners will not provide data relating to worksheets titled "Facilities Spending", "Meter Reading" and "Customer Service" as they relate to the costs covered under the Concessionaire Agreement between Eda Ranu and PNG Water Ltd and the Customer Service Agreement between Eda Ranu and JC-KRTA Consulting Group. This position was made known to ICCC in our earlier discussions last year and expressed in writing to ICCC per letter dated 17th November 2014 (copy attached). Therefore, ICCC should take the costs as per the agreements in relation to those 3 worksheets stated above."*

So while the Commission had expected Eda Ranu to respond to the Draft Report with information which supported the value of the payments it makes to PNG Water Limited and JC-KRTA, instead Eda Ranu refused to provide any information.

From Eda Ranu's submission, the Commission needs to respond to the following issues.

- Has the Commission complied with the Prices Regulation Act?
- Does the Commission have the liberty to exclude contractual arrangements made by an entity's shareholders?
- Is the Commission ignoring professional advice of a legal, technical or financial perspective?

The Commission notes that it is not able to consider professional advice if this advice is not presented to it. So it is unfortunate that Eda Ranu took this view. These are addressed in the following table.

Compliance with the Prices Regulation Act

Eda Ranu in its submission[6] is essentially arguing that by not accepting the outsourcing contracts at face value, the Commission is not having regard to *"the borrowing, capital and cash flow requirements"* of Eda Ranu.

The Commission notes that the common method used by the Commission for setting regulated prices is the building block method. This method is widely accepted around the world as a valid way of setting regulated prices. The building block method specifically excludes any consideration of actual borrowing. Instead the approach calculates the cost of capital of an average company operating in the same market. This is done using a benchmarking analysis of the average level of debt held by comparable companies.

The Commission is firmly of the opinion that the building block method is compliant with the Prices Regulation Act. And that the Building block method does have regard to the borrowing and capital costs of an organisation.

The method used by the Commission to assess the contract payments by Eda Ranu to PNG Water Limited was to separate out, as best it was able, based upon the information provided by Eda Ranu, the capital costs included in the contract. These capital costs have then been adjusted to reflect the weighted average cost of capital that an efficient and equivalent organisation would face if they were operating in PNG.

The Commission's assessment of the current capital costs included in the payments to PNG Water limited has changed since the Draft Report. This is because after the Draft Report was published, Eda Ranu provided the Commission with a copy of the Contract and so the Commission had more information available to make its assessment of costs.

So the while the Commission has not used the exact amounts which Eda Ranu are contracted to pay, the actual amounts used by the Commission are based upon the contracted amounts after adjusting the cost of capital included in these amounts.

Contractual Arrangements made by shareholders.

The Commission rejects the idea that it should accept any contract entered into by a regulated entities' shareholders. If this were true, the shareholder could enter into binding

contracts which required a regulated entity to make payments to a third party for no particular reason. And the Commission would be obliged to make the citizens of PNG pay for it. In the Commissions view, this would not be consistent with the legal requirements for the Commission to protect consumer interests.

The Commission is generally required to assess the prudence of all spending by regulated entities when it determines regulated prices. Outsourcing agreements are no exception to this. Nor is the fact that an agreement may have been made by a company's shareholders rather than its management.

The Commission cannot be bound by decisions imposed upon a regulated entity by its shareholders. This means that while Eda Ranu may be legally bound and contracted to make particular payments, the Commission may choose not to include these in the price path if they are not considered to be economically efficient. Thus Eda Ranu are in the difficult position of being required to provide water services to Port Moresby for an economically efficient price as well as meeting its legal obligations imposed upon it by its shareholder.

Eda Ranu also appears to have been placed in a position where it bears most of the risk of delivering services to customers, while PNG Water Limited bears very little risk. Eda Ranu must pay for water regardless of whether or not money is collected from customers. The Commission has also observed through the course of this review that by outsourcing much of its business operations, Eda Ranu has also outsourced much of the knowledge about its business. So for example Eda Ranu was not able to answer most of the Commission's questions about the cost of water treatment but relied upon PNG Water Limited to do so. However PNG Water Limited had no incentive to answer these questions.

While Eda Ranu management may be restricted somewhat by the contract that is in place, they are still responsible to manage the contract and ensure that the outcomes are as good as possible for both their shareholders and their customers. This includes managing the regulatory price review process. In the course of carrying out this review, Eda Ranu has not responded in any detail to most of the cost analysis included in the Draft Report. In response to the Commission's 80 page draft report, Eda Ranu wrote only two, two page letters. For issues for which Eda Ranu has not responded to the Commissions analysis or questions, the Commission must assume that its analysis is correct. For all these issues the Commission therefore has no choice but to base its final decision on the information and assumptions which were outlined in the Draft Report.

In areas where Eda Ranu has provided further information, the Commission has considered this and taken it into account.

<u>Professional advice to support the Outsourcing Arrangements</u>

In Eda Ranu's written communication with the Commission Eda Ranu noted;

> *"Eda Ranu had entered into the agreements after due consideration of detailed analysis by Infrastructure Development Group (IDG) of the Finance*

Department and report by reputable organisations Deloittes and SMEC (Snowy Mountain Engineering Corporation)"[6]

Eda Ranu did not provide the Commission with copies of these reports. The Commission notes that it is not able to consider professional advice if this advice is not presented to it. Because Eda Ranu did not seek to justify or support the outsourcing arrangements by providing any such reports which included professional advice, the Commission did not consider this advice.

Acceptance of Contracts

Having received Eda Ranu's response to the Commission's stance on the outsourcing arrangements, the Commission has reviewed its position. The key question for the Commission is whether or not an efficient commercial organisation would have entered in these outsourcing arrangements. If they would have done so, then the Commission should accept the payments at face value. But if there is evidence that they would not have done so, then the Commission is not required to accept them.

Organisations might enter into outsourcing arrangements because;

- It reduces costs or
- To get access to capabilities, expertise, or technology which organisation does not directly have access to.
- To change management focus onto or away from particular parts of the business.
- To create particular incentives for dealing with a problem area.

While all these reasons might be valid by themselves, a commercially efficient organisation would not accept any of them if the cost of the contract exceeded its value. Cost will always be a key consideration.

The Commission has considered the two outsourcing arrangements separately

The Contract with PNG Water Limited

The following table outlines some reasons why an organisation might enter into a BOT (Build Operate Transfer) arrangement like the one with PNG Water Limited.

Table18: Reasons for entering a BOT Contract

Possible Reason for entering a BOT contract	Commission's Comments
To gain access to capital to fund new development.	For an investor there are two issues to consider when making an investment. 1) What is the likelihood of complete failure and therefore not getting their money back? 2) What is the return on the investment? Clearly the investors in this BOT arrangement decided the risk of complete failure what not particularly likely. However, it is possible that they only agreed to the

	financing arrangement because they were able to directly manage the operation. And so the BOT arrangement may have been a requirement to receive the finance. However the Commission would expect that in 1997 the Government of the day did have other avenues open to it to gain international finance. So this is an unlikely reason for entering into the contract. However it is also possible that an investor wanted security for the loan and that the BOT contract provided them with that security. However there are several other ways that security over assets can be given without taking on the responsibility of operating those assets. In the Commission's view, getting access to funds is an unlikely reason for entering a BOT arrangement.
Because they believed that the BOT operator could operate the plant more efficiently and by doing so increase the supply of water to the city.	The original BOT proposal discussed the use of new technology which would enable more water to be delivered to Port Moresby with lower capital costs. This appears to be a plausible reason for entering the BOT contract, if Eda Ranu were unable to access this technology directly. The operating plant appears to be run by PNG citizens, rather than overseas staff which PNG Water Limited has brought in. So the actual skill required to operate the plant could not have been a reason for entering into the BOT arrangement. However it is possible that various government departments of the day were not happy with the way Port Moresby's water infrastructure was being managed and so wanted to outsource this to an overseas operator.
Because they believed that the BOT operator could operate the plant at lower costs than Eda Ranu could.	In this situation, the cost of the BOT including the administrative charge would be lower than the cost of Eda Ranu (NCDC) continuing to operate the water treatment plant directly. Normally when considering such a venture, financial modelling is carried out to compare the relative costs of different options. Eda Ranu did not supply the Commission with any documents to show that such an analysis had been done in 1997. While Deloittes and SMEC may have provided advice, Eda Ranu did not elaborate as to what sort of advice was provided.

The Commission also notes the following;

- The effect of the bulk water charge is to turn a fixed cost into a variable payment which varies with the quantity of water used, rather than the capacity of the plant. The Commission is of the view that it would be imprudent for a company to convert a fixed cost into a variable cost where the volume used to calculate the annual charge was likely to increase.

    - If water production volumes increase above the original assumed quantities, the amount charged to recover fixed asset costs will increase. Therefore asset costs will be over-recovered
    - Conversely if water production volumes decrease below the original assumed quantities, the amount charged to recover fixed asset costs will decrease. Therefore asset costs will be under-recovered.
    - The Commission does not know what water quantity was used in 1997 to set the original bulk water charge. But documentation provided by Eda Ranu with the contract indicates that in 1997 there was a general expectation that water consumption in Port Moresby would increase.
      However the Commission does not know the exact details of how the original price was set. So the Commission is not in a position to determine whether or not it was imprudent in this regard. However there is strong possibility that PNG Water Limited have over-recovered the cost of these fixed assets because water volumes have generally increased since the price was set.

- A substantial portion of Eda Ranu's revenue (49.3% in 2013), is being paid out in outsourcing arrangements to what appears to be a related group of companies. The Commission believes that the management of most organisations would feel uncomfortable with such an arrangement. By outsourcing so much of its business, Eda Ranu has substantially reduced its ability to manage, control and prioritise its operating costs and service quality.

    - The Commission is not opposed to outsourcing arrangements in general. They are recognised as being a valid commercial option around the world and are frequently successfully used by profitable companies.

- The bulk water payments to PNG Water Limited represent about 20% of Eda Ranu's revenue. This appears to be out of proportion to the treatment and catchment costs incurred by Water PNG.
    - In Lae the replacement capital cost associated with catchment and treatment assets plus chemical costs is less than 3% of revenue.
    - In Mt Hagen and Kavieng these costs appear to be less than 10% of revenue.

- To the Commission's knowledge this contract was not awarded as part of a competitive bidding process.

- The Commission does not have sufficient information to identify the replacement costs for the water treatment and catchment assets currently operated by PNG Water Limited.
    - As already noted, the costs appear to be high when compared to Water PNG's costs, but as noted in other parts of this report, this information may not be accurate.
    - In the Draft Report, the Commission's assessment of Bulk Water Charges was that they were high. The Commission hoped that Eda Ranu or PNG Water Limited, would provide supporting evidence to the contrary as part of their submission. However neither party provided any evidence to support them other than a copy of the contract.

Overall the Commission has concluded that it does not have sufficient evidence to conclude whether or not Eda Ranu is paying too much for its water. But it is of the view that converting a major fixed cost into a variable cost where there is a significant probability of volume growth is not a prudent decision.

The Commission also believes there are some other considerations here.

- Eda Ranu is contractually obliged to pay this charge. If the Commission does not include the change in the price path, then this may put financial pressure on Eda Ranu. The Commission does not believe it is the interests of customers or any other stakeholder to see Eda Ranu fail financially.
- The Contract will expire within the regulatory period (Jun 2019). At that time Eda Ranu will need to either take over management of the water treatment plant assets, or enter into another contract. The Commission wants to ensure that this or any future contract entered into will achieve the best commercial outcomes for Eda Ranu and its customers. With this in mind, the Commission does **not** want to signal that any contractual costs will automatically be accepted by the Commission and included in future price paths. In contrast the Commission will expect to see clear evidence that the best commercial choice has been made.
- The Commission also expects that it should be consulted prior to any major new agreements being signed. This is because agreements of this nature have a material impact upon the potential prices being paid by consumers and it is the Commission's job to protect consumers.

Having weighed up all these considerations, the Commission has;

- Accepted the contract administration charge at face value and included it in the price path.
- Split the Bulk water charge into fixed and variable components.
- The variable component has been multiplied by forecast volumes and included in the price path.
- The fixed component cost has been adjusted to reflect a return on assets based upon the determined WACC rather than the finance rate used in the contract. This has been set as a fixed annual cost and included in the price path.

The details of these adjustments are described later in this section of the report.

Customer Services Agreement

The Commission notes the following:

- Payments to JC-KRTA are between 7% and 9% of Eda Ranu's revenue, depending upon JC-KRTA's success at revenue collection. Other comparable PNG network utilities do not appear to have a large focus on customer service. In the Commission's analysis of both Water PNG and PNG Power, it was not possible to directly identify what these organisations actually spend on customer service. However in both cases, there was little evidence that the amount was as substantial as what Eda Ranu is currently spending.
    - The Commission notes that customer service is a far greater focus in other countries than it tends to be in PNG. Where customer service levels are high, it can be expensive. The Commission therefore questions whether or not many of Eda Ranu's customers can afford to pay this much for customer service.

- The structure of customer services agreement is presumably designed to give JC-KRTA an incentive to increase the level of debt collection. As the level of debt collection increases then the % of revenue paid to JC-KRTA also increases. In the Commission's view, JC-KRTA do not have a natural incentive to increase the level of debt collection without this remuneration structure. However if Eda Ranu was collecting its own debts then, it would have a natural incentive to collect as many of them as possible.

- To the Commission's knowledge this contract was not awarded as part of a competitive bidding process.

- For the Consumer Services contract the Commission's analysis indicates that underlying costs are substantially lower than the amounts paid by Eda Ranu.
    - Eda Ranu and JC-KRTA refused to provide evidence to the contrary. The Commission believes it would have been relatively straight forward for either party to demonstrate that actual costs were higher if this were true.
    - From the Commissions perspective there are two possibilities;
        1. Either the Commission's assessment is correct and the contract payments are unreasonably high or
        2. Eda Ranu has done itself a great dis-service by not providing more information to demonstrate that the prices Eda Ranu pay JC-KRTA are reasonable.

- While Eda Ranu's shareholders in 1997 may have received advice about the Contract with PNG Water Limited, there was no evidence presented that they received any advice about the contract with JC-KRTA.

On balance, the Commission have proceeded to use its original assessment of this contract after making some minor adjustments. This is discussed later in this section of this report.

9.2. Eda Ranu Operating Expenditure

Eda Ranu classifies its operating costs under four headings;

- Concessionaire Fees
- Labour costs
- Direct Expenses
- Miscellaneous

This report considers each one in turn.

Concessionaire Fees

The Payments made by Eda Ranu to PNG Water Limited (PWL) and JC-KRTA are referred to by Eda Ranu as Concessionaire Fees. They are described in the following table. As already noted these payments are substantial and in 2013 they represented 49% of Eda Ranu's revenues. Eda Ranu appears to have come to rely upon PWL and JC-KRTA for a large portion of its operations and its finance.

The following table describes the various outsourcing payments.

Table19: Eda Ranu various outsourcing payments

Bulk Sales	• PWL provide treated water to Eda Ranu. They own the various assets required to do this and also the water uptake assets which are upstream of the treatment plant. • The charge covers the cost of owning, operating and maintaining these assets as well as treatment chemicals. • The bulk sales charge is related to the volume of water delivered. However there is a take or pay requirement. The volume is measured by cubic metres at the exit of the treatment plant. • The contract ends in 2019, so it covers most of the period of the regulatory contract.
Monthly Administration Fees	• This fee is for the monthly administration of the concession agreement. • Eda Ranu did not provide details of the payment, but it appears to be related to the size of the bulk sales payment.

Consumer services	• JC-KRTA provide billing and collection services to Eda Ranu such as
	  ○ Metre reading
	  ○ Payment collection

	○ Recommendations to disconnect ○ New account setup • The fee is 8% of all Eda Ranu's revenue. • The fee includes the cost of operating and owning various computer systems required to carry out this work. • The fee is reduced to 7% if EDA RANU annual collections fall below 70% and is increased to 9% if EDA RANU annual collections exceed 90%. • The Commission notes that because PWL control the collection of all Eda Ranu's revenue, PWL are able to ensure they are always paid prior to Eda Ranu receiving any revenue. • The arrangement ends in Oct 2018.
Non-revenue water phase 3 payments	• This covers the finance costs of a program aimed at reducing non-revenue water levels. • According to PWL, Phase one and two achieved a 20% reduction in non-revenue water quantities. However the level of non-revenue water began to increase again and so a third program was started. • This contract ran from 2009 to 2011 and Eda Ranu will complete the payments for the contract in 2014.
Monthly Facility Fees	• In 2006 Eda Ranu financed a large portion of its capital spending through PWL. The total cost of the work was K159 million. It covered; ○ Upgrades to Mt Eriama Facility ○ Upgrade to the intake ○ New pumping station ○ New Trunk and distribution pipelines ○ Non-revenue water reduction ○ Project management ○ Technical advice ○ Consultancy ○ Repayment of NAS Fund loan • The largest single item on this list was consultancy at 21 million kina. • The payments are monthly and will end in June 2018, at which time the assets will transfer to Eda Ranu,

In the Draft Report the Commission invited Eda Ranu and any other stakeholders to provide further information about these outsourcing payments. However, Eda Ranu, PNG Water Ltd, JC-KRTA nor any other party provided any further information, or corrected any of the information shown above. The Commission has therefore proceeded on the basis that this is correct.

Bulk Sales Payments

The following table provides a simple analysis of the Bulk sales payments. In 2013 the Bulk sales payment cost Eda Ranu approximately 33 Toea per kilolitre. However the figures provided to the Commission by Eda Ranu indicate that 56% of the water leaving the treatment plant, which Eda Ranu pays PWL for, is not currently billed. This water is either;

- Lost through leakage
- Lost through illegal connections
- Lost due to inaccurate meters

The effect of this is that the cost per litre of billed water is much higher. In 2013, while the cost per kilolitre produced was 34 toea per Kilolitre, the cost per billed kilolitre was 81 toea (as shown in the following table).

Table 20: Real terms bulk water costs

	Units	2009	2010	2011	2012	2013
Bulk Sale Payments	K'000	20,042	19,261	18,138	19,350	20,159
Volume	Million litres	22,049	23,117	25,134	24,952	24,971
Cost per billed Kilolitre	Kina / kilolitre	0.91	0.83	0.72	0.78	0.81
Production Volumes	Million litres	52,841	56,067	54,513	56,925	60,258
Cost per production volume	Kina / kilolitre	0.38	0.34	0.33	0.34	0.33

Note: Figures inflated to December 2014 kina values.

There are two issues which the Commission must address

1) What is a reasonable cost for water treatment?
2) Should water consumers pay for lost or stolen water?

Assessing a reasonable cost for Bulk Water

In order to assess the actual cost of supplying water to Port Moresby, the Commission would need;

- Information about the capital cost of plant and equipment; and
- Information about the operating costs of plant and equipment including, the cost of electricity, chemicals and staff.

The Commission invited both Eda Ranu and PNG Water Ltd to supply this information in the Draft Report, however neither party made any submissions on the subject. The Commission expects that Eda Ranu would not have any knowledge about the underlying costs except what is contained in the contract between themselves and PNG Water Ltd. PNG Water Ltd, themselves would have little incentive to provide any information to the Commission on the subject.

This leaves the Commission with the choice to either;

- Estimate the underlying cost of building and operating a water treatment facility or
- Use the contract as a source of cost information.

The Commission does not have the resources or funds to estimate the underlying costs of the plant and so has relied upon the contract information which is available.

When the Commission published the Draft Report it did not possess a copy of the contract document which describes the charges between Eda Ranu and PNG Water Ltd. Therefore the Commission used the information it had plus some assumptions about the fixed and variable nature of costs for a water treatment plant, to estimate the underlying cost of treating water. The Commission provided all its models to Eda Ranu for them to correct, modify or as a basis for them to make submissions. However neither Eda Ranu nor PNG Water limited provided any further information about the Bulk Water Charge. Instead Eda Ranu emphasized the nature of the relationship between Eda Ranu and PNG Water Ltd as already noted at the beginning of this section. No submission was received from PNG Water Ltd.

After the Draft Report was published, Eda Ranu provided the Commission with a copy of the contract between them and PNG Water Limited. The contract provided the details of how the Bulk Water Charge is calculated and how this is adjusted from year to year.

The Bulk Water Charge is calculated using a series of formulas, but in general the Commission notes;

- Water is charged per m3
    - The initial charge was 0.132 Kina per m3
- The charge per m3 is adjusted annually according to the change in;
    - the cost of chemicals (Aluminium Sulphate, Chlorine gas and hydrated lime)
    - the cost of energy (electricity and diesel)
    - the CPI index
- The initial annual adjustment in 1997 used the following weightings;
    - Energy was weighted as 7% of the annual adjustment.
    - Chemicals were weighted as 30% of the annual adjustment.
    - The CPI Index was weighted at 63% of the annual adjustment.

The Commission has interpreted the information above to mean that 63% of the initial bulk water charge was related to asset costs while the remaining portion was related to operating costs. The following table shows how this differs from what was assumed in the Draft Report.

Table 21 Split between fixed and variable costs (Real 2014 Values)

	% Split (Draft Report)	% Split (Final Report)	Final Allocation 2013 Costs (K Million)
Asset Costs	70%	63%	12.7
Variable Operating Costs	20%	37%	7.5
Fixed Operating Costs	10%		
Total	100%	100%	20.2

The components were treated as follows.

- The variable operating component was converted to a cost per kilolitre using 2013 volumes. This was multiplied by the forecast volume for each year of the regulatory period.
- The asset costs were used to estimate the financial value of the assets in 1997 when they were first acquired by PNG Water Limited. This was done using the finance rate used by PNG Water Limited and assuming that annual payments were constant over the contract period for the concession. The opening value was then treated in a consistent manner with the way the Commission handles all capital costs when determining regulated prices. That is by estimating the annual cost of depreciation of the asset and the cost of capital which remains invested in the asset.
    - Annual asset costs of 12.7 million equates to an original asset value of K101 million in 2014 kina values assuming a finance rate of 11.47%. (The Commission has used PNG Water Ltd's finance rate only to estimate the cost of these assets. In all other cases, where a cost of capital is required, the Commission has used a real pre-tax WACC of 10.19% as discussed in Section 12 of this report).

Treatment of Asset Costs

The Commission notes that an outsourcing agreement like the one between Eda Ranu and PNG Water Limited is likely to treat capital costs in a different manner from the way the Commission normally does. This can be seen in the following chart which compares an annuity approach to the depreciation approach.

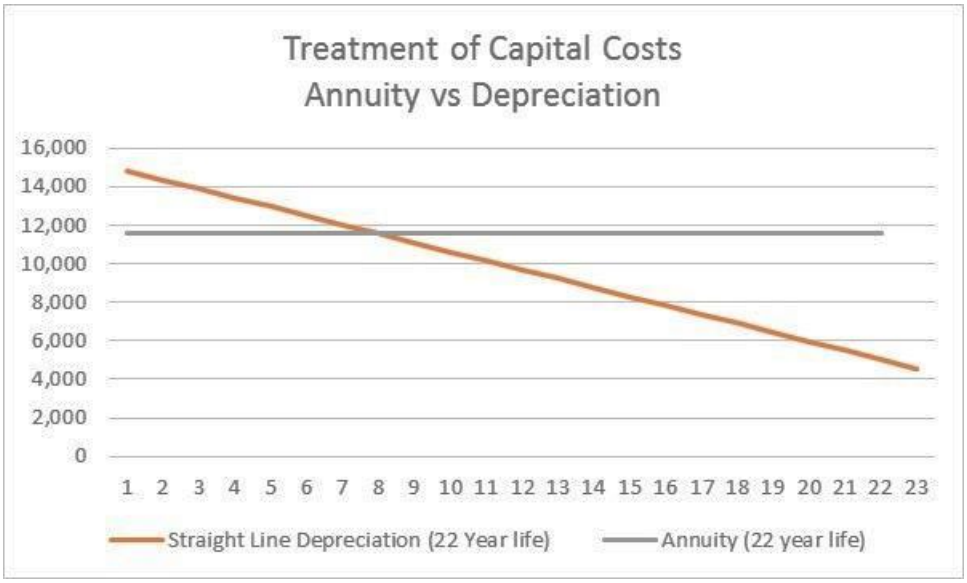
An annuity approach spreads the total cost of an asset evenly over its life. This includes both the depreciation of the asset (i.e. the recovery of capital) and the cost of the capital invested in the asset.

By contrast, the depreciation approach only spreads the depreciation cost evenly over the life of the asset. The cost of capital is unevenly spread. As the value of the asset is decreased by depreciation in a company's balance sheet, the theoretical value of the asset also decreases. Therefore in theory the amount invested in the asset is decreased and so the cost of capital for that asset decreases. In effect the cost of capital declines as the asset ages

and so the total cost of capital for the asset is not evenly distributed over the life of the asset. This is illustrated in the following chart by the downward sloping line.

A net present value analysis of both approaches shows that the net present value of each approach is the same. However in effect, the depreciation method allows a company to recover its costs from an asset earlier than with the annuity method.

Figure 6: Annuity method vs straight line depreciation



Using these two methods will result in quite different allowances for the cost of the asset at a particular point in time. As 2013 is the 16th year of a 22-year contract, this difference will be significant as shown in the following table. In the Draft Report, the Commission also assumed a 50-year life, which also has a material effect on the result.

Table 22: Asset cost estimates for 2013 (2014 Real Values)

Method used to calculate Asset Value	Return on Capital plus Depreciation K millions
Straight Line Depreciation (22 year life)	7.4
Straight Line Depreciation (50 Year life)	9.0
Annuity (22 year life)	11.6
Annuity (50 year life)	10.3
Average Annual fee paid by Eda Ranu (63% of total)	12.7

Note: The weighted average cost of capital used to calculate these numbers is 0.1019

In the Draft Report the Commission used the depreciation method. At that time the Commission expected Eda Ranu and PNG Water Limited to provide further information about the value of the original value of the assets and the Commission's assessment of them. However it appears that both Eda Ranu and PNG Water Ltd have simply accepted this approach and have not engaged in any discussion about methodology. So in the absence of any clarification the Commission must now make a decision about which method it might use.

The Commission notes that in estimating that the water treatment assets had an implied 1997 value of K101 million kina, there is an implicit assumption that annual payments were constant over time. To be consistent with this, the Commission must use the annuity method.

The next decision for the Commission is to estimate the life of the assets. The life of the contract is 22 years, but the Commission understands that the assets were not new when the concession agreement started. Nor does the Commission believe that the assets will be written off once the contract is completed. Instead the assets will be transferred back to Eda Ranu and will continue to be used and maintained. When Commission staff visited the water treatment site, PNG Water Ltd staff commented that treatment plant showed no sign of wearing out. In the absence of any guidance from Eda Ranu or PNG water limited, the Commission believes that a 50 year life is more realistic than a 22 year life.

However, if the Commission chooses to use a 50 year life, while Eda Ranu pay for the assets over a 22 year period, this will have the effect that Eda Ranu will be financially squeezed. The alternative for the Commission is to use a 22 year life and to specify that in the 2019 price review, no cost allowance be made for the water treatment assets at all, on the basis that they have already been paid for by Eda Ranu's customers.

To summarise, the Commission has two choices as follows.

1) Use an annuity approach with an economic life of 22 years, and specify that no further allowance be made for the cost of these assets in the price path after 2019.
2) Use an annuity approach with an economic life of 50 years and continue to include an allowance for the cost of these assets after 2019.

Because, as already noted, the Commission is concerned about the financial squeeze that a lower price path might place upon Eda Ranu, the Commission has decided to use the first approach. This means that the Commission has decided to set the allowance for water treatment asset costs at K11.6 million per year.

In the Draft Report, the Commission included the value of the water treatment assets in the RAB and treated them the same as all other Eda Ranu assets. However because the Commission has now decided to use an annuity method to allow for the cost of these assets, the Commission has;

- Removed these assets from the RAB
- Listed the amount of K11.3 million as a separate annual charge in the building block model.

Water plant operating costs

To calculate the operating cost of the plant, for each year of the regulatory period, the Commission has;

1. Divided the 2013 operating cost by the 2013 volume to calculate a cost per kilolitre (see Table 19).

2. The Cost per kilolitre was then multiplied by the forecast volume (see table later in this section).

Table 23: Water treatment cost per kilolitre

Water treatment 2013 operating costs (Kina millions)	7.5
Water treatment 2013 production volume (million kilolitres)	60.3
Total Water Treatment cost allowance (toea / kilolitre)	12.4

The cost of lost water

The Commission accepts that some level of lost water is inevitable in any water network on the scale of Eda Ranu's. This is true of water networks in both developed and developing countries. However the Commission does not think that 56% losses is acceptable.

Eda Ranu provided the Commission with the following information about losses.

Table 24: Breakdown of reasons for losses

	% of Production Volume
Billed Consumption	44%
Unbilled Authorised Consumption (Authorised supply to settlements and other political agreements)	14%
Commercial Losses (Illegal consumption, meter errors, data errors)	32%
Physical Losses (Leakage)	10%

Considering the nature of the losses, the Commission;

- Does not think it is reasonable for paying customers to pay for stolen water.
- Does not think it is reasonable for paying customers to cover the cost of Eda Ranu's inaccurate meters.
- Does not think it is reasonable for paying customers to cover the cost of water that Politicians may choose to give away. Under such circumstances, the Commission is of a view that Politicians should recompense Eda Ranu directly. The Commission must treat Eda Ranu as a stand-alone business entity and not as a social welfare agency.
- Notes that only 10% of losses are due to leakage. The Commission notes that by international standards this is low. If this is correct, then it indicates that Eda Ranu's network is in good condition and is well maintained.

Overall the Commission is of the view that losses are unacceptably high and that an efficient commercial organisation would find ways of reducing these. This would include;

- Initiatives to reduce illegal connections
- Not entering into agreements which involve free supply of water
- Initiatives to enable settlement areas to both receive and pay for water

The Commission has therefore set targets for the reduction of losses as follows.

Table 25: Eda Ranu water loss targets as set by the Commission

	2014	2015	2016	2017	2018	2019
Target	56%	48%	41%	35%	30%	25%

The Commission has built these targets into the Eda Ranu price path. If Eda Ranu does not achieve them, effectively it will be paying for water for which it is not receiving revenue. The Commission regards this as a significant incentive for Eda Ranu management to improve its stewardship of its water. The Commission also notes that PNG Water Limited have no incentive to assist Eda Ranu to reduce water losses as this will result in lower bulk water charges. This means that Eda Ranu will need to identify how to reduce losses without the assistance of PNG Water Limited.

The targets which the Commission has set are unchanged from the Draft Report. Eda Ranu did not make any submission in regard to these targets. Therefore the Commission must assume that Eda Ranu think they are reasonable and can be achieved.

Determined allowance for Bulk Water Costs

Using the demand figures identified earlier in this report, the operating cost of the bulk water charge has been calculated as follows

Table 26: Bulk Water Charge Allowance

	2015	2016	2017	2018	2019
Billed Volumes (million litres)	26,087	26,966	27,876	28,818	29,794
Loss Targets (%)	50%	41%	35%	30%	25%
Production volume (million litres)	52,175	45,705	42,886	41,169	39,726
Variable production costs (K000's)	6,458	5,657	5,308	5,096	4,917
Fixed production costs (K 000's)	11,626	11,626	11,626	11,626	11,626
Annual Treatment operating costs (K 000's)	18,085	17,284	16,935	16,722	16,544

In the year 2019, it has been assumed that both the operating cost and the fixed costs will be incurred for the full year, even though Eda Ranu will stop paying PNG Water Limited after June. This is because the method used to calculate the annualised cost of the assets spreads the cost over the full year. Eda Ranu will need to start paying the operating costs directly after June 2019, so the Commission has assumed that these payments also will continue for a full year.

These costs have been included in the building block model.

Monthly Administration Fees

The following table shows the administration fees Eda Ranu has paid PNG Water Limited.

Table 27: Contract Administration Fees

	2009	2010	2011	2012	1013
Administration Fees (Nominal - K 000's)	1,439	1,519	1,589	1,668	1,994

Administration Fees (Real 2014 - K000's)	1,873	1,844	1,805	1,865	2,114
Volume (million kilolitres)	22.0	23.1	25.1	25.0	25.0
Cost per billed Kilolitre	0.08	0.08	0.07	0.07	0.08

The Commission has made the following observations about this charge.

- Monthly administration fees are approximately 10% of the Bulk Water charge.
- When asked neither Eda Ranu nor PWL explained exactly what this charge covered, other than saying it was an administration charge.
- The amount is fixed but has an annual CPI adjustment.
- Eda Ranu has been contracted by its shareholder to pay this fee.

As discussed elsewhere in this report, the Commission has considered the information available and the various issues involved and has decided to include the administrative charge.

The Commission has used the forecast 2014 value of the administration fee. It is assumed that this will be constant over the regulatory period in real terms and that the fee will terminate when the contract does in June 2019.

Table 28: Contract Administration Fee

K 000's	2015	2016	2017	2018	2019
Administrative Fee	1,718	1,718	1,718	1,718	859

Consumer services costs

Consumer services are provided by JC-KRTA and this includes;

- Metre reading
- Payment collection
- Recommendations to disconnect
- New account setup

The charge is structured in the contract as a % of revenue. The % varies according to JC-KRTA's success in collecting Eda Ranu's debts. The variability of the charge acts as a performance incentive for JC-KRTA. The following table shows the actual charge as a % of actual revenue.

Table 29: Consumer services costs.

		2009	2010	2011	2012	1013
Consumer Services	K 000's	6,466	7,746	9,907	7,686	10,087
Annual Revenue	K 000's	83,678	95,916	100,179	103,939	115,316
% of Revenue	%	7.7%	8.1%	9.9%	7.4%	8.7%

In the Commission's view, if Eda Ranu were managing this activity themselves, then it would have a natural incentive to collect this revenue. The performance element of this charge is only necessary because JC-KRTA have no natural incentive to maximise the proportion of billed revenue which it collect. So the underlying cost to provide these services would not normally vary in proportion to the % of revenue.

The Commission would expect that the underlying cost of this activity would vary according to the number of customers which Eda Ranu has. Therefore the cost per customer is a more relevant measure of the efficiency of this activity. The following table shows the actual cost per customer in real terms (2014).

Table 30: Consumer services cost per customer

	2009	2010	2011	2012	2013
Consumer Services Charges (K 000's)	8,417	9,404	11,256	8,595	10,692
Number of Customers	15,306	15,555	15,701	15,869	16,062
Kina per customer	550	605	717	542	666

The Commission notes that for small customers this cost will exceed the revenue of a customer. Revenue for the average Domestic customers is currently about K903 per year. So for these customers it appears that on average Eda Ranu is spending more than 70% of the revenue providing customer services. Any service where the cost of collecting the revenue is more than the cost of providing the service is highly inefficient. Therefore the Commission does not accept that these costs reflect those of an efficient service provider in the PNG context.

The Commission would expect that some of these costs would be fixed in nature. These would include systems costs and management costs.

In the Draft Report, the Commission proposed a set of assumptions about the activities required to provide customer service and used these to model what expected customer service costs might be. Stake holders were invited to make submissions about the assumptions the Commission was proposing to use. Eda Ranu did not make a formal submission about these assumptions, but they were discussed briefly in a meeting the Commission held with Eda Ranu. Eda Ranu commented in particular that;

- To read metres it required at least 3 staff for security purposes.
- That because of the time it took to gain entry to a customer site in order to read a metre, the actual number of metres which could be read in a day was far less than the Commission's assessment.

No other comments or submissions were received in regard to the Commission's assumptions about service costs. The Commission met with JC-KRTA, but it did not make a submission or provide any comments on the subject.

The Following table shows the assumptions which the Commission has changed in the Final Report.

Table 31: Changes to customer service assumptions

	Draft	Final
Metre readings per day	900	109
Staff required to read a metre	1	3

All other assumptions remained the same as follows.

Assumptions used:

- On average a customer will interact with Eda Ranu 4 times per year and each interaction will take about 10 minutes.
- Customer service reps are paid K20 per hour. There is one supervisor to every 8 customer service reps. Supervisors are paid K40 per hour. A Customer service rep has 6 hours per day of productive time.
- A metre reader and accompanying security staff are paid K4 per hour for an 8 hour day. One supervisor can supervise 10 meter readers and is paid K20 / hour.
- It costs K1 per bill payment on average and there are 12 payments per year.
- A new account set up costs K100 and the average account has a 5 year life.
- A disconnection costs K100 (including security) and reconnection costs K50.
- 5% of customers disconnect per year and are then reconnected.
- A bad debt costs K100 in administration costs and 5% of customers incur a bad debt each year.
- The cost of IT systems required to support customer services is K1 million per year and is independent of the number of customers.
- The cost of office accommodation and administration is K1 million per year.

Using these assumptions produces the expected costs shown in the following table. On the basis of these assumptions the total customer driven cost would be about K79 per year.

Table 32: Customer service cost per customer

Customer Services	Annual Average Customer Cost(Kina per Year)
Metre reading cost per year	12
Annual customer service cost per customer	22
Payments cost	12
Disconnection cost per average customer	5
Reconnection cost per average customer	3
Bad debt cost per average customer	5

Cost of setting up a new account spread over life of customer	20
Total average service cost per customer	79

Using these assumptions, the Commission determined to include the following costs in the regulatory operating costs for Eda Ranu.

Table33: Total Customer Service Costs

	2015	2016	2017	2018	2019
Number of Customers	17,040	17,551	18,078	18,620	19,179
Customer driven costs (K'000s)	1,347	1,387	1,429	1,471	1,516
IT Costs (K 000's)	1,000	1,000	1,000	1,000	1,000
Office and Admin costs (K000's)	1,000	1,000	1,000	1,000	1,000
Collection initiatives (K000's)	2,000	2,000	2,000	2,000	2,000
Total Customer Service Costs (K 000's)	5,347	5,387	5,429	5,471	5,516

In addition to what was included in the Draft Report, the Commission has also added a further allowance for revenue collection initiatives (see table above). Because the Commission has an expectation that Eda Ranu will improve its revenue collection and reduce the level of stolen water, the Commission thinks it is reasonable to make budget provisions for this in the price path.

An example of such an initiative might be offering customers a "Prompt payment discount" if their bill is paid on time. Eda Ranu could do this within the constraints of the Maximum Average Price without sacrificing any revenue. Such initiatives normally have costs associated with changes to billing systems, bill design and communication to customers.

The Commission notes that even with this additional allowance the total allowance for customer service costs is still less than what Eda Ranu currently pay JC-KRTA. (In 2013 Eda Ranu paid JC-KRTA K10.1 million Kina).

Non-Revenue Phase 3 costs

PWL will not be charging these fees during the regulatory period and therefore they have not been considered by the Commission.

Monthly Facility Fee

In 2006 Eda Ranu financed much of its capital spending for the year through PNG Water Limited. The Commission understands that this was largely driven by the requirements of the contract in place between Eda Ranu and PNG Water Limited. Although whether or not 100% of this spending was required to be financed by PNG Water Limited is not clear to the Commission.

The nature of the financing arrangement is that PNG Water Limited paid for these assets and will continue to own these assets until June 2019.

The building block method uses a weighted average cost of capital (WACC) to determine the cost of capital for a business. The WACC is considered to reflect the capital costs of an efficient business operating in its particular industry and country. The method applies this WACC to all the capital costs regardless of what the actual costs incurred by the business might be. For this reason, the Commission has listed the assets at historic cost in the RAB and treated these assets in the same way as all of Eda Ranu's other assets. This has the effect of removing any financing costs which are currently built into the Monthly Facility Fee and replacing these with the finance costs which arise under the building block model using the WACC determined in this report.

The following list of assets was provided to the Commission.

Table 34: List of assets provided by Eda Ranu

Item	Kina (000's)
Set-up / Mobilisation Cost	25,445
Mt Eriama Upgrading (136 MLD to 184 MLD)	21,178
Intake	1,938
Raw Water Main Pipeline	20,817
Booster pumps	3,898
Power supply and civil works (pumping station)	3,683
Trunk Pipelines	12,913
Trunk Pipelines	3,933
Distribution Pipelines	6,666
Substitution Item - Telemetry / IWON	4,981
Substitution Item - NRW reduction	12,498
Substitution Item - TR (Technical Representative) addl fees	663
Substitution Item - PC (Project Co-ordinator) addl fees	663
Balance for other Substitution Items	2,744
Consultancy and other costs	21,140
2006 savings utilisation	1,470
2004 savings utilisation (NASFund repayment)	6,000
1999 savings utilisation USD component	5,377
Variations -1999 savings utilisation - kina component	3,115
Total Cost	159,120

The Commission asked for further information about this list of items but did not receive it. Also no submissions were made in regard to the Commission's interpretation and treatment of these costs. Therefore the Commission has concluded that its treatment of these assets and costs is reasonable and appropriate. Therefore no changes have been made to what was proposed in the Draft Report.

Several items in the list appear to be finance arrangements. This includes

- 2006 savings utilisation
- 2004 savings utilisation

- 1999 savings utilisation USD component
- Variations – 1999 savings utilisation – kina component.

On the assumption that these costs do relate to financing arrangements the Commission has chosen to ignore these costs.

In considering capital spending the Commission is required to assess whether or not spending is "Prudent".

The Commission is concerned about the item labelled Consultancy and other costs. The amount seems to be excessively large in proportion to total cost of list of items covered. Also the nature of many of the items listed appears to be things that Eda Ranu would not need consultancy advice for. For example, the Commission would expect that Eda Ranu's own engineers would be capable of designing pipelines. Eda Ranu did not provide any clarification about this item. So the Commission has therefore decided not to accept the consultancy fee as "prudent" capital spending.

The other item the Commission also has asked questions about is the NRW reduction. NRW stands for Non-Revenue Water, and the Commission understands that over the years Eda Ranu has carried out a number of initiatives designed to reduce the quantity of water for which it receive no revenue. From the description of these programs, they do not involve building capital assets. Instead the Commission suspects that Eda Ranu chose to use the facility fee to fund operating cost expenditures to cover the NRW program costs. As non-revenue reduction management is an ongoing cost for Eda Ranu, the Commission considers that any costs relating to this should be treated as operating costs. Thus Eda Ranu has effectively taken out a loan to support its operating expenditure. The building block method and the WACC calculation is based upon debt levels for an average company operating in the same industry as Eda Ranu in PNG. So the actual debt levels of Eda Ranu are not directly relevant to the price setting method. The Commission has therefore also removed this item from the list as they do not appear to be valid capital costs.

Furthermore the Commission observes that JC-KRTA have a conflict of interest when it comes to Non-Revenue Water. This occurs because PNG Water Limited is paid for all the water it produces, regardless of whether or not Eda Ranu's customers pay for it. Initiatives which reduce non-revenue water quantities are also likely to reduce overall production quantities. So by reducing the quantity of Non-Revenue Water, PNG Water Limited would see its own revenues reduced. As there appears to be a linkage between PNG Water Limited and JC-KRTA, then it is not in JC-KRTA's interests for the quantity of non-revenue water to be reduced. The Commission therefore thinks that it is inappropriate for JC-KRTA to be involved in initiatives to reduce non-revenue water.

The Commission has added the following amounts to the RAB on the understanding that there were capital assets developed in 2006.

Table 35: Amounts added to the RAB on capital assets developed in 2006

Item	Kina (000's)
Set-up / Mobilisation Cost	25,445
Mt Eriama Upgrading (136 MLD to 184 MLD)	21,178
Intake	1,938
Raw Water Main Pipeline	20,817
Booster pumps	3,898
Power supply and civil works (pumping station)	3,683
Trunk Pipelines	12,913
Trunk Pipelines	3,933
Distribution Pipelines	6,666
Substitution Item - Telemetry / IWON	4,981
Substitution Item - TR (Technical Representative) addl fees	663
Substitution Item - PC (Project Co-ordinator) addl fees	663
Balance for other Substitution Items	2,744
Total Cost	109,520

Eda Ranu Direct Costs

The following table contains Eda Ranu's direct costs expressed in real terms (2014 Kina values) for the past five years.

Table 36: Eda Ranu Direct Costs (Real 2014 values)

(K 000's)	2009	2010	2011	2012	2013
Production Materials	1,070	2,355	1,702	1,670	2,963
Minor Works	538	532	368	374	4,825
Water Treatment	95	67	26	-1	39
Water Disconnection/Reconnection	448	341	572	390	1,349
Electricity for pumping	1,621	333	715	1,027	602
Elcom Offtake Agreement (Penstock)	181	765	65	215	278
Water Usage	345	312	274	292	279
Hire of Heavy Equipment	972	810	1,052	1,076	4,451
Total	5,270	5,514	4,773	5,041	14,786

It can be seen that in 2013 total direct costs tripled from previous years. In the Draft Report, the Commission invited Eda Ranu to provide more information about this increase. However Eda Ranu did not provide an explanation as to why this had occurred and made no formal submission in regard to this.

The Commission notes that the major contributors to the 2013 increase were shown in Eda Ranu's accounts as follows.

- Production materials rising from K1.5 million to K2.8 million
- Minor works rising from K0.3 million to K4.6 million

- Hire of heavy equipment rising from K1.0 million to K4.2 million

Electricity costs have declined in materiality from being 31% of direct costs in 2009 to only 4% of direct costs in 2013.

Eda Ranu has proposed in its March 2014 submission that direct costs will grow by 3% per annum in line with forecast population growth for Port Moresby.

The following table shows that for four of the last five years there was a reasonably consistent relationship between direct costs and water and sewerage volumes. However in 2013 this relationship is broken with direct costs tripling as already mentioned. Eda Ranu's proposed costs for the next five years equated to a cost of 16 toea per kilolitre.

Table 37: Relationship showing between direct costs and volumes.

	2009	2010	2011	2012	2013
Direct Costs (000's)	5,270	5,514	4,773	5,041	14,786
Volume of Water and Sewerage (million litres)	40,187	41,883	45,747	45,566	45,681
Direct Cost per Kilolitre (K/kilolitre)	0.131	0.132	0.104	0.111	0.324

In the Draft Report the Commission proposed to use 12.3 toea per kilolitre as an allowance for direct costs going forward. The Commission invited Eda Ranu to provide further information to justify why the direct cost allowance should be higher. The sorts of arguments that the Commission expected to hear were;

- Eda Ranu need to spend more on maintenance of its network and therefore minor works costs, and production material costs would need to increase.
- Development and upgrade of roads in Port Moresby is driving increased requirements to hire heavy equipment to shift Eda Ranu's mains.

However Eda Ranu was completely silent on this issue and gave no justification for the proposed increase. Generally the Commission regards improved maintenance positively and wants to make provision for the cost of improving service outcomes for customers. The Commission has therefore made provision for recovery of increased spending costs by building a service quality premium into the price path. This is described in Section 15 of this report.

Since producing the Draft Report, the Commission has reviewed the CPI figures used to convert nominal values into real values. As a consequence of this the real terms direct cost numbers have increased. These are shown in the table above. The Commission has continued to treat the 2013 value as an outlier and has used the next highest value of 13.2 toea per kilolitre.

Based upon the demand forecast in Section 8 and using 13.2 toea per Kilolitre, the Commission has made allowance for direct operating costs for Eda Ranu as shown in the following table.

Table 38: Eda Ranu Direct Cost Allowance

	2,015	2,016	2,017	2,018	2,019
Forecast volumes - water and sewerage (million litres)	47,736	49,382	51,087	52,852	54,681
Direct Cost Allowance (K000's)	6,301	6,518	6,743	6,976	7,218
Performance linked allowance (K000's)	8,000	8,000	8,000	8,000	8,000

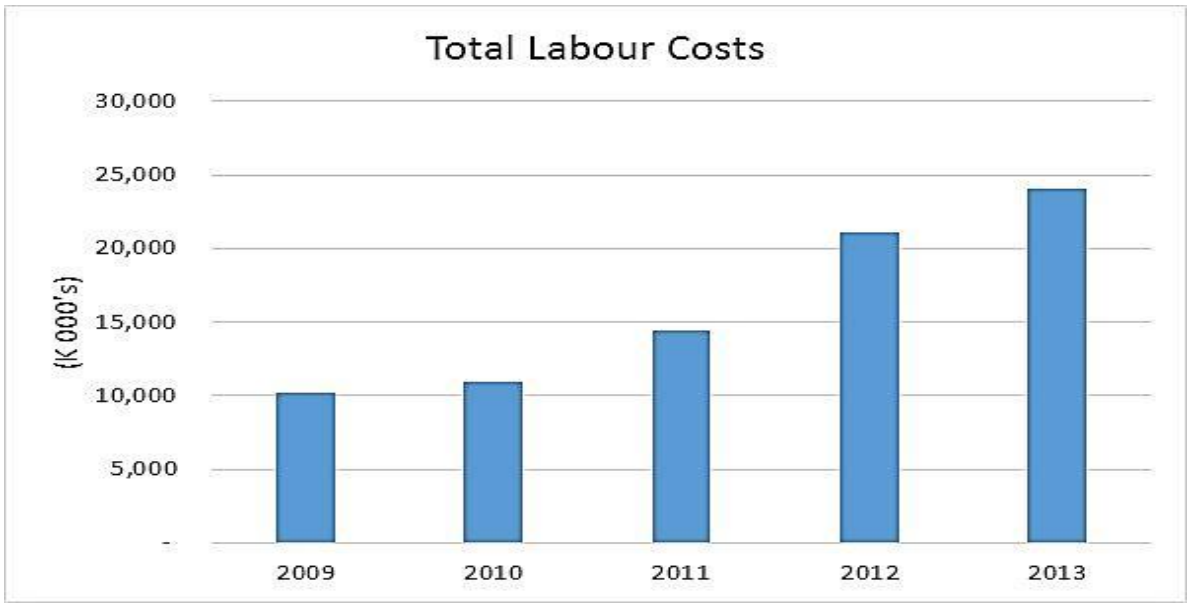
Labour Costs

A summarised view of Eda Ranu's labour costs is shown in the following table.

Table 39: Eda Ranu Labour Costs - Real terms (2014 values)

(K 000's)	2009	2010	2011	2012	2013
Salaries	1,011	1,019	1,805	3,281	3,034
Wages	4,374	5,111	6,255	6,533	7,901
Allowances	4,341	4,017	5,490	9,920	10,024
Other costs	506	796	842	1,330	3,146
Total Labour Costs	10,233	10,943	14,392	21,064	24,105

Figure 7: Total Labour Costs – Real Terms (2014 values)



In the 2009 price review Eda Ranu were planning to employ 57 additional staff. The Commission does not know if this occurred or not. However the following table provides a comparison of Eda Ranu's 2009 labour cost forecast compared to actual costs both inflated into 2014 values. One might guess that Eda Ranu did not complete its recruitment program until 2011. Alternatively rather than employing more staff Eda Ranu may have increased wages, salaries and allowances.

Table 40: 2009 forecast vs actual labour costs (2014 values)

	2009	2010	2011	2012	2013
2009 Forecast	13,725	14,136	14,560	14,998	15,447
Actual Costs	10,233	10,943	14,392	21,064	24,105
Actual as % of Forecast	75%	77%	99%	140%	156%

The following table provides a simple analysis of labour costs.

Table 41: Analysis of labour costs

	2009	2010	2011	2012	2013
% Increase Total Costs		6.94%	31.51%	46.36%	14.44%
% increase Salaries		0.70%	77.25%	81.74%	-7.54%
% Increase Wages		16.85%	22.37%	4.45%	20.94%
% Increase Allowances		-7.47%	36.66%	80.70%	1.05%
Allowances as % of salary and wages	81%	66%	68%	101%	92%

From this the Commission notes:

- There have been significant increases in salary costs. In the five-year period, salaries have increase by 135%.
- Wages increases are much lower compared to salary increases. In the five-year period wages have increased by 81%.
- Overall the senior staffs have received larger increases than the junior staff.
- Allowances have grown to be generally equal to the cost of Salary plus wages and are more than three times higher than salary costs. This later point is important as salaried staff generally receive more allowances than waged staff.

Eda Ranu provided the following information in order to help the Commission understand how costs were distributed between senior and junior staff in 2014. The average costs shown include allowances.

Table 42: Average staff costs

	Number of Staff	Salary and Allowances	Average Cost (Kina per person)
Executive Managers	8	8,317,983	1,039,748
Line Managers	16	4,328,268	270,517
Office Workers	87	4,877,732	56,066
Field Workers	147	6,258,725	42,576
All Staff	258	23,782,708	92,181

Eda Ranu provided the following comments about Staff Allowances.

Table 43: Eda Ranu – description of staff allowances

Allowance	Comments about allowance
Staff Clothing	As a corporate image, all of the SOE's are providing Uniforms to all their employees in PNG. For Eda Ranu we have types of uniforms for office workers and field workers.
Dependant Education	All employees on salary Grade 6 and above are provided education assistance in a form of an allowance – as an entitlement. The allowance varies based on the Grading from K 5,000 to K 30,000 per annum. Payment made for Elementary to Secondary schools attracts no tax. Payment for tertiary education and or encashment attracts tax.
Leave Fares	The company provides leave fares to all staff. The leave fares also vary from K 500 to K 15,000 pa. Staff on Grade 1 to 10 are eligible once every two years. Staff on Grade 11 and above are entitled every year. These allowances cover all staff.
Medical Insurance	Medical insurance is provided to all staff. The company pays premiums directly to our insurers.
National Provident Fund	There is a requirement for all employers to contribute to a superannuation scheme. The employee contributes 6% and the employer contributes 8.4%
Personnel Allowances	This refers to gratuity payments and is paid to staff on Contract of Employment as part of their entitlement.
Domestic Market Allowances (DMA)	These are entitlements paid to skilled workers who have tertiary qualifications
MV Allowances	The company provides 24 hour motor vehicle access to its senior managers as their employment entitlement. However, the General Managers and above are provided an allowance in place of company provided vehicle. The managers use the allowance to obtain motor vehicles for their personal and company use under a novated lease arrangement.
Rental-Residential	As part of the entitlement all staff are provided allowances in lieu of rental. In other words, the company does not provide accommodation but gives an allowance which employees use to find their own accommodation. This allowance differs based on the positions and grading.
Staff Home Ownership Scheme	The company provides a "Suspensory" loan to assist staff to own a home/house. This loan is not repayable by staff but is amortised over an 8 year period.

Salaries and Wages	Salaries are reviewed based on performance.
Rationalisation	We have planned for an aging workforce and where there is a restructure, there will be redundancies.
Staff Training	Training is provided for all staff from Management down to General Workers. The annual training budget is K700,000. Training requirements are determined through staff appraisals and training needs analysis which are then prioritised through annual training plans.
Wages Overtime	As a water & sewerage utility company, there are always breakages which workers must attend to, especially after hours and this results in overtime payments. The overtime rates vary from after hours at time and half (1.5) and weekends and public holidays are on double time (2).

The Commission is generally concerned about the level of increase in labour costs. Labour costs have increased at a rate which is far in excess of inflation. Some of this may have been driven by the employment climate created by the LNG project in Port Moresby over the past five years. The Commission accepts that all Eda Ranu staff must of necessity live in Port Moresby, where accommodation costs are very high by international standards. Therefore the Commission understands that allowances for this will be high.

However, it must be remembered that Eda Ranu's costs are paid for by its customers. And that most of Eda Ranu's customers do not receive these sorts of allowances. The Commission therefore asks the question, "Is it fair for Eda Ranu staff to receive these allowances when most of its customers do not?"

The Commission is of a view that high salaries may be appropriate where staff are highly skilled and have specialised expertise. If this is true then, then the Commission would also expect higher levels of productivity and improved performance levels. Therefore the Commission would like to see that a significant proportion of Eda Ranu's revenue is directly conditional upon achieving the service level objectives specified by the Commission for the benefit of customers.

It is the Commission's objective to ensure that there is a direct relationship between the cost of providing a level of service and the price which customers pay. If the achieved service level is low, then the price paid should also be lower. Conversely Eda Ranu needs to know that if it achieves higher levels of service it will also be able to charge higher prices. In this way it can make trade-off decisions between what it spends and the revenue it earns in return.

Forecast Labour Costs and the Service Price Premium

In its original submission Eda Ranu proposed that labour costs would increase annually by 3% over the next five years. The Commission requested that Eda Ranu provide a forecast of its staff numbers. However Eda Ranu did not provide this information. Therefore the Commission have assumed that staff numbers will not increase. Therefore any labour cost increase will reflect an increase in salaries, wages and allowances.

Generally the Commission is of the view that Eda Ranu has made no justification for any real terms increases in wages and salaries over the next regulatory period. Now that the LNG project is completed, there will no longer be upwards pressure on salaries for staff with specialised skills. The Commission therefore expects that salaries and wages will not increase at rate which is higher than inflation.

The Commission does expect that Eda Ranu will see an increase in staff numbers, once the contract with PNG Water Limited and JC-KRTA comes to an end. However, this has already been provided for in the allowance for water treatment costs and customer service costs.

The Commission has decided to accept this level of spending on labour, but has linked a portion of it to company performance. The new pricing structure will include a Service Performance Premium. This will be adjusted from year to year depending upon the Eda Ranu's performance against the measure describe in Section 15 of this report. Thus the price will be made up of a base component which is not linked to performance and a service performance premium component which is linked to performance.

The Commission has decided to set the real terms 2009 cost as the base salary cost which will be included in the base component of the price. Labour costs in excess of this level will be covered by the service performance premium component of the price.

The following tables shows the amounts the Commission have determined.

Table 44: Eda Ranu Labour costs allowance

	2015	2016	2017	2018	2019
Base Labour Costs (K 000's)	10,233	10,233	10,233	10,233	10,233
Eda Ranu Proposed Costs (K 000's)	25,362	26,123	26,906	27,713	28,545

Table 45: Allowance for Service Performance Premium

Base Labour Costs (K 000's)	10,233
Eda Ranu Proposed Costs (K 000's)	25,362
Performance Linked Labour Costs (K 000's)	15,128

Submissions and Discussions

The Commission invited stakeholders to provide feedback about how it was proposing to handle labour costs. No formal submissions were received on this subject. From discussions with Eda Ranu it was clear that what the Commission had proposed in Draft Report was not well understood. General comments were made that it was not possible to reduce salaries.

The Commission understands that it is difficult to reduce staff costs. However the Commission also notes that internationally it is common for companies to reduce their staff numbers when they are under pressure. Common methods for doing this are.

- Reduce staff numbers by making staff redundant.
- Reduce staff numbers by attrition – as staff leave they are not replaced. It is not unusual for staff turnover to be as high as 20% per annum. This therefore does create opportunities with careful planning to reduce staff numbers over time without redundancies.

The Commission does not want to see Eda Ranu reduce its staff numbers. Rather the Commission wants to see Eda Ranu improve its service levels. For this reason, the Commission is not proposing to reduce the staff cost allowance in the price path. Rather the Commission is making portion of the staff cost allowance conditional upon achieving specified service levels (see Section 15).

Eda Ranu Miscellaneous Costs

The following table contains Eda Ranu's miscellaneous costs over the past five years

Table 46: Eda Ranu Miscellaneous Costs adjusted to 2014 values

(K '000s)	2009	2010	2011	2012	2013
Administration Costs	1,893	2,536	2,783	4,621	5,458
Bad Debts	1,251	2,398	1,405	(1,151)	1,060
Consultants and Contractors	829	1,042	769	1,519	2,468
IT&T	1,097	1,172	1,158	1,004	725
Motor Vehicle	1,277	1,328	1,459	1,569	3,910
Office	4,086	3,765	3,674	4,231	5,391
R&M	1,066	862	849	753	1,107
Travel	506	543	698	812	1,698
Total Miscellaneous	12,006	13,645	12,795	13,357	21,817

The Commission makes the following observations about these costs;

- Total Miscellaneous costs increased substantially in 2013 with a 63% increase. The increase appears to have occurred across a large number of items.
- Administration costs increased by 66% in 2012.
- Consultants and contractors have increase substantially in 2013.
- Spending on motor vehicles increased by 150% in 2013.
- Travel costs more than doubled in 2013. Eda Ranu has all its business located in one city yet, its travel costs are comparable to Water PNG, who has its network distributed across the whole country. The Commission would expect Eda Ranu to have substantially lower travel costs than Water PNG.
- IT&T costs have not increased. Eda Ranu does not appear to be making any substantial investment in new IT Systems.

Eda Ranu in its submission proposed a 3% real terms increase each year for the next regulatory period.

From the Commissions perspective, Eda Ranu appears to have successfully operated with lower costs from 2009 until 2012, and service levels do not appear to have substantially improved in anyway in 2013. In the Draft Report the Commission proposed to use the average real terms cost of 2009 to 2012 to set the price path. The Commission did not receive any submissions on this issue and so has decided to proceed as proposed.

The allowance for miscellaneous costs will therefore be as shown in the following table:

Table 47: Eda Ranu Allowance for Miscellaneous costs

	2015	**2016**	**2017**	**2018**	**2019**
Miscellaneous	12,951	12,951	12,951	12,951	12,951

Summary of Eda Ranu Operating Costs

The following table provides a summary of the operating costs which the Commission has determined to include in the base component of the price path for Eda Ranu.

Table 48: Eda Ranu Operating Costs in base price Component

(K 000's)	**2015**	**2016**	**2017**	**2018**	**2019**
Water Treatment	18,085	17,284	16,935	16,722	16,544
Administrative Cost	1,718	1,718	1,718	1,718	859
Customer Service	5,347	5,387	5,429	5,471	5,516
Direct Costs	5,872	6,074	6,284	6,501	6,726
Labour Costs	10,233	10,233	10,233	10,233	10,233
Miscellaneous	12,951	12,951	12,951	12,951	12,951
Total Operating Costs in base price	54,205	53,647	53,549	53,597	52,828

As discussed the following table shows the additional amount that has been set aside for the Service Premium Price.

Table 49: Eda Ranu Service Premium Price Allowance

Performance linked component for labour (K 000's)	15,128
Performance linked component for direct maintenance costs (K 000's)	8,000
Total performance linked allowance (K 000's)	23,128

Table 50 shows how this has been used to calculate a service premium price for both Water and Sewerage. The weighting used is as discussed in Section 15 of this report.

Table 50: Calculation of Eda Ranu Service Premium

	Water	Sewerage
Weighting	80%	20%

Performance linked allowance (K 000's)	18,502	4,625
Regulatory Volume (Kilolitres 000's)	26,087	21,649
Service Price Premium (Toea / Kilolitre)	71	21

Final Determination:

The Commission's Final Determination for Eda Ranu's efficient operating costs to include in the base component of the price path for the next regulatory period commencing 1st January 2015, are as follows:

Year ending 31st December (K '000 real)	**2015**	**2016**	**2017**	**2018**	**2019**
Operating expenditure	54,205	53,647	53,549	53,597	52,828

Final Determination:

The Commission's Final Determination for Eda Ranu's service price premium, to be adjusted each year, depending upon Eda Ranu's performance for the forthcoming regulatory period commencing 1st January 2015, are as follows:

	Water	Sewerage
Service price premium (Toea/ Kilolitre)	71	21

9.3. Water PNG Operating Expenditure

Water PNG classifies its operating costs under three headings.

- Labour Costs
- Direct Costs
- Miscellaneous Costs

This report addresses each one in turn.

Labour Costs

Table 51 compares what was forecasted in the 2009 pricing review with the actual costs inflated into 2014 Kina values.

Table 51: Water PNG – Actual Labour costs compared to 2009 Forecast

(K 000's)	**2009**	**2010**	**2011**	**2012**	**2013**
2009 Forecast of Labour Cost (inflated to 2014 Values)	21,263	21,901	22,558	23,235	23,932

Actual labour cost (inflated to 2014 values)	17,729	20,724	27,635	26,356	26,988
% of Forecast	83%	95%	123%	113%	113%

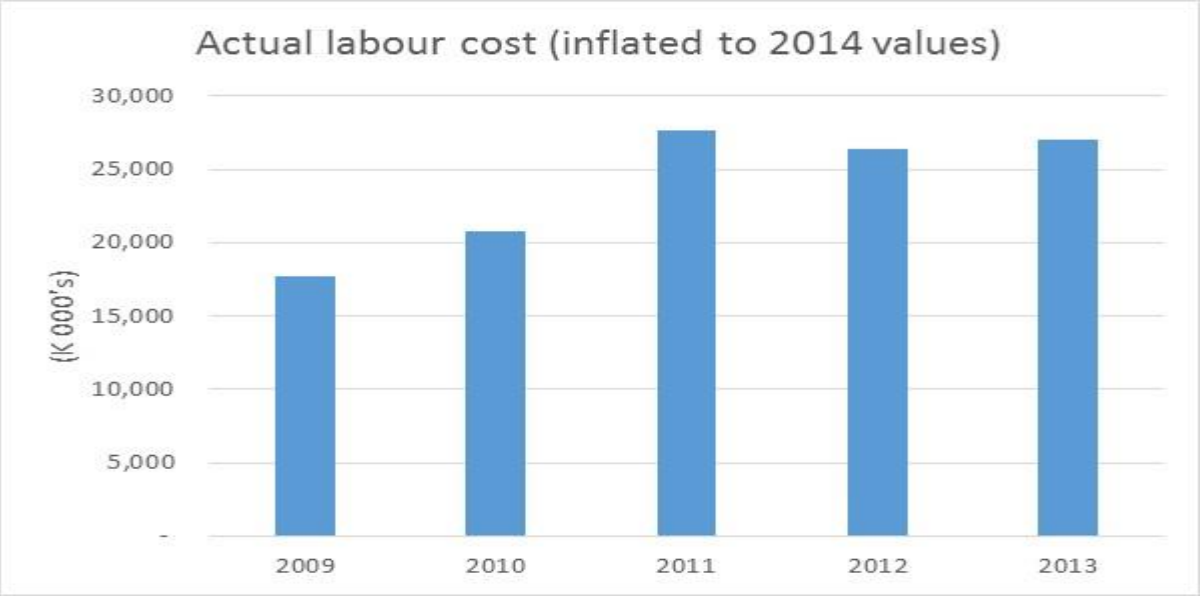
The Commission notes that Water PNG has been far more constrained within its 5-year forecast than Eda Ranu. Eda Ranu's labour costs have increased higher above its forecast than Water PNG's has as shown in the following table.

Table 52: labour cost as a % of forecast

(K 000's)	**2009**	**2010**	**2011**	**2012**	**2013**
Eda Ranu - Actual as % of Forecast	75%	77%	99%	140%	156%
Water PNG – Actual as % of Forecast	83%	95%	123%	113%	113%

However labour costs for Water PNG have still grown by 52% in real terms over the 4 year period.

Figure 8: Water PNG: Actual Labour Costs



The Commission requested that Water PNG provide actual staff numbers and average salary information so that the Commission could better understand what was driving these costs. Water PNG provided the following staff numbers shown in the following table. The Commission has divided real labour costs by staff numbers to get a view of how average staff costs have changed.

Table 53: Staff numbers and average labour costs

(K 000's)	**2,009**	**2,010**	**2,011**	**2,012**	**2,013**	**2,014**
Real Labour Cost (2014 values)	17,729	20,724	27,635	26,356	26,988	30,300
Number of staff	410	410	354	347	357	407
Average labour cost per person	43,243	50,546	78,065	75,955	75,598	74,447

The Commission asked Water PNG why staff numbers fell so dramatically in 2011. Water PNG replied that it was not sure if the numbers were correct.

For the 2014 increase, Water PNG explained that;

> *"it was necessary for the increase as Water PNG planned to cover 16 districts by the year 2018 at the rate of 2 districts to be delivered each year. Four new districts were delivered with water supplies last year and they are Kerema, Bunu, Kupiano & Kainantu. Board had approved a ceiling of 411 from 407 which is an increase of 4 positions".* [4]

The Commission observes that 16 new districts at a rate of 2 staff per district equating to 32 additional staff, and so this does not completely explain the increase.

The Commission notes that Water PNG have commented that the staff numbers may not be correct. If this is true, then the Commission is left wondering what else is not correct. At this time, with time constraints within which the Commission must make a determination, the Commission has little choice but to accept the information provided to it. And so has chosen to assume in good faith that these numbers are correct.

The Commission also noted that cost of Water PNGs' staff allowances appeared to be far smaller than Eda Ranu's in proportion to salaries and wages (see following table).

Table 54: Water PNG - Labour cost break down

(K 000's)	**2009**	**2010**	**2011**	**2012**	**2013**
Wages & Salaries	15,059	17,967	23,700	22,935	22,645
Allowances	1,466	1,872	1,685	1,303	1,935
Training	568	376	835	693	1,184
Gratuity and Directors Fees	637	509	1,414	1,426	1,224
Total Labour	17,729	20,724	27,635	26,356	26,988

Water PNG - Allowances as % of salary and wages	10%	10%	7%	6%	9%
Eda Ranu - Allowances as % of salary and wages	81%	66%	68%	101%	92%

Water PNG also provided the information shown on Tables 55 and 56.

Table 55: Current Salary information

Staff Category	**2014 Salaries & Wages (Kina)**	**2014 Allowances (Kina)**	**2014 Gratuity (Kina)**	**Superannuation (Kina)**
Executive Managers	583,847	1,226,262	225,588	49,043
Line Managers	907,276	2,200,849	424,853	76,211
Head Office Workers	3,428,547	3,476,294	271,456	287,804
Branch Office Managers	665,859	500,589	262,754	55,932

Branch office & Field Workers	5,883,219	3,339,380	21,586	494,083
Total	**11,468,748**	**10,743,374**	**1,206,237**	**963,073**

Table 56: 2014 average staff costs

Staff Category	Average Salary per person	Average Allowances per Person	Avg. Gratuity per person	Average Superannuation per person
Executive Managers	97,308	204,377	37,598	8,174
Line Managers	56,705	137,553	26,553	4,763
Head Office Workers	35,714	36,211	2,828	2,998
Branch Office Managers	51,220	38,507	20,212	4,302
Branch office & Field Workers	34,607	19,643	127	2,906
Total	**28,179**	**26,396**	**2,964**	**2,366**

The Commission notes that Water PNG does not operate in Port Moresby and therefore does not need to provide the allowances to cover the cost of living in Port Moresby. The Commission asked Water PNG about the allowances it does provide and received the following feedback.

Table 57: Water PNG Allowances

Line Items	Comments
Leave Fares	• Only those who are employed in a different location from where they were recruited receive paid leave fares. • These are provided every 2 Years and include dependant family members.
Superannuation	• All staff receives superannuation contributions at 8.33%.
Salaries & Wages	• Salaries and wages are reviewed annually. Water PNG uses the Government Recommendation for CPI adjustment. 3 year reviews are carried out to peg salaries to market conditions. The last one was in 2011. Individuals can be re-graded based upon performance.
Staff Training	• Water PNG budget 2% of wages and salary for training.
Wages Overtime	• Overtime is paid as required to meet the needs of the business. Rates are 1.5 times the hourly rate on Saturday and 2 times the hourly rate on Sunday.
Gratuities	• (It was not clear to the Commission under what circumstances a gratuity was paid).
Bonus	• Bonuses are paid to all staff in years where financial performance is good. This occurred in, 2009, 2011, 2012 and 2013.

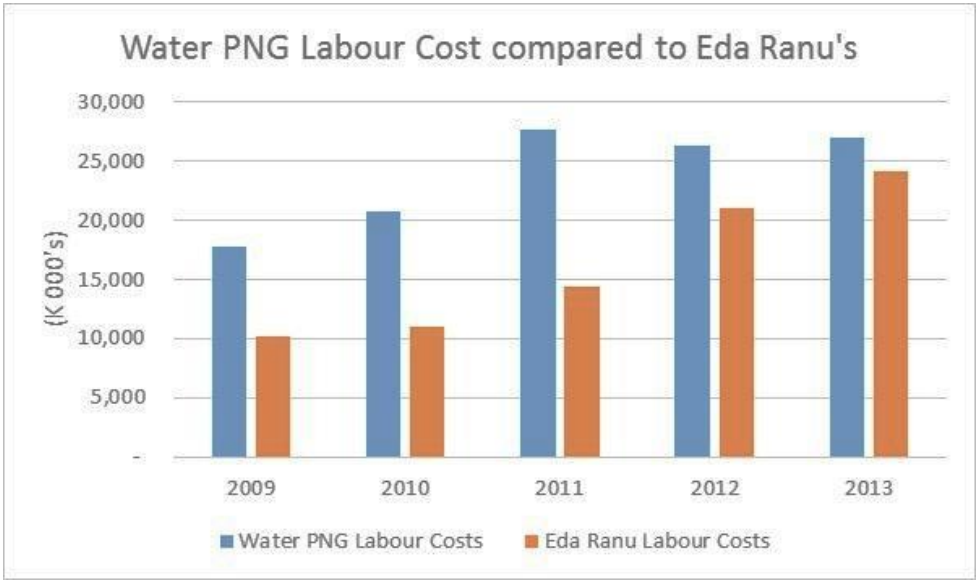
Other Labour Costs	• This includes vehicle allowances, housing allowances protective clothing and recruitment.

Another interesting comparison can be made between Eda Ranu and Water PNG. Eda Ranu delivers approximately twice as much volume of Water and Sewerage as Water PNG. However at the beginning of the regulatory period Eda Ranu's costs were approximately 60% of Water PNG's. However at the end of the regulatory period they have risen to about 90% of Water PNG's. (See Figure 9).

It would appear that labour productivity for Water PNG's operations is substantially higher than for Eda Ranu. The Commission can think of several possible explanations for the differences in cost.

- Eda Ranu has outsourced some of its operations including customer service and water treatment which would mean that its direct labour costs are lower
- Water PNG staff may be less productive than Eda Ranu staff.
- The dispersed geographic nature of Water PNG's operations may cause it to require more staff to deliver its volume than Eda Ranu does.

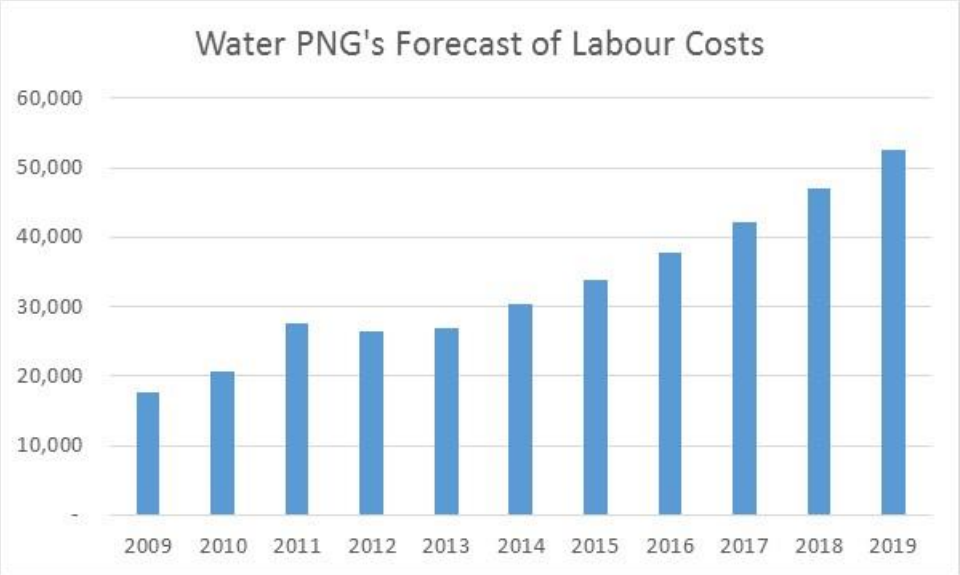
Figure 9: Water PNG Labour costs compared to Eda Ranu's



Forecast Labour Costs

Water PNG is proposing a 6% real terms increase in labour costs every year for the next five years. This is in addition to a forecast 19% increase in labour costs from 2013 to 2014. If Water PNG's labour costs did increase this much then the costs would have more than tripled in real terms over a 10 year period.

Figure 10: Water PNG's forecast of Labour Costs



The Commission asked Water PNG for further information about its labour costs and how this might change over the regulatory period. Water PNG provided the following forecast of staff numbers.

Table 58: Projected staff numbers

	2013	2014	2015	2016	2017	2018	2019
	Actual	Budget	Projections	Projection	Projection	Projection	Projection
Executive Managers	5	6	6	6	6	6	6
Line Managers	11	16	16	16	16	16	16
Head Office Workers	79	96	96	96	96	96	96
Branch Office Managers	11	13	14	16	17	17	17
Branch Office Workers	88	106	110	110	110	110	110
Field Workers	163	170	180	180	180	180	180
Total	357	407	422	424	425	425	425

As already noted, Water PNG has increased or is increasing its staff numbers to support water supply in 16 new areas from 2013 until 2018. Water PNG indicated that it has budgeted 2 people per region for this. This equates to 32 new people. The table above shows that number of field workers increasing by 17 and the number of branch office workers increasing by 22 which adds up to 39 additional staff. Head office workers are also increasing by 17 plus there are an additional 8 managers.

When the Draft Report was published, the Commission had not received any information from Water PNG to justify its increased labour costs. So in the Draft Report, the Commission proposed to include Water PNG's real terms 2009 labour cost in the base component price. The real terms increases above 2009 costs were to become part of the service performance

premium component of the price. However now that Water PNG has explained that it needs additional staff in order to support additional service areas, the Commission has reviewed this position.

The Commission notes that in 2009, according to the information provided by Water PNG, it had 410 staff and that now it has 407 staff. As the Commission has used 2009 labour costs as the basis for calculate the portion of the labour cost which will be included in the base component of the price, then the Commission sees no need to make any changes from what was proposed in the Draft Report. The Commission has therefore decided to keep the split between the base component price and the service performance premium the same as proposed in the Draft Report.

The Commission also notes that the Water PNG Board has approved a maximum number of staff of 411, and that this is less than the projected number of staff put forward to the Commission by Water PNG. From this the Commission concludes that the Water PNG Board believe Water PNG can operate effectively with 411 staff.

On this basis the Commission has reduced the 2015 total labour cost allowance to reflect a total of 411 staff rather than 422 as projected by Water PNG. To do this the Commission has assumed an incremental cost of K80,000 per person. This is based upon the cost information provided for head office and branch office staff (including salaries, allowances and other costs). This reduces the 2015 estimated cost from K33.8 million to K32.9 million. The Commission has used this amount to set the service linked price premium as shown in the following two tables. The weightings used to split the allowance between Water and Sewerage is as discussed in Section 15 of this report.

Table 59: Labour cost allowances for Water PNG

(K 000's)	2015
Labour costs in base price component	17,729
Water PNG total labour cost allowance	33,825
Labour costs in the premium price component	16,096

Table 60: Calculation of Service Performance Premium for Water PNG

	Water	Sewerage
Weighting	80%	20%
Performance linked allowance (K 000's)	12,876	3,219
Regulatory Volume (kilolitres 000's)	14,092	6,355
Service Price Premium (toea / kilolitre)	91	51

Direct Costs

The following table shows how the direct costs have changed in real terms over the regulatory period. Costs actually fell from 2009 to 2010 but then rose again significantly in 2013.

Table 61: Actual Direct Costs

	2009	2010	2011	2012	2013
Direct Costs- Real Terms 2014 Values (K 000's)	15,015	12,536	12,980	13,576	17,038
Water & Sewerage Volume (million litres)	20	20	19	20	20
Cost per kilolitre	0.76	0.63	0.67	0.69	0.86

About 75% of directs costs are power and fuel. Repairs, Maintenance and Materials make up most of the rest of the cost. The 30% increase in 2013 appears to have occurred equally in electricity, Repairs & Maintenance and Materials.

Direct Cost forecast

Water PNG in its submission is proposing a 6% annual real terms increase in direct costs. In the Draft Report the Commission expressed the view that direct costs should increase in direct proportion to product volumes.

In the Draft Report the Commission requested that Water PNG provide further explanation about what was driving its direct costs. In discussions Water PNG highlighted that electricity was a major component of its direct costs and that changes in electricity prices are beyond its control. The Commission notes that fuel prices have recently fallen and that this is a major component of electricity costs in PNG.

The Commission has decided to modify the direct cost allowance slightly. In the Draft Report the Commission used an average cost per litre from the past five years but excluded 2013 on that basis that it was an outlier. Rather than excluding 2013, the Commission has decided to include it. The rationale is that energy costs are cyclical and go up and down. The full five year period is therefore likely to be representative of the range of input costs which water PNG will face over the next five years.

The average direct cost per kilolitre used was therefore K0.721. This was multiplied by the forecast demand volumes to set the expected direct costs for the next regulatory period. The following table shows the direct cost allowance which the Commission has included in the price path.

Table 62: Water PNG- Direct Cost Allowance

	2015	2016	2017	2018	2019
Forecast Volume (million litres)	22.2	22.8	23.4	24.0	24.7
Direct Cost Allowance (K 000's)	15,996	16,409	16,860	17,321	17,794

Miscellaneous Costs

The following table shows Water PNG's Miscellaneous costs inflated to 2014 values.

Table 63: Water PNG – Miscellaneous Costs in real terms 2014 values.

(K 000's)	2009	2010	2011	2012	2013
Contract services	616	762	410	292	288

Professional Services	1,883	2,117	2,118	2,707	2,994
Travel Costs	507	979	897	873	1,612
Stationery Costs	889	962	881	870	1,116
Communication Costs	1,307	1,339	1,085	1,374	1,183
Insurance	236	437	433	315	236
Finance & Admin	1,977	1,630	2,104	2,316	2,234
Sundry Costs	5,779	4,992	3,279	(755)	4,646
Security	722	748	847	884	754
Repairs & Maintenance	921	828	1,040	986	1,040
Miscellaneous Costs	14,838	14,794	13,094	9,862	16,102

In the Draft Report the Commission removed the line item titled "finance" costs on the assumption that these related to the funding of the company. Funding costs are covered by the return on capital calculations in the RAB. In discussions with Water PNG the Commission was assured that this line item did not include finance costs but were in fact administrative costs. On this basis the Commission has included these in its final determination.

It is interesting to see that costs fell from 2009 until 2012 and then rose in 2013. Water PNG in its submission proposed that miscellaneous costs would increase by 5% per year in real terms. The Commission sees no reason why this should occur. And Water PNG did not present any rationale for why it should increase. Miscellaneous costs should not be directly driven by customer volumes or product volumes. So the Commission is proposing to take an average of the last five years and set this as a fixed annual allowance.

Thus the Miscellaneous cost allowance will be.

Table 64: Water PNG - Proposed Miscellaneous Cost Allowance

(K 000's)	**2015**	**2010**	**2011**	**2012**	**2013**
Miscellaneous	13,738	13,738	13,738	13,738	13,738

Summary of Water PNG's operating costs

The Commission is proposing that the following operating costs will be covered by the price path.

Table 65: Water PNG - Proposed Operating Costs

(K 000's)	**2015**	**2016**	**2017**	**2018**	**2019**
Labour	17,729	17,729	17,729	17,729	17,729
Direct	15,996	16,409	16,860	17,321	17,794
Miscellaneous	13,738	13,738	13,738	13,738	13,738
Operating Costs	47,464	47,876	48,327	48,789	49,261

Final Determination:

The Commission's Final Determination for Water PNG's efficient operating costs to include in the base component of the price path for the forthcoming regulatory period commencing 1st January 2015, are as follows:

Year ending 31st December (K '000)	**2015**	**2016**	**2017**	**2018**	**2019**
Operating expenditure	**47,464**	**47,876**	**48,327**	**48,789**	**49,261**

Final Determination:

The Commission's Final Determination for Water PNG's service price premium, to be adjusted each year, depending upon Water PNG's performance for the forthcoming regulatory period commencing 1st January 2015, are as follows:

	Water	Sewerage
Service price premium (Toea/ Kilolitre)	91	51

10. Review of Capital Expenditure

The Commission has decided to treat major new capital spending differently from capital spending on minor works. Capital spending on minor works has been considered and included in the approved price path for both Eda Ranu and Water PNG. For major capital projects the Commission has decided not to pre-approve any capital spending, but has made provision for these projects to be approved and included in the price path, over the course of the regulatory period. This is discussed in this section of the report.

10.1. Eda Ranu Review of Capital Expenditure

The forecast capital expenditure as provided for during the 2009 pricing review and the actual capital expenditure incurred by Eda Ranu during the current regulatory period is displayed in the following table.

Table 66: Eda Ranu – Proposed capital costs Year ending 31st December

(Kina '000 nominal)	2010	2011	2012	2013
Forecast	6,000	5,500	5,000	4,500
Actual	532	4,609	3,716	3,569
Difference (Actual - Forecast)	(5,468)	(891)	(1,284)	(931)
Actual as % of Forecast	9%	84%	74%	79%

This Commission notes that there is a discrepancy between what is recorded in Eda Ranu's asset register and what was presented in its submission. The numbers shown here are from the asset register.

10.2. Forecast Capital Expenditure for Eda Ranu

Forecast capital expenditure for the forthcoming regulatory period as provided by Eda Ranu is outlined in the following table.

Table 67: Forecast capital expenditure

Asset Category	2014	2015	2016	2017	2018	2019
Buildings	3,250	1,200	1,200	1,200	1,200	1,200
Furniture & Fittings	80	100	100	100	100	100
Motor Vehicles	890	-	-	-	-	-
Office Equipment	2,538	100	100	100	100	100
Plant & Equipment	266	400	400	400	400	400
Sewerage	2,700	2,000	2,000	2,000	2,000	2,000
Water	6,440	2,000	2,000	2,000	2,000	2,000
Total Proposed Spending	16,164	5,800	5,800	5,800	5,800	5,800

Eda Ranu did not provide the Commission with a capital asset work plan. From the forecast it appears that Eda Ranu has no major capital works planned. The Commission notes that if

Eda Ranu does not carry out capital works then the Commission cannot approve the corresponding increases in the price path.

The Commission notes that Eda Ranu's proposed capital spending is for minor works and includes no major capital costs. The Commission also considers that the level of Eda Ranu's proposed capital appears to be reasonable considering,

- The size of Eda Ranu's network and capital assets
- The level of spending in recent years.

On this basis, the Commission has accepted Eda Ranu's proposal and included this forecast capital costs in the base component of the price path.

However the Commission does note that about 20% of Eda Ranu's proposed spending is on buildings. The Commission accepts that spending on commercial buildings and structures is necessary. But the Commission does not support investment in residential property. The Commission notes that;

- Investment in residential accommodation is not Eda Ranu's business.
- Investing in residential accommodation exposes Eda Ranu to economic risk and uncertainty that is unrelated to itscore business.
- The Commission would not expect Eda Ranu to have expertise in this area.
- Eda Ranu provides staff allowances for accommodation.
- Providing staff allowances for accommodation is acceptable to the Commission only if it is necessary to recruit and retain staff.
- From discussions with recruitment companies, the Commission notes that, the private sector in Port Moresby does not generally provide housing as part of salary packages.
- Providing staff allowances avoid any need to invest in residential property directly.

The Commission accepts that some state-owned enterprises do have circumstances where staff are working in remote areas and there is no residential accommodation available. Under these rare circumstances it might be acceptable for a state owned enterprise to build residential accommodation for its staff. However for Eda Ranu, the Commission is not aware of any circumstance where this would be necessary. If Eda Ranu did choose to invest in residential property, the Commission would remove these assets from the regulatory asset base and would not include these costs in the regulated price path.

Final Determination:

The Commission's Final Determination on Eda Ranu's capital expenditure to be undertaken in the forthcoming regulatory period:

Year ending 31st December (K '000)	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital expenditure (net of capital contributions)	16,164	5,800	5,800	5,800	5,800	5,800

10.3. Water PNG Review of Capital Expenditure

The following table compares the forecast capital spending from the 2009 review and the actual capital spending since then.

Table 68: Water PNG – Forecast vs Actual Capital Spending

(Kina '000 nominal)	2010	2011	2012	2013
Forecast	57,150	149,750	202,100	136,600
Less Gifted Funds	55,150	147,550	189,800	134,200
Net Forecast Spending	2,000	2,200	12,300	2,400
Actual Spending	71,555	9,475	8,868	6,765
Less Actual Gifted Funds	65,128	9,377	34,572	17,590
Net Actual Spending	6,427	98	(25,704)	(10,825)
Actual as % of Forecast	321%	4%	-209%	-451%

The Commission makes the following observations from this table:

- A substantial part of the gifting expected for 2011 to 2013 did not occur.
- In 2012 and 2013 Water PNG received more in gifting than it actually spent.

10.4. Water PNG Forecast Capital Expenditure

The following table shows Water PNG's capital spending forecast.

Table 69: Water PNG – Forecast Capital Spending

(K 000's)	2014	2015	2016	2017	2018	2019
Land	14,343	500	500	500	500	500
Civil Works	28,425	13,200	18,300	22,500	15,500	20,300
Buildings	2,167	800	2,000	800	500	500
Pipelines	3,287	52,900	73,000	90,200	61,800	81,100

Plant & Equipment	4,967	22,100	30,400	37,600	25,800	33,800
Computers, Furniture & Fixtures	1,273	800	800	1,000	1,000	1,000
Vehicles	800	850	900	950	1,000	1,000
Other Assets	944	500	600	650	700	700
Work in Progress	2,276	-	-	-	-	-
Total Forecast Spending	58,481	91,650	126,500	154,200	106,800	138,900

Forecast Gifting	10,000	88,200	121,700	150,300	103,100	135,200
Net Forecast Capital Spending	48,481	3,450	4,800	3,900	3,700	3,700

Water PNG provided the Commission with its capital works plan as follows.

Table 70: Water PNG submitted capital work plan

Town/District	Specific CAPEX Type	Region	G					Amount in Million Kina		
				Total	2015	2016	2017	2018	2019	2020
LNG Project	Portion 486 Water Supply Development	S	G1	**60.00**	2.50	2.50	7.5	7.5	20.0	20.0
Lae	SCADA	M	G2	**1.50**	0.25	0.25	0.25	0.25	0.25	0.25
Various	WAGIS (Lae, Madang & Kokopo)	M	G1	**1.50**	0.25	0.25	0.25	0.25	0.25	0.25
Wabag	Water Supply Upgrade Development	H								
Wabag	Sanitation Upgrade Development	H	G1	**22.00**	1.0	1.0	5.0	5.0	5.0	5.0
Kundiawa	Kundiawa STP Upgrade	H	G4	**7.00**	3.5	3.5				
Lae	Lae (Malahang Pipeline Extension)	M	G4	**0.00**						
Lae	Lae Sewerage Upgrade	M	G1	**11.00**	0.5	0.5	2.5	2.5	2.5	2.5
Lae	Lae - Nadzab Corridor	M	G1	**35.60**	2.5	2.5	5.1	5.1	10.2	10.2
Kokopo	Kokopo New Bore Dev.	I	G1	**10.00**	1.0	1.0	2.5	2.5	1.5	1.5
Popondetta	Popondetta Network Extn	S		**4.00**	0.5	0.5	1.0	1.0	0.5	0.5
Wewak	Wewak WTP Upgrade	M		**15.00**	2.5	2.5	2.5	2.5	2.5	2.5
Mt.Hagen	Mt Hagen (Intake & WTP upgrade)	H		**20.00**	5.0	5.0	2.5	2.5	2.5	2.5
Alotau	Alotau (Ravens upgrade)	S		**1.00**	1.0					
Popondetta	Popondetta Relocation	S		**2.50**	0.5	0.5	0.75	0.75		
Kimbe	Kimbe (New Bores)	I		**3.00**	0.5	0.5	1.0	1.0		
Madang	Madang FTZ Feasibility	M		**63.00**	3.0	3.0	3.5	3.5	25.0	25.0
Manus	Lorengau Sewerage	I		**23.20**	5.75	5.75	3.10	3.10	5.5	
Kiunga	Kiunga Water Supply Dev.	S		**0.50**	0.25	0.25				
Kiunga	Kiunga Sewerage Dev.	S		**0.50**	0.25	0.25				

Kainantu	Kainantu W/S Dev.	H		**1.50**	1.5					
Finschafen	Finschhafen W/S Dev.	M		**0.40**	0.4					
Maprik	Maprik W/S Dev.	M		**1.00**	1.0					
Wau	Wau WS Development	M		**8.45**	0.225	0.225	6.0	2.0		
Bulolo	Bulolo W/S Development	M		**10.80**	0.30	0.50	6.00	4.00		
Kupiano	Kupiano W/S Dev.	S		**12.00**	2.0	5.0	3.0	2.0		
Angoram	Angoram W/S & Sanitation Dev.	M		**10.50**	0.5	8.0	2.0			
Pangia	Pangia W/S Dev.	H		**8.50**	5.0	2.5	1.0			
Ialibu	Ialibu W/S Dev.	H		**9.50**	1.0	7.5	1.0			
Namatanai	Namatanai W/S Dev.	I		**12.00**	2.0	5.0	5.0			
Aitape	Aitape W/S Dev.	M		**7.45**	0.45	5.00	2.0			
Bialla	Bialla W/S Dev.	I		**17.00**	2.0	8.0	5.0	2.0		
Palmalmal	Palmalmal W/S Dev.	I		**13.30**	0.8	10.5	2.0			
Gehua	Gehua - Alotau	S		**6.95**	0.5	2.0	0.5	4.0		
Malalaua	Malalaua W/S Development	S		**0.00**						
Wapenamanda	Wapenamanda	H		**8.00**	0.5	6.0	1.5			
Yawasoro	Yawasoro W/S& S Dev.	M		**6.50**	0.5	1.0	5.0			
Yangoru	Yangoru W/S Dev.	M		**5.50**	0.5		5.0			
Ahi	Ahi W/S Dev.			**1.00**	1.0					
Misima	Misima W/S Dev.			**0.20**	0.2					
Nawaeb	Nawaeb W/S Dev.			**0.00**						

Kerema	Kerema W/S Dev.	S		**5.00**	5.0					
Kerema	Kerema Sanitation Dev.			**10.00**	7.0		3.0			
Vanimo	Vanimo W/S Dev.	M		**40.00**	2.5	2.5	7.5	7.5	10.0	10.0
Vanimo	Vanimo Sanitation Dev.	M		**16.00**	1.0		5.0		10.0	
Mendi	Mendi W/S Dev.	H		**35.00**	10.0	10.0	7.5	7.5		
Mendi	Mendi Sanitation Dev.	H		**10.00**				2.5	2.5	5.0
Tari	Tari W/S Dev.	H		**14.81**		0.3	0.6	12.5	1.5	
~~Minj~~	~~Minj W/S Dev.~~	~~H~~		~~**0.00**~~						
Banz	Banz W/S Dev.	H		**12.40**			0.30	0.6	10.5	1.0
ABG	Buka Water Supply Development	ABG		**13.50**	1.0	2.0	10.5			
ABG	Buka Sewerage Development	ABG		**25.30**		1.3	17.0	7.0		
Western	Kiunga Town W/S Development	S		**0.50**	0.3	0.2				
Goroka	Goroka W/S Upgrade Dev.	H		**10.00**	2.5	5.0	2.5			
Goroka	Goroka Sanitation Upgrade Dev.	H		**17.00**			1.0	1.0	10.0	5.0
Arawa	Arawa Water Suppply Rehab.	ABG		**20.00**	10.0	5.0	5.0			
Arawa	Arawa Sanitation Rehabilitation	ABG		**35.00**		5.0	10.0	10.0	10.0	
Central City	Central City W/Supply Dev.	S		**9.00**			3.0	3.0	3.0	
Central City	Central City Sanitation Dev.	S		**7.00**					2.0	5.0
	Grand Total			**702.4**	**90.4**	**122.2**	**155.3**	**103.1**	**135.2**	**96.2**

The Commission commends Water PNG for having an extensive plan for capital works and would encourage Eda Ranu to develop a similar plan.

Because most of the capital spending is funded by gifting the actual level of direct capital investment proposed by Water PNG is relatively low. The Commission considers that the level of Water PNG's proposed capital appears to be reasonable considering,

- The size of Water PNG's network and capital assets
- The level of spending in recent years.

On this basis, the Commission has accepted Water PNG's proposal and included this forecast capital costs in the base component of the price path.

Final Determination:

The Commission's Final Determination on Water PNG's capital expenditure to be undertaken in the forthcoming regulatory period:

Year ending 31st December (K '000)	**2015**	**2016**	**2017**	**2018**	**2019**
Capital expenditure (net of capital contributions)	3,450	4,800	3,900	3,700	3,700

10.5. Treatment of Gifted Capital

Capital is normally gifted for particular purposes and usually in circumstances where commercial investment is not viable. The reason a provider of the gifted capital generally provides the capital is to ensure a particular portion of the community has access to the services which that capital enables. The reasons why commercial investment may not be viable might include;

- Prices which customers in an area can afford to pay are not high enough to cover the full cost of the assets required to provide the service.
- There are not enough customers in an area to make service in that area commercially viable.

The Commission makes the following observations about Gifting:

- Gifting of capital is effectively a subsidy.
- The subsidy is provided for the benefit of the service provider's customers and not for the benefit of the service provider itself.
- If the Commission included the cost of these gifted assets in the price path, then the Commission would effectively be removing the subsidy from the regulated price.
- This would have the effect of making customers to pay the full economic cost of the service rather than the subsidised price.
- By including the cost of the gifted asset in the regulated price path, the Commission would be removing the incentive for gifting.
- The effect of including the cost of the gifted asset in the regulated price path means that the gift would be for the benefit of the service provider and not the service provider's customers. This is not the intention of the entity providing the gift.

For the above reasons, the Commission excludes gifted capital or gifted assets from the building block calculation and does not include them in the regulated price path.

10.6. Treatment of Forecast Capital Expenditure

In past determinations the Commission has pre-approved forecast of capital spending and allowed for this in the price path. At the mid-term review, half way through the regulatory period, the Commission then assesses whether or not the capital has been spent on the things that were originally envisaged. The Commission has often been disappointed by this process. Organisations are dynamic and capital development plans are always changing so it is always unlikely that the capital has been spent exactly as envisaged in a forecast.

For example in the 2004 review the Commission approved Eda Ranu's capital plan which included the cost of a new sewerage treatment plant for K112 million. The price path was set to cover this, yet no mid-term review was carried out and no downwards price adjustment was made. Essentially Eda Ranu's customers paid for an asset that was never built.

The Commission has therefore decided to pre-approve spending for minor works but not to pre-approve any major capital spending. Rather the price path will be subject to an annual review where the regulated entity will submit its actual capital spending on major projects to the Commission. Any major capital projects where spending was in excess of the minor works budget will be assessed for prudence by the Commission. If the Commission approves the spending then a price adjustment will be made.

The effect of this may decrease the level of certainty that Eda Ranu and Water PNG have that they will get a return on any large investments they make. However, the Commission is more concerned that planned investment in productive assets is actually spent. Frequently SOE's are failing to invest in their networks in order to adequately meet the needs of their customers and to achieve the required service levels. Therefore as an incentive to actually progress major capital projects, the Commission will only increase prices once the capital for these projects has been spent. To support this approach the Commission has outlined here the sorts of projects that the Commission will approve. These include projects which;

- Increase capacity in line with meeting expected demand
- Increase the reliability of service to customers
- Enable the regulated entity to meet service level targets set by the Commission
- Increase the ability of the regulated entity to measure the performance of its assets.
- Increase the efficient running of the organisation
- Decrease operating costs more than the increased capital cost.

To further increase the level of certainty for Eda Ranu and Water PNG Limited, the Commission will provide a commitment to either party if they approach the Commission prior to an investment. This is discussed further in the next section of this report.

The spending of capital alone is not sufficient for the Commission to raise prices. All capital spending must be directed at achieving one of the above objectives. Examples of capital spending that the Commission will not approve include;

- Failed projects

- Replacement of assets before the end of their economic lives
- Luxury assets such as expensive company cars
- Investments in residential housing

The Commission notes that if the regulated entity spends capital for which the Commission does not approve a price increase, the entity will become disadvantaged and potentially less able to make other investments. In the Commission's view this is normal for any business operating in a competitive market. If a business makes poor investment decisions then it will have to carry the cost of the decisions without being able to recover them from customers. The regulatory process assumes that each regulated entity has a shareholder who wants to maximise the returns from the business. In the case of both Eda Ranu and Water PNG, the only shareholder is the Government. Should the business find itself no longer able to operate because of poor business decisions, then this would be a matter that the business would need to discuss with its owners. The role of the Commission is to protect both the interests of the customer and the interests of the regulated entity. And this does not involve making customers pay for poor management if it occurs.

No submissions were received which made any particular comment on this approach. Water PNG in its submission simply noted that the Commission was proposing to do this. In the absence of any submissions, the Commission has decided to proceed with this approach.

The Commission also notes that neither Eda Ranu nor Water PNG has any projects planned for which it envisages a need to use this process. However, should any projects arise during the course of the regulatory period, there will be an opportunity for either party to have the price adjusted to cover the cost of the project. The Commission hopes that this will encourage both Eda Ranu and Water PNG to consider possible new investments that will improve either the coverage or the quality of their services.

Final Determination:

The Commission decided to pre-approve capital spending on <u>minor</u> works.

10.7. Price Adjustments for large new capital projects

For major capital projects, in excess of K10 million, the Commission is proposing that Eda Ranu and Water PNG can approach the Commission prior to the final commitment for funding of the project to fully describe the project requirements, scope and benefits. The Commission would then provide a commitment to cover the cost of the project in the price path once the project is successfully commissioned. The Commitment might be subject to any reasonable conditions that the Commission saw fit to set.

The Commission understands that Eda Ranu and Water PNG are required to justify any new capital spending to the Independent Public Business Corporation (IPBC). Therefore the Commission would expect that any analysis that the Commission might require would simply be what they would prepare for the IPBC in any case. Therefore the Commission does not expect this process to be particularly onerous for the Eda Ranu and Water PNG. However, the Commission would expect to see a business case which includes a financial cash flow analysis of the proposed investment and its alternatives, plus a description of the benefits to customers and to the business.

When the project is completed, Eda Ranu and Water PNG would then provide evidence of actual costs and make provision for the Commission to inspect the new assets. Once the Commission is satisfied that the project has been successfully completed and that all specified conditions have been met, the Commission will then adjust water and sewerage prices as part of the annual price review.

Table 61 illustrates the calculation the Commission will use to establish the price adjustment for a major capital investment.

Table 71: Example of a price adjustment for a major capital investment

Year		2016	2017	2018	2019
Row 1	Project Asset Value (K Million)		50	49	48
Row 2	Project Depreciation (K Million)		1.00	1.00	1.00
Row 3	Project Return (K Million)		5.10	4.99	4.89
Row 4	Annual Project Cost (K Million		6.10	5.99	5.89
Row 5	Volume (million Kilolitres)		20	21	22
Row 6	Price increase (Toea / kilolitre)		0.305	0.285	0.268

Row 1 Project Asset Value: Each year value = the previous year value minus the Project depreciation amount shown in the row 2.

Row 2 Project Depreciation: This is the project asset value divided by the economic life. The amount is the same every year.

Row 3 Project Return: This is the Project Asset Value times 0.1019 (the WACC).

Row 4 Project cost: In any year the project cost = Project Depreciation + Project Return

Row 5 Volume: This is regulatory volume specified in this report. The Commission may elect to only apply the price increase to particular prices, in which case the volume would be adjusted to reflect the volumes applicable to the relevant prices.

Row 6 Price increase per kilolitre: This is the project cost for that year divided by the regulatory volume for that year.

The Price increase will be added to the base price component.

A CPI adjustment will be made at the end of each year. The adjustment will be made to all future years for that project until the end of the contract. The following table illustrates how this adjustment will be done.

Table 72: Consumer Price Index adjustment for 2016 – 2019

Year	2016	2017	2018	2019
Price increase (Toea / Kilolitre)	0	0.305	0.285	0.268
2017 CPI increase			5%	5%
Price used in 2018			0.300	0.281
2018 CPI increase				4%
Price Used in 2019				0.292

At the end of any particular contract year, this calculation will be done for all capital projects successfully completed in that year.

Final Determination:

Eda Ranu and Water PNG to apply to the Commission during the regulatory period to have their tariffs adjusted to cover major capital works.

11. Determination of the Regulatory Asset Base (RAB)

In both the 2004 and the 2009 water and sewerage pricing reviews the Commission has used a rollover of the previous price reviews regulatory asset base. In the 2009 review the Commission did evaluate the possibility of using other methods, and proposed in the Draft Report to use a form of optimal deprival value to determine the RAB. However for a number of reasons in the Final Report the Commission determined to roll over the RAB from the previous review.

This means that the RAB for both Eda Ranu and Water PNG has not been reviewed in any depth for more than 10 years. The Commission therefore considers that a closer inspection is required.

Following the publication of the Draft Report, both Eda Ranu and Water PNG provided the Commission with information about the replacement cost of parts of their network. In particular this included;

- The approximate replacement cost of mains, including pipes, valves and installation costs.
- The length of mains in their network.
- The number of valves of various types in their networks.

The Commission only collected this information for the water networks and did not evaluate the cost of the sewerage network. The information provided by Water PNG did not include all the geographic areas in which it provides service.

The Commission has used this information to calculate a total replacement cost for this portion of each entity's assets.

11.1. Eda Ranu Water Network Replacement Costs

Table 73: Replacement cost of pipes in Eda Ranu's Water Network

Pipe Size (mm)	Length (km)	Replacement Cost (labour and materials) Kina / km	Replacement Value (Kina Millions)
100 mm Pipe	198.4	500,000	99
150 mm Pipe	153.3	600,000	92
200 mm Pipe	29.5	700,000	21
250 mm Pipe	39.6	800,000	32
300 mm Pipe	6.2	900,000	6
375 mm Pipe	4.5	1,100,000	5
400 mm Pipe	0.3	1,300,000	0
450 mm Pipe	5.7	1,700,000	10
500 mm Pipe	3.9	1,850,000	7

525 mm Pipe	29.4	2,000,000	59
600 mm Pipe	28.8	2,400,000	69
750 mm pipe	14.0	2,750,000	39
800 mm pipe	1.4	3,100,000	4
900 mm Pipe	3.1	3,400,000	10
1000 mm Pipe	4.1	3,800,000	15
1050 mm Pipe	-	3,950,000	-
1100 mm Pipe	2.5	4,100,000	10
1200 mm Pipe	4.9	4,500,000	22
Total	529		500

Table 74: Replacement cost of valves and metres in Eda Ranu's Water Network

	Number in Network	Replacement Cost (labour and materials) Kina/Item	Replacement Value (Kina Millions)
Closed Valve	96	3,000	0.3
Reflux Valve	2	4,000	0.0
PRV	2	20,000	0.0
Air valve	8	10,000	0.1
End Cap	14	500	0.0
Pump	10	200,000	2.0
Washout Valve	38	3,000	0.1
Flow and Pressure measuring point	31	40,000	1.2
NRW Meter Point	48	200,000	9.6
Meter	5	100,000	0.5
Valve Without Gate	1	3,000	0.0
Change in Material/Diameter	6	6,000	0.0
Open Valve	220	3,000	0.7
Customer Premises Metre (15mm)	65,000	650	42.3
Fire hydrants	2,512	750	1.9
Total			58.7

The information provided to the Commission indicates that it would cost about K560 million to replace Eda Ranu's water network. Using the pre-tax WACC calculated in this report and the asset lives shown in the following table, this equates to annual cost of capital of about K45 million.

Table 75: Cost of Capital Calculation

		Pipes	Valves & Metres
Replacement Value	K million	501	59
Economic Life	Years	50	25
Annual Depreciation	K million	10	2
Current Average Age	Years	19	22
Cumulative Depreciation	K million	190	52
Current Value	K million	310	7
Pre Tax WACC	%	10.19%	10.19%
Return on Capital	K million	32	1
Cost of Capital	K million	42	3

The asset register information provided to the Commission by Eda Ranu indicates that the water assets have a current depreciated value of about K2 which equates to an annual capital cost of less than K1 million on these assets.

Table 76: Comparison of RAB information to Replacement Costs

	RAB information	Replacement Cost
2014 Value of new asset (K million)	67	560
Current Depreciated Value – 2014 (K million)	2	317
Annual Depreciation (K million)	0.6	12
2014 Cost of Capital (K million)	0.8	45

From this the Commission observes that the replacement cost of the assets as estimated by Eda Ranu is substantially higher than an inflated view of historic costs would indicate. There are two possible reasons for this.

1. The Eda Ranu asset register may not include all the historic spending upon these assets. This is quite likely, as many of these assets are old and ownership of these assets has changed hands since some of them were originally built.
2. The cost of building these types of assets has increased in real terms.

11.2. Water PNG Network Replacement Costs

Water PNG provided information about various parts of its network. However the information provided was unclear and Water PNG staff were generally not available to answer questions about the information Water PNG had provided. Therefore the Commission did not estimate replacement costs for Water PNG's network.

11.3. Chosen Approach to setting RAB

In setting regulated prices the Commission must ensure that;

- Regulated entities can continue to finance investment in the infrastructure they require to deliver their services,
- And that they have incentives to do so.

This means that the prices must be high enough to finance the required investment and to reward any investment with a fair return that reflects the value of that investment.

For this reason the Commission must consider just how important it is for prices to be able to cover the replacement of old assets. The approach generally followed by the Commission sets prices on historic depreciated costs inflated into today's values. The dynamics of this is that prices will be lower when assets are older. However as assets are replaced, then prices will need to increase to cover them. In monopoly markets, this is a relatively straight forward exercise for a regulator. The down side is that when large portions of the asset base are replaced, customers will see big increases.

In the case of Eda Ranu, it appears prices might need to be 10 times higher to cover a theoretical depreciated replacement cost. This is clearly not something that customers can afford.

Therefore the Commission has decided to continue to value assets based upon depreciated historic costs inflated into today's currency value.

Both Eda Ranu and Water PNG's asset registers had some limitations. Eda Ranu did not identify the date of purchase and this had to be estimated based upon the accumulated depreciation and the depreciation rate used. It was assumed that all assets in the register were still in use and that no assets still in use were not in the register. Any assets that were fully depreciated for which no purchase date was available, were assumed to be built in 1975. 1975 was chosen, as this is a time when there was significant infrastructure development in the PNG.

Water PNG has also not electronically updated its asset register for the last three years. For these three years the Commission relied upon the information Water PNG provided about actual capital spending in its submission.

The roll forward method uses the following steps.

For each year starting from the year of the oldest asset;

- Add the opening balance
- Add new additions at historic cost
- Subtract depreciation
- To give the closing balance for the year.
- The next year's opening balance is calculated as the previous year's closing balance inflated by the inflation rate calculated from the CPI index.

Depreciation was calculated as follows.

- Straight line depreciation was used.
- Depreciation on new assets was assumed to start half way through the year.
- The amount of depreciation each year was calculated using a running total.
- The running total was inflated each year using the calculated inflation rate described above.
- As new assets were added the appropriate straight line depreciation amount was added to the total.
- If assets were disposed of, then the appropriate inflated depreciation rate was removed from the running total depreciation amount.

Economic lives used were chosen for individual asset types. Then for each major asset class a weighted average life was calculated based upon the weighting of the historic cost of assets in the asset register. The economic lives used are as listed in the following table. These are consistent with those used in other recent determinations made by the Commission.

No formal submissions were made in regard to economic lives. However Water PNG did make some verbal comments that it did not think assets in PNG would last as long as this. However the Commission has generally observed that in practice assets such as these do last this long and continue to be used by businesses in PNG.

Table 78: Economic lives of assets

	Economic Life (Years)
Building	50
Fence	20
House	50
Communications equipment	5
IT	4
Office Fit out	10
Office Furniture	10
Forklift	10
Truck	10
Vehicle	10
Building services	10
Backhoe	10
Equipment	10
Pump	10
Test Equipment	5
Sewerage Mains	70
Manholes	70
Pump Station	70
Reticulated Sewer	70

Sewer Lagoon	70
Trunk Sewer	70
Water Distribution Main	70
Water Reservoir	100
Water Reticulated Main	70
Water Service Main	70
Water Site works	70
Water Trunk Main	70

Final Determination:

The Commission has adopted the roll-forward approach to determine the opening value of RAB for Eda Ranu and Water PNG to use as the base for roll forward of RAB in each year of the next regulatory period.

11.4. Land Assets

Land assets are a special class of asset. They do not normally depreciate. Indeed in PNG at present the value of land appears to be increasing in real terms.

In the Draft Report the Commission proposed that land be recognised as an asset as part of the regulatory asset base. Furthermore it was proposed that any gains in the value of land would be recognised by the Commission as income.

The Commission received various comments on this approach both in this and in other determinations. The Commission has therefore reconsidered its treatment of land. The following table provides an analysis of the options.

Table 79: Analysis of options available in the treatment of land in the RAB

Options	Comments & observations
1) Excluded land entirely from the RAB	This does provide any return to the regulated entity. The investment in land is a legitimate cost to the business and is tying up capital. Such an approach would create an incentive for the entity to sell land and rent it.
2) Include land in the RAB at historic cost. Do not inflate it with CPI.	This provides the entity with a return on its actual capital investment. It avoids "windfall gains", whereby customers pay higher prices due to inflation in land prices, even though

	the company has made no further investment. It does not recognise the opportunity cost of land. It creates the perverse incentive for the regulated entity to sell land and buy it back, to record it at a higher value in its books.
3) Include land in RAB at current value based upon market prices.	Provides a return based on the opportunity cost of the land. It has the effect of providing windfall gains to the regulated entity whereby its prices go up even though it has made no further investment.
4) Include land in RAB at current value based upon inflation of historic cost.	Provides a return based on the opportunity cost of the land. It has the effect of providing windfall gains to the regulated entity whereby their prices go up even though they have made no further investment. However all the company's non-land assets also have the same effect.
5) Include land in the RAB at current value and treat increases in land value as income.	Provides a return that is lower than historic cost in the earlier years. At an annual inflation rate of 5%, it will take 20 years before returns exceed the returns using the historic cost method (i.e. option 2). In effect it does not reflect the cost of capital invested. It does not recognise the opportunity cost of continuing to own land.

The Commission notes that in competitive markets, a company must receive a return on all its capital invested. If market prices are not high enough to cover the cost of land at current values, then the company will have an incentive to sell the land and close down its business or perhaps relocate to another location, if this is a viable option.

The Commission understands that most of the land on which Eda Ranu's and Water PNG's network assets sit, is not owned by them or has been gifted to them. However there are some circumstances where they are forced to acquire land in order to provide their services.

The downside of using the inflated value is that it does produce a windfall gain for the regulated entity. Their prices go up each time land values go up, even though they have not invested any further. However this is true of all assets in RAB. The only difference is that land does not depreciate and so the effect of inflation is more noticeable on land than on other assets.

On balance the Commission has decided to adopt option 4, because it

- Provides a fair return on investment.
- It recognises the opportunity cost of owning land.
- It removes any perverse incentive to sell and buy back land.

By adopting the approach the Commission will not recognise gains in land value as income.

The Commission notes that it will not include any land that is gifted to the regulated entity in the regulatory asset base.

Final Determination:

The Commission's Final Determination is to Include land in the RAB at current value based upon inflation of historic cost. The Commission will exclude any gifted land asset from the entity's RAB.

11.5. Eda Ranu Regulatory Asset Base

Using the approach described above, the value of Eda Ranu's opening RAB is as shown in the following table:

Table 80: Eda Ranu Opening Regulatory Asset Base

(K 000's)	Opening Balance	2014 Depreciation
Building Assets	4,046	73
Furniture & Fittings	201	38
Motor Vehicle	6,315	783
Office Equipment	2,827	522
Plant & Equipment	1,643	644
Sewerage	46,788	911
Water	208,982	3,379
Land	8,367	
All Assets	279,167	6,439

Eda Ranu's Opening RAB to apply in the forthcoming regulatory period is K297.167m

11.6. Water PNG Regulatory Asset Base

Gifting

Water PNG has over the past decade received K214 million of gifting. Gifting is generally provided to develop water or sewerage services in areas where it would not be commercially feasible to do so. Generally, when gifting is received it is the intention of the donor that the capital will establish the infrastructure which can then be operated by the

local operator and that customers will only pay for its upkeep but not its initial development.

In many cases there are some issues with this.

- The area may have very few customers who can afford to pay enough to even cover the operating costs and maintenance costs.
- Sometimes assets are gifted by particular countries. Later it can be difficult to find parts to maintain these assets. Language barriers can also make it hard to communicate with these countries to find out how to maintain assets.

In the Commissions view, where funding for capital spending has been received, or the assets themselves have been gifted, then the value of these assets should not be included in the regulatory asset base.

- The price path should not include a return on these assets
- The price path should not include the return of capital for these assets.
- The only cost included in the price path for these assets should be the operating costs.

Water PNG has provided the Commission with the sums which have been gifted to it over the years. However the Commission does not know exactly which assets these sums have been used to purchase. The Commission understands that gifted assets are recorded in Water PNG's asset register. However in some years the gifting amount is more than the historic cost amount recorded in Water PNG's asset register.

Therefore the Commission has treated grants as a separate asset class and calculated an opening balance, closing balance and depreciation amount for each year using the rollover method. This has been deducted from the other balances to produce the RAB.

The Commission also asked Water PNG about land acquisition. Water PNG responded that;

- "*Normally if land belonged to the state we would have got it for free. Otherwise any compensation paid will be out of funds provided by the state for the project*."[4]

For this reason not all land has been included in the RAB.

Residential Housing

As already discussed in Section 10.2 the Commission does not generally support investment in residential housing for staff. This was also emphasised in a meeting between the Commissioner and Chief Executive Officer and representatives from Water PNG. The Commission has removed K3.7 million of housing assets from Water PNG's RAB.

Regulatory Asset Base

Using the above approach the Commission has determined that the opening RAB for Water PNG be as shown in the following table.

Table 81: Water PNG Opening Regulatory Asset Base

	Opening Balance	2014 Depreciation
Buildings	20,700	806
Civil Works	276,596	5,213
Computers, Furniture & Fixtures	2,484	570
General Plant	114	32
Pipelines	237,940	5,504
Plant & Equipment	15,169	2,462
Vehicles	5,712	1,055
Tools	1	1
Meters	3,802	416
CWIP	20,832	2,042
Other	2,560	36
Total Asset Value	585,909	18,138
Less Grants	248,466	4,722
Opening RAB	332,755	13,416

Water PNG's Opening RAB to apply in the forthcoming regulatory period is K332.755m

12. Weighted Average Cost of Capital

The Commission received no submissions regarding its proposed calculation of the weighted average cost of capital (WACC). The Commission has therefore determined to use what was proposed in the Draft Report.

The WACC calculation formula is outlined below;

$$\text{Post-tax WACC} = R_e * E / V + R_d * (1-t) * D / V \quad \textbf{(1)}$$

where:

R_e = return on equity;

R_d = return on debt;

t = tax rate;

E = market value of equity;

D = market value of debt; and

V = market value of business (i.e. D + E).

The return on debt (R_d) is calculated by adding a debt margin to the risk-free market rate.

$$R_d = R_f + DM \quad \textbf{(2)}$$

where:

- R_f is the risk free rate in PNG; and
- DM is the debt margin.

The return on equity (R_e) as indicated in the above WACC formula is derived by using the CAPM and the formula is outlined below;

$$R_e = Rf_{international} + \beta_e \times (R_m - R_f) \quad \textbf{(3)}$$

where:

- $Rf_{international}$ is the risk free rate;
- β_e (equity beta) is a measure of correlation between a business's risk and that of the overall market;
- R_m is the market rate of return;
- R_f is the risk free rate in PNG; and
- $(R_m - R_f)$ is the Market Risk Premium ("**MRP**").

The international risk free rate ($Rf_{international}$) is calculated as follows;

$$Rf_{international} = [(1+ R_f) / (USA_{CPI}) \times (1+PNG_{CPI}) \times (1+CRP) - 1] \quad \textbf{(4)}$$

where;

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

According to the CAPM formula, the return on equity for a particular business is derived by adding the international risk free rate to the product of the equity beta and the Market Risk Premium (i.e. difference between the market return and the risk free rate). The margin, that is the equity beta (β_e), reflects how risky a business is relative to the overall market.

The Commission prefers using the Monkhouse formula as shown below to calculate the equity beta.

$$\beta_e = \beta_a + (\beta_a - \beta_d) \times \left(1 - \frac{R_d}{(1+R_d) \times t}\right) \times \frac{D}{E} \quad \textbf{(5)}$$

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

Given the above equations for the calculation of the WACC, the Commission has to decide on the range of parameters used in the WACC calculation. These include;

- Risk Free Rate;
- Inflation;
- Debt margins;
- Taxation;
- Market Risk Premium;
- Equity beta; and
- Gearing ratio.

12.1. Risk free rate

The risk free rate of return represents the rate of return on a security, or portfolio of securities, that has no default risk and is not correlated with returns on other assets in the economy. The general accepted approach by regulators is to use the yield from certain long term government securities to generate an estimate of the risk free rates. These instruments are commonly accepted as the lowest risk debt instrument observable, and as a result are viewed as reasonable proxies for a 'risk free' rate of return.

Due to the lack of an appropriately traded government bond in PNG, in the 2009 Review the Commission used the 10-year US government bond rate plus an allowance for country risk

premium and an adjustment for the difference between US and PNG Inflation. The Commission has decided to adopt a similar approach for this review, but with some minor changes. Because of the nature of the businesses under review, where the average asset life duration is in excess of 50 years, a 10 year bond appeared too short. As information about 20 year bonds is available the Commission has chosen to use these to set the risk free rate.

The formula (4) above is used to estimate the risk free rate. As indicated in the formula, the US risk free rate is used as an initial proxy to determine the international risk free rate. The Commission has used US bonds with a 20-year term to maturity as a proxy to calculate the risk free rate for purpose of determining the WACC.

Using the data on the US Treasury's website and taking a one month average (March 2014) of the 20 year US Treasury yield gives a rate of 3.35%.

Tables showing these yields can be extracted from *http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldAll* .

12.2. Inflation

The above risk free rate of 3.35% includes an expected rate of inflation which poses a problem as PNG has a different inflation expectation than the US. Therefore we firstly need to adjust the US risk free rate for this difference in country inflation expectations.

The following observations were noted on the US inflation rate:

- Current inflation is at 1.5%
- Long term inflation expectation is 1.8% (countryeconomy.com)
- 20 year indexed Treasury yield spread – 2.3%

Considering this the Commission is proposing to use 2.0% for US inflation as a midpoint between the Treasury indexed spread and the long term inflation expectation.

For PNG the following data was available:

Table 82: PNG inflation expectation

	2010	2011	2012	2013	2014	2015	2016	2017	Average
PNG Actual Inflation	5.6%	8.6%	3.6%	2.8%					
Bank of PNG (Monetary Policy Statement)					6.50%	5.5%	4.0%		**5.2%**
PNG Budget (2014)					5.80%	4.5%	5.2%	5.2%	**5.2%**

The Commission has decided to use 5.2% for PNG inflation.

12.3. Country Risk Premium

Having estimated the inflation, the Commission has to estimate the Country Risk Premium ("**CRP**") which will be applied to the derived US treasury securities yield that reflects PNG inflation. CRP reflects risks inherent to investing in different sovereign territories. It is close to zero for most developed and stable countries, but can be substantially higher in emerging markets. Generally, it can be attributed to variations in the degree of economic, political, financial and institutional stability in different countries.

In previous determinations, the ICCC has used a CRP of 3%. The Water and Sewerage determination (2009), the PNG Harbours determination (2009) and the PNG Power determination (2012) all used 3%.

This rate was originally set by Rothschild's at the time of the 2001 privatisation processes. It was considered to be the rate which was appropriate over the long term in PNG, despite other estimates at the time generating a much higher CRP. The ICCC does not possess a copy of any report from Rothschild's which explains the basis for this rate.

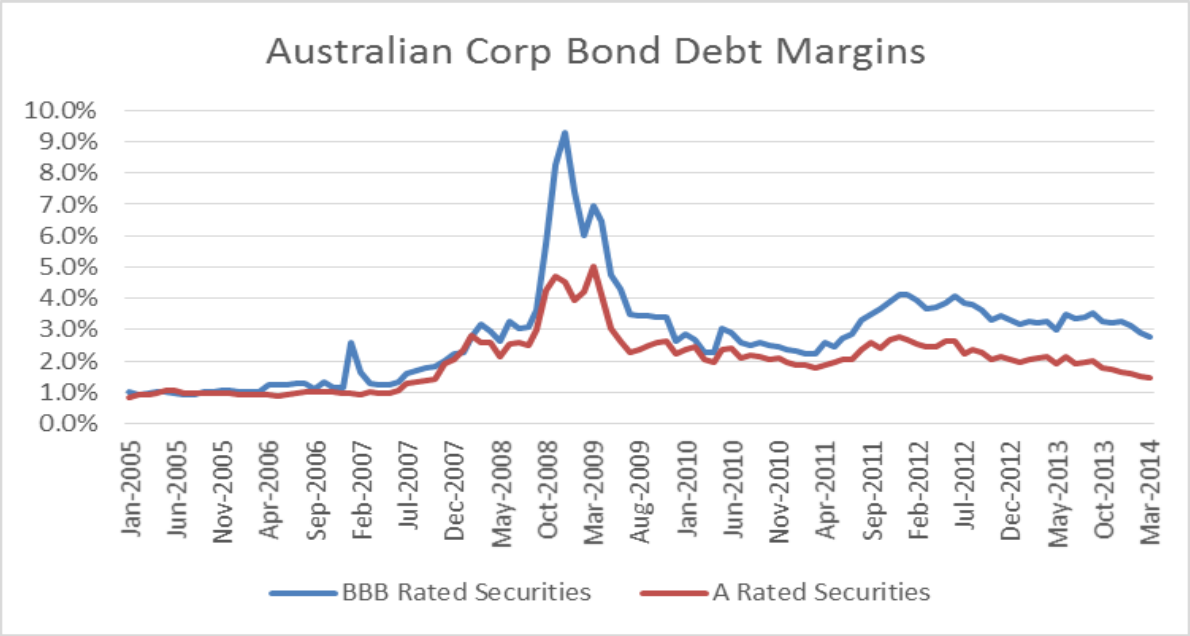
In 2009, the ICCC commissioned Price Waterhouse Coopers ("PwC") to provide advice on the country risk premium. PwC provided the ICCC with estimates of the range of CRP for PNG over the six quarters to the end of March 2009. The PwC estimates ranged from 2.5% to 8.1% depending on the quarter. However, the ICCC was concerned that this range was heavily skewed by the impact of credit market dislocation associated with the Global Financial Crisis (GFC) occurring at that time. Therefore the ICCC sought the council of Ross Garnaut formerly of Rothschild's. Professor Garnaut suggested that in his experience the long term average CRP in PNG was 3%. At that time, given the amount of capital deployed by both companies in PNG, the ICCC decided to defer to Professor Garnaut regarding the CRP.

The Commission has determined that there is value in remaining consistent with previous determinations and has therefore continued to use 3% in this price review.

12.4. Debt Margins

The Independent Authority and Pricing Tribunal of New South Wales has recently issued a fact sheet (*New Approach to Estimating the Cost of Debt: Use of the RBA's Corporate Credit Spreads - February 2014*) outlining a new data set it is proposing to use to establish a regulatory debt margin. This is based on credit spreads for Australian non-financial corporate bonds and is compiled by the Reserve Bank of Australia (RBA). The graph below shows the credit spreads or debt margins against Government Securities for the last nine years.

Figure 10: Australian corporate bond debt margins



The above graph shows a sustained step change in debt margins after the GFC, in part due to the continuing Euro crisis. Spreads have also increased between A and BBB rated securities, evidence of a sustained transition to quality.

Based on this data the average BBB debt margin for March 2014 was 2.8%.

Table 83: Average BBB debt margin

BBB-rated securities	**Spread to Aust. Government Bonds**			
Units	%'s			
Tenor	**3 year**	**5 year**	**7 year**	**10 year**
Mar-2014	1.71%	2.03%	2.34%	2.77%

(*Source:* http://www.rba.gov.au/statistics/tables/index.html)

It would seem reasonable, in the first instance, to adopt this metric as the estimation of debt margin for the pricing reviews.

In consideration of the above margin, a summary table below captures the debt margins used in the previous determinations compared to that proposed above.

Table 84: Summary of debt margins used in previous determinations against the proposed debt margin

	Ports (Dec 2009)	**Water (Dec 2009)**	**Petroleum (Oct 2010)**
Debt Margin - Previous	4.0%	2.7%	3.1%

Methodology	Based on AU corporate bonds with a BBB+ credit rating and a 10-year term to maturity. The PWC report calculated the rate at 3.1%.	Estimate by PWC based on 10 yr AU BBB+ Corp bonds and recent regulator estimations.	Based on the PWC calculation for Ports.
Proposed 2014			
Methodology	Australian 10 Year Non-financial BBB Corporate Bond Spread Against CGS – one month average.		
Debt Margin	**2.8%**		

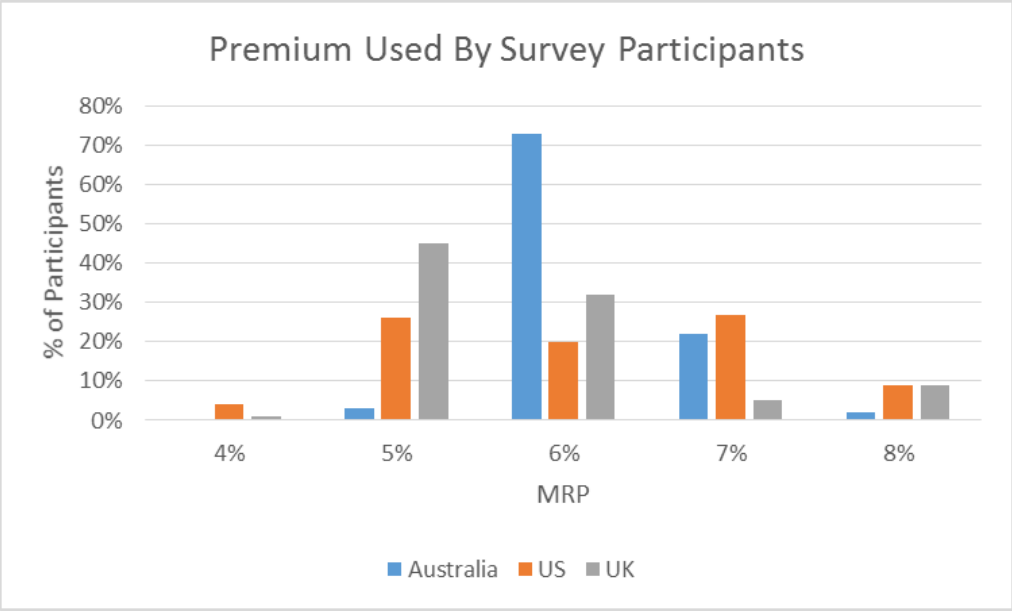
Therefore the Commission has decided to use 2.8% as the debt margin.

12.5. Market risk premium

The market risk premium ("**MRP**") reflects the additional return over and above the risk free rate that an investor would expect to earn by holding a well-diversified portfolio of assets.

Survey evidence is one way in which forward-looking expectations of market participants can be observed. In fact, since the risk premium is an average of the premium demanded by investors, surveying investors about their expectations for the future can be a valid approach.

Figure 11: Market risk premiums used by KPMG survey participants



Source: KPMG - Valuation Practices Survey 2013.

The chart above shows that survey participants are for Australia, predominantly using an MRP of 6%. For the US market, the spread is more evenly across the 5%, 6% and 7% while for the UK market the predominant rate used is 5%.

The MRP section of the KPMG survey report referenced above concludes '*…there is good reason to believe that a more appropriate figure for Australia looking forward would be closer to 5%. While 6% is currently the preferred risk premium for Australian regulators, this is currently under review*.'

The Commission has also considered other methods of estimating the MRP including measuring historic premiums and implied premiums.

There is currently no common ground on which to base a clear argument for moving from the 6% MRP used by the ICCC in past determinations. This position is also supported by the fact that the majority of practitioners and regulators in Australia are still using a 6% MRP.

The Commission has determined to use an MRP of 6.0%.

12.6. Taxation

In previous determinations, the Commission has adopted a statutory tax rate of 30% in the WACC calculation. 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. Hence the Commission has determined to continue to use a tax rate of 30%.

12.7. Equity beta

The equity beta (β_e) represents the degree of riskiness of a business compared to the overall market. Equity beta is estimated by assessing the movement in a particular business's share price relative to the average of the overall market. Therefore, the equity beta indicates the level at which the business's risk correlates with the risk of the market as a whole. A low equity beta (less than 1.0) indicates that the stock is less volatile or less risky than the market in general, and reacts less to movements in the average market. An equity beta of 1.0 means that the stock moves in line with the market or is as risky as the market itself and an equity beta greater than 1.0 means that the stock is more sensitive to any moves by the market. Ultimately, the equity beta incorporates the market's perceptions of the risk of that business in comparison with the rest of the market.

The value of equity beta has a significant effect on the value of WACC. There is a positive relationship between the value of equity beta and the WACC because the WACC increases as the value of equity beta increases. This is because increase in the value of equity beta indicates that there is increase in the level of the sensitivity of the particular stock to movements in the overall market conditions thus indicating an increase in the level of risks. Therefore the WACC has to increase as a result to compensate investors in bearing the additional risk by investing in the business.

The following table lists sources and resultant beta for water companies. This is the same list as used in the gearing estimation.

Table 85: Sources and resultant beta for water companies

	Description	Asset Beta	Source
Ofwat	Water and sewerage sectors in England and Wales. Consists of 34 privately owned companies.	0.4 - Ofwat (noted avg measured betas of 6 UK water utilities was ¬ 0.25)	Cost of capital for PR14: Methodological considerations- PWC UK July 2013
Govt. of Sth Aust.	Water & Sewerage SA	0.36	Regulatory documents retrieved from relevant websites
IPART	Bulk Water NSW	0.37	
QCA	Water Queensland	0.27	
ESC	Water Pricing Review	0.27	
Damodaran	97 Companies in the Global market – under Damodaran's Utility (water) category	0.58	Refer Appendix 2
ICCC	Water and Sewerage Price review	0.35	Water Sewerage Review Final Report- 17Dec09

The table above shows a general consistency other than the Damodaran sourced data. The difficulty with the Damodaran data is the potential wide definition of companies that fall under the 'Utilities (water)' category. As such the suggestion is to use the UK and Australian sourced data.

The average of the above asset betas (exclusive of the Damodaran and ICCC data) is 0.33.

The Commission has determined to use an asset beta of 0.33.

12.8. Gearing ratio

In order to construct the WACC, a gearing ratio needs to be determined to apply the appropriate weights within the WACC. Gearing is defined as the proportion of debt to equity in the total capital structure of the business. The Commission could use a long–term industry average for the gearing levels, or a capital structure deemed to be an efficient structure given the risks faced by the business rather than the actual ratio faced by the regulated entity. This approach is usually adopted by regulators to ensure that the regulated business is not rewarded for inefficiency in its capital structure.

The following table lists sources and resultant gearing levels for the same set of water companies which was considered for the equity beta.

Table 86: Sources and gearing levels for water companies considered for the equity beta

	Description	Gearing %	Source
Ofwat	Water and sewerage sectors in England and Wales. Consists of 34 privately owned companies.	57.5% - Ofwat (noted 63% - average actual gearing for these entities over the last 10 years)	Cost of capital for PR14: Methodological considerations- PWC Uk July 2013
Govt. of Sth Aust.	Water & Sewerage SA	55% - Estimate of efficient gearing level.	Regulatory documents retrieved from relevant websites
IPART	Bulk Water NSW	60% - Estimate of efficient gearing level.	
QCA	Water Queensland		
ESC	Water Pricing Review		
Damodaran	97 Companies in the Global market – under Damodaran's Utility (water) category	34%	Refer Appendix 2
ICCC	Water and Sewerage Price review	60% - Estimate of efficient gearing level.	Water Sewerage Review Final Report- 17Dec09

The table above shows a general consistency other than the Damodaran sourced data. The difficulty with the Damodaran data is the potential wide definition of companies that fall under his 'Utilities' (water) category. As such the suggestion is to use the UK, Australian and past ICCC sourced data.

There is a consistent use of a gearing level around the 60% mark. The ICCC have used this in its past determinations, and there is nothing to indicate this approach should change.

The Commission has determined to continue using 60% as the gearing for Water.

12.9. Summary of WACC parameters

Having considered all the above, the following are the parameters the Commission is proposing to use.

Table 87: Summary of WACC parameters proposed

US Risk Free Rate	3.35%
US Inflation	2.0%
PNG Inflation	5.2%
Country Risk Premium	3%
PNG Risk Free Rate	11.2%
Market Risk Premium	6.0%
Debt Margin	2.8%
Return on Debt	14.0%
Tax Rate	30%

Gearing	60%
Asset Beta	0.33
Equity Beta	0.81
Return on Equity	16.0%

This results in the WACC as shown in the following table

Table 88: Proposed weighted average cost of capital

WACC (Post Tax- Nominal)	11.1%
WACC (Pre Tax- Nominal)	15.9%
WACC (Post Tax- Real)	5.7%
WACC (Pre Tax- Real)	10.19%

The Commission has determined to use a pre-tax real WACC of 10.19% and has applied this return to the assets in the building block model.

12.10. Submissions

The National Research Institute wrote in its submission:

> "*The proposed use of WACC in the Draft Report for the forthcoming regulatory period is applicable. However it seems unclear and requires substantive information. For example, there are no illustrations in the Draft Report of the rationale or specific factors that make strong case to employ WACC on PNG water utilities. Although the parameters are define and benchmarked against best regulatory practices, it appears additional insights necessary on the subject is required.*
>
> *Employing WACC into specific regulatory jurisdiction is equally important. Hence, it is commendable to use one that fittingly integrates well with Water PNG and Eda Ranu circumstances rather than a 'one size fits all' approach. This has potential to bring forth maximum public benefit through fair returns on capital, reflection of genuine costs and efficient pricing outcomes, and appropriate incentives to maintain a commercial focus in the operations of Water PNG and Eda Ranu"*[7]

The Commission notes the support of the National Research Institute for the use of WACC specific to Eda Ranu and Water PNG. The Commission notes that its use of WACC and the method used to calculate it in this report are the same as all other instances where the Commission has used it in the past. Arguments for or against particular inputs into the WACC calculation can be complex. The Commission has tried to consistently apply them and describe how it has done so.

[7] NRI, *Submission to ICCC on Pricing and Regulatory Review on Water and Sewerage Services*, November 2014, Page 4.

The Commission did not see any need to specifically justify the use of WACC in this report, as it is standardly used in the building block method around the world. And the building block method is commonly used to establish the "Cost of a service" by regulators.

Final Determination:

The Commission has adopted a pre-tax real WACC of 10.19% and has applied this return to the assets in the building block model.

13. The form of regulation

Section 4 of this report determined the need to continue to regulate Eda Ranu and Water PNG. This section considers the form this regulation should take.

13.1. Background

In the 2009 review the Commission chose to move away from price regulation using a Maximum Average Price approach towards a maximum allowable revenue approach. Since then operating costs for both Eda Ranu and Water PNG have increased significantly faster than inflation, yet volumes have been relatively static. The Commission is therefore reviewing the effects of this change and has also briefly considered alternative forms of regulation.

In its submission the National Research Institute made the following comments.

> *"The Draft Report proposes a new form of regulation that would induce strong incentives to Water PNG and Eda Ranu to increase volumes and customers. It will be interesting to see whether there is also sufficient incentive for Water PNG and Eda Ranu to achieve cost efficiencies under the proposed regulatory model. However, the fact that the analysis is based on mere assumptions puts its credibility in question – which could bring into disrepute any decisions that may be subsequently reached.*
>
> *NRI therefore suggests that ICCC should undertake a more rigorous analysis of the subject with the aim of outlining the key features of the regulatory model and identifying the rationale for its proposed approach. Whether the proposed model is benchmarked against any best practising regulator model for water and other utilities and how PNG's case fits well into the new arrangement are areas that should be discussed in this the Draft Report."*[3]

The Commission thinks that the National Research Institute have raised some valid issues and asked some valuable questions and would like to address them. The Commission believes that the National Research Institute has raised the following major issues.

- Has the Commission conducted a rigorous analysis of the form of regulation?
- Whether the proposed model is benchmarked against any best practice regulator model for water utilities?
- Does the form of regulation provide incentives to achieve cost efficiencies?
- Whether or not the assumptions used in the Commission's analysis of the two forms of regulatory pricing will influence the conclusion?

13.2. Alternative forms of regulation

There are a range of forms of regulation available to regulators and many papers have been written which describe them. [8] However the following table provides a brief overview. The approaches can generally be classified as being direct or indirect forms of regulation.

Table 89: Ranges of regulatory options

Cost of service (rate of return)	Prices are set by the regulator to fully recover the entity's costs.	Provides assurance to consumers that prices are only high enough to cover costs. Ensures that revenues are sufficient for the entity to continue to operate. Does not create incentives to reduce costs. But instead creates incentives to over invest. Tends to provide the regulated entity with guaranteed returns.
Profit Sharing	Allows the entity to keep only a portion of the earnings it receives in excess of a given level.	Still involves estimation of the cost of service but the focus on profit may provide incentives to reduce costs.
Incentive	Provide incentives for service providers to continuously seek out cost efficiencies. Incentives can take a variety of forms. This usually involves allowing entity to keep at least some of the efficiency gains as higher profits.	There is an incentive to run down assets so performance measures are crucial to guard against this. Overtime as an industry becomes more efficient there is a tendency to converge on "Cost of service" regulation.
Benchmarking	Prices are set on the basis of comparisons of various measures with other comparable service providers.	It may often be difficult to find comparable companies or to gain access to information about them. The method may result in prices that are lower than the full cost of providing services.
Pricing Principles	This involves the specification of pricing principles with which service providers must comply.	Appropriate prices provide signals to customers about the cost of services which encourage efficient allocation of resources.

[8] An example of a paper which describes the range of options available to regulators is the Queensland Competition Authority Final Report on :SEQ Retail Water Long-Term Regulatory Framework -Annual Performance Monitoring - Part B – Section 3.3"

		Does not ensure that prices reflect prudent and efficient costs. Often used in conjunction with other forms of regulation.
Price Disclosure	Price disclosure involves the publication of key information to increase scrutiny of prices and market performance.	Relies upon an active and informed customer base to scrutinise and provide feedback.
Price Monitoring	The regulator tracking prices and / or profits over time. The approach is usually used to determine whether or not market power is a concern.	Can be used as a transition either towards more direct control of prices or after removing direct control of prices.
Performance Monitoring	Performance monitoring focuses upon a business performance and allows service providers the flexibility to seek the lowest-cost means for achieving the level of performance desired.	Service providers need to identify the cost implications of delivering different levels of service for each outcome in order to decide which level is economically efficient and affordable for customers.
Propose and Respond	The regulated entity submits a proposal to the regulator for consideration. The regulator is unable to reject that position, or substitute its own proposal, if it could be demonstrated that the proposal fell within a reasonable range.	The regulator may not have sufficient information to determine a reasonable range unless it has had a prior regulatory role.

The Commission currently uses a mix of these regulatory methods.

Table 90: Methods currently in use by the Commission

Regulatory Method	Current Usage
Cost of service (rate of return)	This is the approach currently used by the Commission to regulate Eda Ranu and Water PNG.
Profit Sharing	Not currently used.
Incentive	Used in regulatory contracts for PNG Power and PNG Ports.
Benchmarking	Has been used to determine staffing levels for PNG Ports. But has not been used directly to compare prices.
Pricing Principles	Used in regulatory contracts for PNG Power and PNG Ports.
Price Disclosure	Not consciously used by the Commission, although monitored pricing information is often publically available. So the method is in effect used indirectly.

Price Monitoring	Used widely by the Commission.
Performance Monitoring	Used in regulatory contracts. The Commission is increasing its focus on performance measurement to ensure that consumers receive value for money.
Propose and Respond	Not currently used

13.3. Best Practice

The Commission is of the view the there is no perfect form of regulation. Any form of regulation chosen will involve some compromise. Each method has both advantages and weaknesses. These must be carefully considered in the context of the particular entity which is being regulated.

Factors which should be considered include the following.

- The current level of performance
- The existence of performance measures
- The stability and maturity of the market
- The level of market power
- The current method of regulation in use
- The current set of issues which need to be addressed.
- The impact of making changes

In any particular jurisdiction, a regulator will be facing a particular set of issues and so will choose the form of regulation to address those issues. So while a particular form of regulation may be common in other jurisdictions, this does not mean it is the best option for PNG. However the Commission has noted the forms of regulation which are used in the UK and in Australia.

In the United Kingdom, the water regulator generally uses benchmarking metrics to determine prices for water utilities. The Commission notes that in the UK there are a number of water utilities of similar size, operating in similar environments who are directly comparable to each other. This is not the case in PNG.

In Australia the most common form of regulation for water utilities is direct price control. This sometimes takes the form of a maximum average price (see the following table) but more commonly involves setting the actual prices which utilities will charge.

Table 91: Australian Regulators approach to water price regulation[9]

Jurisdiction	Water Entities	Approach to regulation
New South Wales	Sydney Water Corporation Sydney Catchment Authority Some local councils	**Direct** - IPART determines prices
ACT	ACTEW	**Direct** - ICRC determines prices
Victoria	Numerous metropolitan, regional and rural water entities	**Direct** - ESC approves/ determines prices
South Australia	SA Water	**Direct** - ESCOSA determines average revenue caps
	Intermediate and minor water entities	**Indirect** - annual price monitoring
Western Australia	Water Corporation	**Direct** - ERA recommend prices to be set by the minister
Queensland	QCA	**Indirect -** Price monitoring with the potential for price determination.

13.4. Method of regulation chosen

The Commission has observed that operating costs for both Eda Ranu and Water PNG have continued to rise at rates well in excess of the rate of inflation. While this occurs, overall volumes of water and the number of customers have not increased materially (see Section 9). Nor have service levels improved (see Section 15). The Commission believes that this demonstrates the need for the Commission to continue to control prices. Without price controls, the Commission believes that both Water Utilities will have a tendency to simply pass costs on to customers, rather than seeking ways of operating more efficiently.

While Water PNG has not always increased its prices to the maximum level allowed, it has continued to allow its costs to increase. To the Commission, this is a warning signal that Water PNG's business model may not be sustainable. And that Water PNG may need to change its approach to building new networks in order to continue to grow its business.

[9] Queensland Competition Authority Final Report on :SEQ Retail Water Long-Term Regulatory Framework -Annual Performance Monitoring - Part B, page 10"

In controlling prices the Commission needs to consider how to provide incentives for Eda Ranu and Water PNG to improve both their economic efficiency and the service they deliver to consumers.
This involves incentives to;

- Deliver service to more customers
- Deliver higher volumes to customers
- Improve their service performance
- Do all of these things at the lowest possible cost.

The current form of regulation, focuses on cost only and drives some perverse incentives.

1. There is an incentive to lower service levels. By lowering their service levels, companies can reduce their cost and improve their profits.
2. There is an incentive to restrict water supply and not to connect new customers. This is driven by the revenue cap and discussed later in this section.
3. There is no incentive to reduce costs – the five year price review process tends to reward cost increases with higher prices. Conversely if they do reduce costs, prices will be decreased at the next review period.

The Commission believes that the form of regulation must continue to directly take into account the actual cost of providing services. If it does not, then the commercial viability of regulated entities may be threatened. It must also directly address the incentives which drive each company's behaviour. The Commission has therefore chosen to continue its current form of regulation but has also introduced mechanisms to provide incentives for better performance.

The Commission does not believe that benchmarking is an option for either Eda Ranu or Water PNG. This is simply because of the difficulty of accessing information from comparable companies.

However the Commission is also in a poor position to evaluate a company's costs. A company will always know more about its own costs that a regulator can ever hope to. So if the Commission can create incentives for companies to reduce their own costs, this is likely to produce better outcomes.

The Commission has directly addressed the first of these incentives above by linking prices to service levels (see Section 15).

The second incentive has been addressed by changing from a Revenue Cap to a Maximum Average Price cap (This is discussed later in this section).

The third incentive is discussed next.

13.5. Incentives to achieve cost efficiencies

The current regulation method does not provide a natural incentive for Eda Ranu or Water PNG to reduce costs. The Commission has instead focused on capping overall costs at current levels.

Incentive regulation usually tries to use a mechanism which allows a regulated entity to keep profits that result from reducing its costs. By itself this does not provide any benefit to consumers. So regulators usually attempt to ensure cost savings are shared with consumers. A common approach to this is to use a negative X factor. The logic of the approach is

- It is expected that over time the regulated entity will discover ways of reducing costs.
- The regulator makes an educated guess about just how much this cost reduction might be.
- An X factor is chosen which share the gain between the regulated entity and its customers.

For example if it is expected that costs will reduce by 2% per annum, then the regulator will set the X factor at -1%. This means that the regulated entity will grow its profits by 1% per year and customers will be better off with prices decreasing by 1% each year.

The Commission has used this approach in both PNG Power and PNG Ports regulatory contracts and has not found either one to be effective in encouraging cost efficiency. In PNG rather than costs decreasing over time, they have been generally rising at a rate which is higher than inflation. So the Commission does not regard the X factor approach as an effective method of providing incentives to reduce costs by itself.

The Commission is generally concerned with this outcome and regards it as indication of regulatory weakness. In response to it, the Commission has been taking a more analytical approach to regulatory reviews. Rather than simply rolling over previous determinations, the Commission has been looking for ways to change regulatory frameworks. An example of this is the Commissions treatment of Eda Ranu's outsourcing contracts in this review.

For incentive regulation to work a company must have a strong profit motive. There are two requirements for a company to have an incentive to grow its profits.

1. Generally there needs to be someone, usually a shareholder, who has an incentive to grow profits. This is generally because the higher the profits, the higher the dividend that the shareholder will receive or the higher the price that the shareholder sell their shares for.

2. The shareholder needs to have significant control or influence over the activities and investments of the company. There are many private companies listed on share markets where this is not true. For example if the largest shareholder of a company owns less than 5% of the shares and has no representation on the board of the

company, then it is likely that no shareholders have control or influence over what the company does.

When this second requirement is not met, what commonly occurs is that executive managers extract more value from the company than a shareholder would reasonably allow them to, if they did have control over the company. This might take the form of higher salaries, expensive cars and unreasonable annual bonus payments.

If a business does not have a strong profit motive then no form of incentive regulation will make any difference to the economic efficiency of a business.

It is likely that companies will be able to do far more to drive economic efficiencies by setting staff performance incentives than any mechanism a regulator can employ. This is because companies have a better knowledge of the critical performance measures which drive their business. The Commission believes it is beyond its own scope to set performance incentives for the staff of the entities it regulates.

In this price review the Commission has chosen to continue with a "cost to serve" approach to regulation. The Commission has sought to hold costs at current levels while putting in place pricing incentives for both Eda Ranu and Water PNG to improve service levels. The Commission believe this will promote consumer interests more than the use of a traditional "incentive regulation" approach at this time.

13.6. Maximum Allowable Revenue vs Maximum Average Price

The following analysis shows that the Maximum Allowable Revenue method of regulation provides the regulated entity with no incentive to grow volumes but in fact provides the entity with an incentive to restrict supply.

Conversely the following analysis shows that the Maximum Average Price method provides a regulated entity with a strong incentive to grow volumes. This method is also more risky for the regulated entity because if actual volumes are less than forecast, then revenues will be less than its costs.

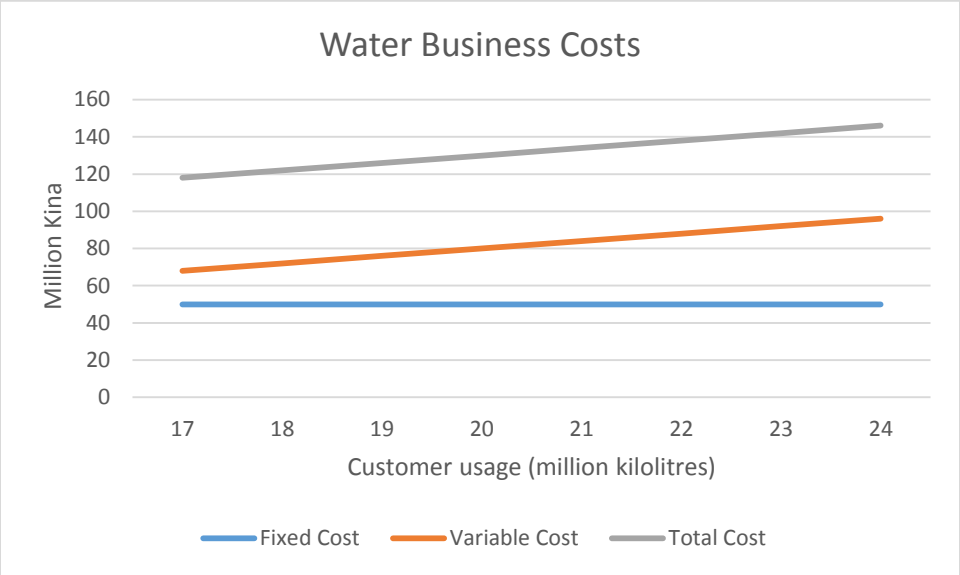
The cost structure of a regulated water company

Let us suppose that a particular water business has a long run cost structure as follows

- Annual Fixed Cost = K50 million and
- Long run variable cost = K4 per Kilolitre

Then as volumes grow the business will have a long run cost curve that looks like the following.

Figure 12: Water business costs



If the current volume of customer demand is 20 million kilolitres then the current cost of operating the network will be

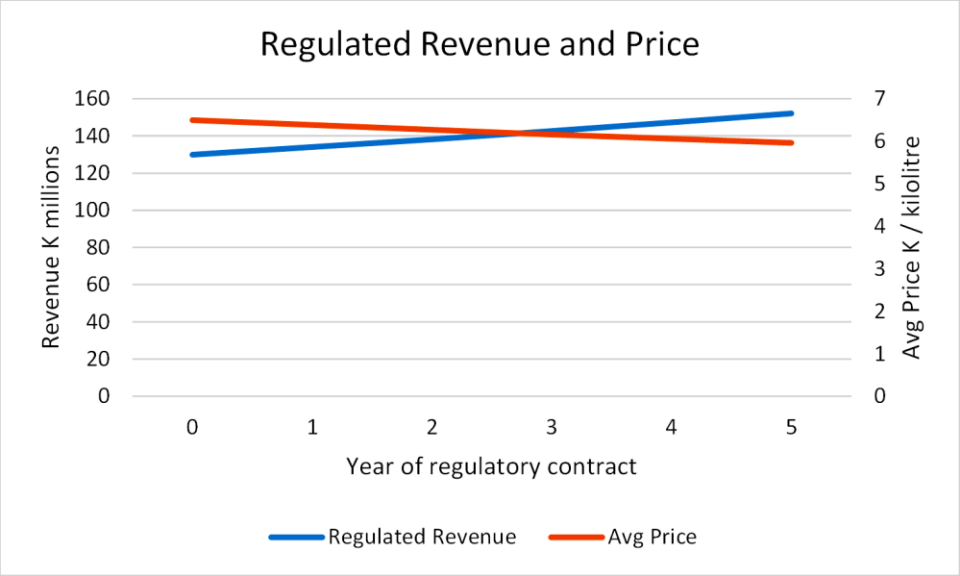
- K50 million + K4 x 20 million kilolitres= K130 million.

And the average cost per kilolitre will be

- K130 million / 20 million kilolitres = K6.5 per kilolitre

Suppose that the demand forecast agreed by the regulator and by the water business has 5% annual growth. And suppose that the regulator sets prices using a maximum average price adjusted annually by an X factor so that the regulated revenue equals the cost to run the business with 5% growth. Then the regulated revenue over a five year period would look like the following chart.

Figure 13: Regulated revenue and price

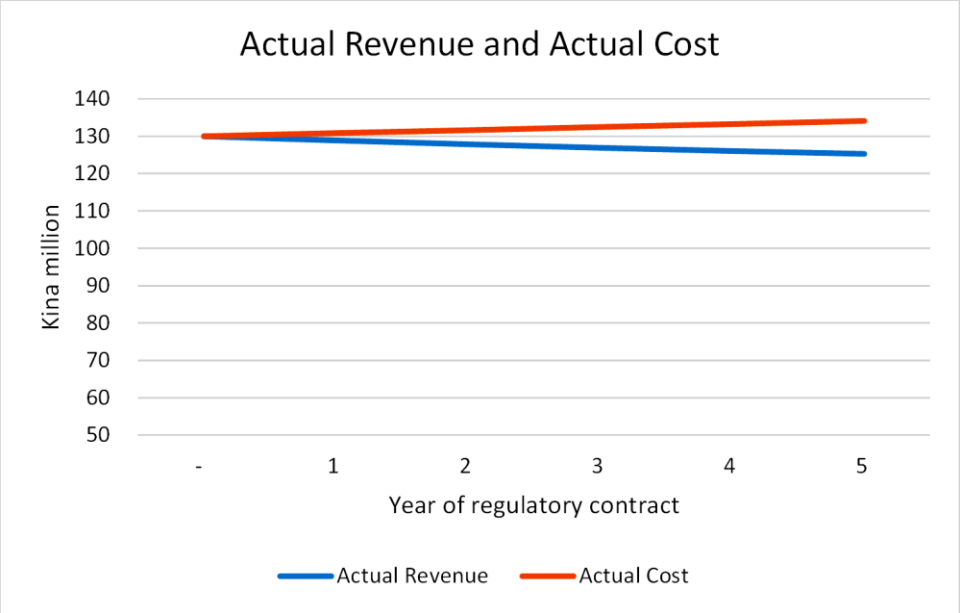


Scenario 1

If the actual volume growth is equal to 5%, then the actual revenue will be exactly equal to the actual cost.

But suppose that the actual growth rate is only 1% per annum. The difference in cost and the regulated revenue will be as follows.

Figure 14: Actual revenue and actual cost

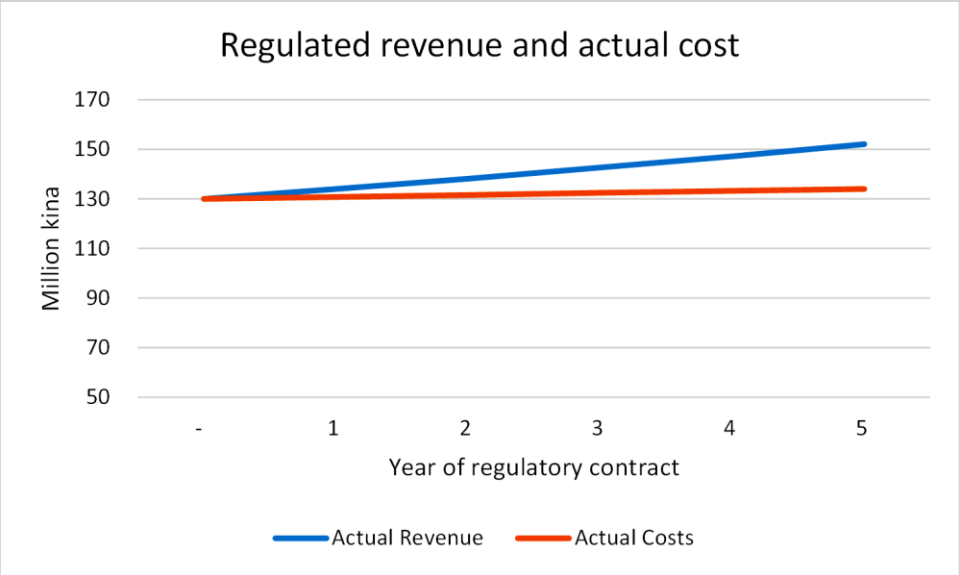


From figure 14 above we can see that the revenue has declined rather than increased. This is due to the expectation that the average cost would fall faster than it actually did. By the end of year 5 there is a 7% Gap between revenue and cost.

Now let us suppose that the regulator chooses to regulate using a maximum revenue cap plus an Additional Allowable Revenue (AAR) per kilolitre where the additional volume is 5% higher than the forecast. Suppose that Additional Allowable revenue is equal to the variable cost per kilolitre which is K4.

If the actual volume growth is only 1% and therefore lower than forecast, there will be no AAR adjustment to the revenue. Therefore the resultant actual revenue will be equal to the original forecast regulated revenue. But the actual cost will be lower as follows.

Figure 15: Regulated revenue and actual cost



From this we can see that the revenue which the regulated water company receives will be about 12% higher than actual costs by the end of year 5.

Results for Scenario 1 where growth is less than forecast

Table 92: Scenario 1 financial results.

Form of regulation	Maximum Average Price	Maximum Allowable Revenue
Actual Cost - year 5 (K million)	134	134
Actual Revenue - Year 5 (K million	125	152
Variation between cost and revenue	-9	+18

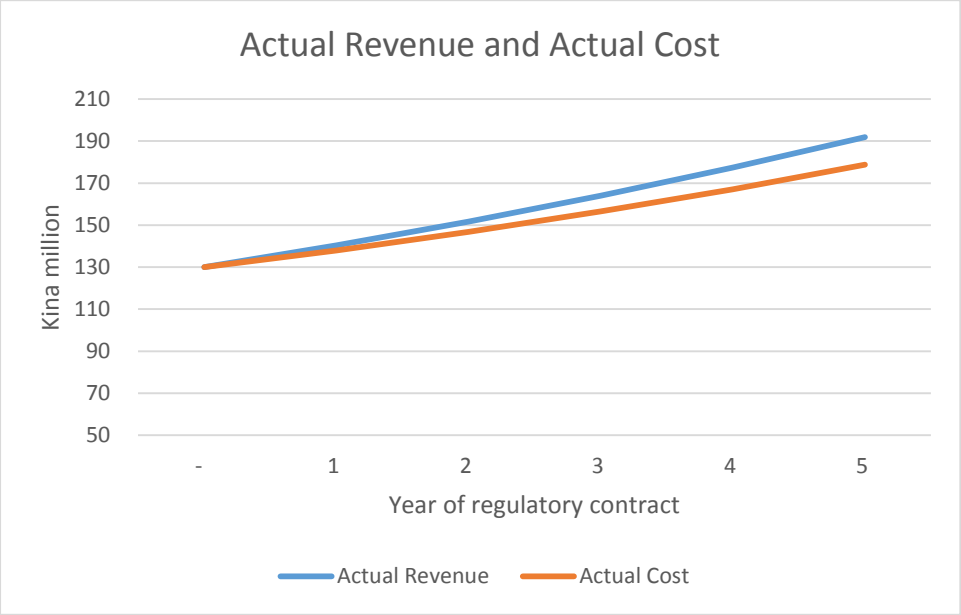
Overall there is a K27 million difference in the resultant revenue by year 5. This equates to 21% of starting revenue.

Scenario 2.

Now suppose that actual annual growth is 10% per annum. Let us now see what happens to the water company's revenue under each form of regulation.

Under the Maximum Average Price form of regulation we will get the following result.

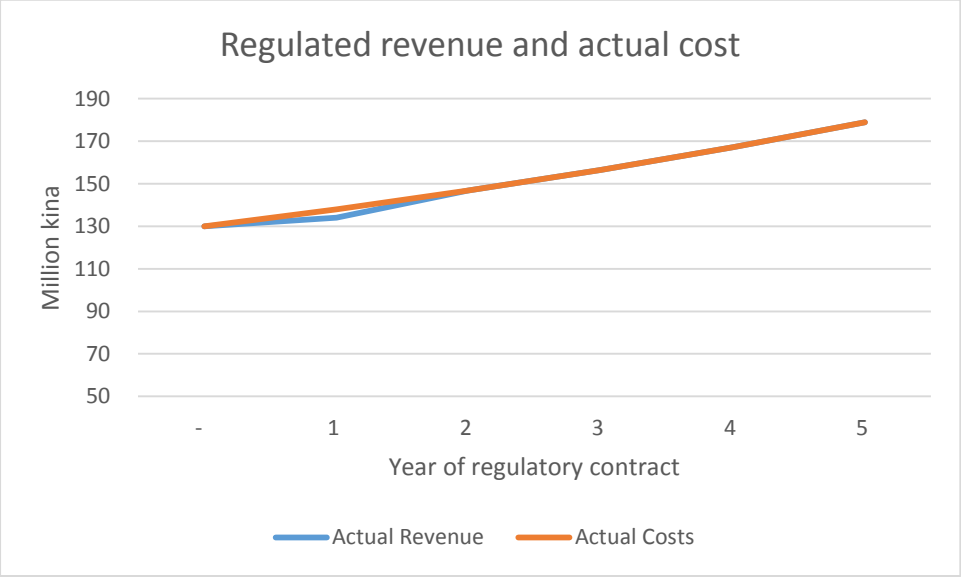
Figure 16: Actual revenue and actual cost



The actual revenue will exceed the actual cost because the average cost is falling faster than was originally forecast.

Under the Maximum Allowable Revenue form of regulation we will get the following result.

Figure 17: Regulated revenue and regulated cost



From the above we can see that the actual revenue is equal to the actual cost in every year except in year 1 when the 5% threshold was not reached.

In summary, Scenario 2 with 10% annual volume growth produced the following results.

Table 93: Scenario 2 financial results

Form of regulation	Maximum Average Price	Maximum Allowable Revenue
Actual Cost - year 5 (K million)	179	179
Actual Revenue - Year 5 (K million	192	179
Variation between cost and revenue	+13	0

From this we see that the Maximum Average Price strongly rewards the water company for higher volume growth. But the water company is indifferent under the maximum allowable revenue method.

Conclusions about the form of regulation

From these two scenarios we get the following Matrix.

Volume, Revenue and Costs under MAP and MAR forms of regulation

	Maximum Average Price	Maximum Allowable Revenue
Low Volume Growth	Revenue less than costs	Revenue higher than costs
High Volume Growth	Revenue greater than costs	Revenue equal to costs

From this we can conclude that with a Maximum Average Price form of regulation the regulated water company has a strong incentive to grow volumes. While under a Maximum Allowable Revenue form of regulation, the water business not only has no incentive to grow volumes at all but also has an incentive to restrict supply.

As noted earlier, the National Research Institute raised the issue that this analysis was based upon assumptions. The Commission therefore tested the analysis further by using quite different assumptions about the split between fixed and variable charges. In particular it considered the example where variable costs were very low and most costs were fixed. The results of this analysis were the same as the above. The Commission is therefore of the view that the above analysis is valid.

13.7. Commission's determination on the form of regulation

The Commission notes that no one opposed the change from a revenue cap to a maximum average price cap. Water PNG commented in its submission that it accepted the change. The National Research Institute commented that they thought more analysis was required. The Commission has therefore done some further analysis of the various options available to the Commission. This analysis has not changed the Commission's view that a maximum average price construct provides better incentives to deliver increased volumes.

The Commission has therefore determined to stop using Maximum Allowable Revenue and return to a Maximum Average Price approach to regulating both Eda Ranu's and Water PNG's prices.

Final Determination:

The Commission's Final Determination on the form of regulation, is to change from the Maximum Allowable Revenue (MAR) construct to the Maximum Average Price (MAP) construct.

14. Prices

The Commission has used the building block method to calculate the revenue requirement for each company. The based revenue requirement is the revenue which each company must receive in order to operate efficiently at a base level. The base revenue requirement is used to calculate the base price component. The service price premium is then added to the base price component to calculate the total price.

The Commission has smoothed annual price changes using an X factor. The X factor will be multiplied by the Maximum Average Price (MAP) for Water and Sewerage each year to calculate the MAP for the following year. The X factor is set so that the NPV of the regulatory revenue over the 5 year regulatory period is equal to the NPV of the revenue requirement over the same period. The term "regulatory revenue" refers to the revenue received when the volumes are multiplied by the MAP.

Each year prices will be adjusted using the following formula.

$$MAP_{(Y=1)} = (MAP_{(y=0)} - SP_{(y=0)}) \times (1 + CPI \quad + X) + SP_{(y=1)} \times (1 + CPI) \; + OverUnderAdj$$

Where;

$MAP_{(Y=1)}$ = the Maximum average price in the current year

$MAP_{(y=0)}$ = the Maximum average price in the previous year

CPI = the CPI adjustment based upon the inflation in the previous year

$X\ Factor =$ the X factor as calculated by the Commission in this report

$SP_{(y=0)}$ = the Service Price Premium for the previous year

$SP_{(y=1)}$ = the Service Price Premium in the current year

$OverUnderAdj$ = the adjustment to reflect the over or under recovery of the Maximum average price for the previous year. This is described later in this section.

The same formula will apply to the calculation of both MAP for water and the MAP for sewerage. The same X factor will apply to both the water MAP and the sewerage MAP.

14.1. Incremental Costs

In the Draft Report the Commission proposed to set lower prices for the initial quantity of water used by customers. The idea was to make water more affordable to those who can least afford to pay, and to subsidise these lower prices by charging large customers more for the quantities they use. So it was proposed that;

- Eda Ranu customers would pay K0.50 per kilolitre for the first 50 kilolitres used each month.

- Water PNG customers would pay a lower rate (not actually stated in the Draft Report) for the first 20 kilolitres used each month.

(Subsequently the Commission has decided to set these rates at 30 toea per kilolitre, so the rest of this Section refers to 30 toea per kilolitre for the initial quantity of water used).

The Commission is required to consider the legitimate commercial interest of the entities it regulates. With this in mind the Commission wanted to understand the incremental costs for each company to deliver incremental volumes to its customers. And if there were cross subsidies between small users and large users, how material were those cross subsidies.

The National Research Institute wrote in its submission;

> *"In pricing water and sewerage services, it is important to set prices based on the cost of supplying and distributing water to urban centres …whilst considering broader policies of municipal authorities and provincial and local level governments. Prices should be reasonable and reflect the need for investment to provide quality, reliable water supply and its security to support economic, social and environmental sustainability"*
>
> *"This would be consistent with the ICCC's position in the Draft Report to subject the review to the underlying costs of the two water utilities' operations".*[3]

Since the Draft Report was written, the Commission has estimated the forward looking long run incremental network cost per kilolitre of delivering water to customers. The Commission wanted to understand this cost because it reflects the level of additional investment required by each company to build network to support additional customers and volumes.

The results for Port Moresby and Lae are shown in the following table further below. The results have been expressed as ranges rather than discrete numbers, to reflect the level of uncertainty in the results. However, it is possible the more detailed costing will give results outside these ranges. The Commission also modelled other portions of Water PNG's network, but have not reported these because of the low level of confidence in the numbers provided by Water PNG.

It should be noted that the Commission has not relied upon the outputs of this analysis to calculate the maximum average prices set for Eda Ranu and Water PNG.

The costs shown in the table are an estimate of the cost of delivering one more kilolitre of water to a customer. The costs include both capital and operating costs of building, owning and operating the respective networks, but do not include customer service costs. Customer services costs are generally driven by the number of customers not the volume of water consumed.

Table 94: Forward looking incremental cost (Kina per kilolitre) of water delivered to customers

(Kina / Kilolitre)	Eda Ranu Domestic	Eda Ranu - Non Domestic	Lae - Domestic	Lae – Non Domestic
Peak Hours Costs				
Catchment			0.07	0.07
Treatment	0.12	0.12	0.02	0.02
Storage	0.28	0.28	0.11	0.11
Main	2 to 3	5 to 6	0.2 to 0.5	3.5 to 4.5
Total peak hour incremental cost	2.5 to 3.5	5.5 to 6.5	0.4 to 1.0	3.7 to 4.7
Off Peak Costs				
Catchment			0.01	0.01
Treatment	0.12	0.12	0.01	0.01
Total off peak incremental cost	0.12	0.12	0.02	0.02
Average Cost	1 .2 to 1.8	4 to 5	0.2 to 0.5	2.7 to 3.4

Note: Eda Ranu treatment costs also cover catchment costs.

The accuracy of this analysis was limited by the availability of information from Eda Ranu and Water PNG. The numbers are based upon a number of assumptions including the following.

- Consumption rates are for an average domestic or an average non-domestic customer in each network.
- Peak hour usage for non-domestic customers is assumed to be 8 hours per day on business days.
- Peak hour usage for domestic customers is assumed to be 5 hours per day 7 days per week (2.5 hours in the early morning and 2.5 hours in the early evening).
- The replacement cost of individual network components, including pipes, valves, storage tanks, catchment assets and water treatment assets were provided by Eda Ranu and Water PNG.
- Capacity information was as provided by Eda Ranu and Water PNG, including the diameter and length of pipes, the size of storage tanks, the number and type of valves in each network and the pumping rate of pumps.
- Water PNG provided dosage rates for water treatment.
- A maximum flow rate of 1 metre per second was used to calculate mains capacity.

Observations about network economics

The capacity requirements in networks are driven by peak consumption. In Port Moresby consumption by large customers completely outweighs consumption by domestic

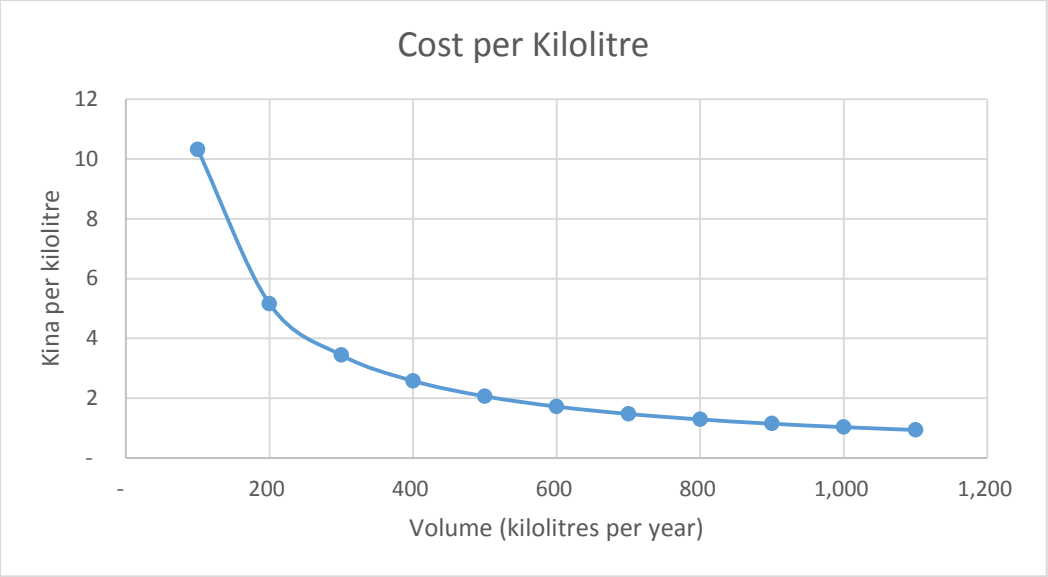
customers. So the peak usage of many parts of Eda Ranu's network is driven by large customers and occurs during the business day. Because domestic peak hour consumption occurs at a different time of the day, from large customer consumption, domestic customers are not generally driving the capacity requirements of much of Eda Ranu's network. This means that for major portions of Eda Ranu's network, additional volume delivered to domestic customers will not drive any incremental cost. This will be true for large distribution mains and storage in central areas.

The impact of peak usage dynamics can be seen in the table above, in that off-peak usage is not driving any cost into mains or storage assets. And Non-domestic peak hour consumption costs are almost twice as much as domestic peak hour consumption.

The Commission has less information about consumption by different customer types in Water PNG's network, but expects that in some areas, domestic customer usage will outweigh non-domestic. So it should be noted that if domestic consumption is larger than non-domestic consumption, then network costs will tend to be driven by domestic usage.

Many PNG domestic customers are very low users. This means that in some areas, network utilisation may be poor. This is illustrated in the following graph which shows the way the cost per kilolitre will change as average consumption per customer increases.

Figure 18: Relationship between cost and volume for a service main.



The example shown in the graphs is for a 100mm service pipeline with a maximum flow rate of 1 metre per second. The graph is based upon the following input assumptions.

- A 100mm service pipe costs K500,000 per kilometre to install.
- Allowing for maintenance costs and assuming a 50 year life, this equates to an annual cost K103,000 per km.
- If the average customer uses 463 kilolitres at peak hour and there are 1,825 peak hours in a year then the maximum number of customers the pipe can support is 111.

- The length of the pipe will be determined by both, the number of customers it can support and the density of customers along the pipe.
- In the example shown in Figure 18 we have assumed a customer density of one customer every 10 metres.
- Under these circumstances we would expect the cost per kilolitre to be just over K2 per kilolitre.
- If the average customer usage increased, but customer density remained about the same, the pipe would not support as many customers. This would mean that the service pipeline would be shorter, and more service pipelines or larger diameter service pipelines would be required. The net effect is that a service pipeline is used more efficiently, as more water is delivered to fewer locations.

Observations about long run incremental costs

The Commission needs to decide whether or not setting low prices for low user customers, (as low as 30 toea per kilolitre), will drive any disincentives for the two water providers to provide service to new customers. The Commission observes that;

- There is a high level of uncertainty in the results.
- For Eda Ranu the average incremental network cost per kilolitre of water for a domestic customer is estimated to be more than four times the proposed price of 30 toea per kilolitre (i.e. 120 to 180 toea per kilolitre).
- For Water PNG in Lae only, the average incremental network cost is around or below 30 toea per kilolitre. But indications and expectations are that in other areas served by Water PNG, the incremental costs will be much higher than this.
- In addition to these network costs the water utilities must also cover all their customer service costs and their head office costs.

A simplistic view of these observations would be to conclude that setting a low price for low users will discourage investment to provide service to new customers. However, it must also be understood that the Commission is setting the price for all customers as a whole, not just new customers. And the method the Commission uses to set prices, spreads all costs over all customers. The effect is that if the water utility invests in new assets, then the cost of these assets is built into the price paid by all customers, not just the customers who use those new assets. So if the water utilities invest in new assets they are able to charge all their other customers more.

The methodology used by the Commission to set prices uses depreciated costs which reflect the age of the assets, rather than current replacement costs. The effect of this is that prices will increase when assets are replaced. But if assets are old, then prices will be low. Over the life of an asset, the regulated entity gets a fair return on its investment. But the method weighs the returns they receive up front. So in effect returns on assets are higher when they are newer.

The incremental cost analysis used here reflect a forward looking replacement cost not the depreciated historic cost of the asset upon which average prices are based.

Having carried out this analysis the Commission must now decide if selling some quantities of water at prices that are below forward looking incremental costs is acceptable.

Table 95: Arguments for or against use of low prices for initial increments

Arguments In Favour	Arguments against
• Use of the maximum average price construct means that water utilities will still be able to fully recover their costs. As volumes of low price water increase they will be able to increase prices for larger customers without breaching the maximum average price. • The volume of water used by large customers far outweighs the volume use by small customers (10% for Eda Ranu and 6% for Water PNG). This means the cost to large customers is small while the benefit to small customers is large. • The low rates are a form of socio-economic subsidy. • Both Eda Ranu and Water PNG currently have price points which are below incremental costs. So this is already current practice. This especially likely to be the case for Water PNG where it is expected that new customer in regional networks have higher marginal costs yet still pay nationally averaged prices. • Low rates support reduction of illegal use of water. Low income household are more likely to be able to afford to pay. The utilities will be better off if they are paid something for this water even if is below cost. Currently they are incurring the cost illegal connections but are not receiving any revenue for them.	• Prices which are below incremental costs promotes inefficient use of resources.

From the above the Commission concludes that there are more arguments in favour of the cross subsidy.

The Commission must also decide what the price point should be. In the Draft Report, the Commission proposed to use 50 toea per kilolitre for Eda Ranu, but did not propose a price point for Water PNG. The Commission picked 50 toea because Eda Ranu already offered this

for the first 15 kilolitres to "lifeline" customers. However the Commission observes that at this price point, illegal use of water is rampant. The Commission therefore concluded that a lower price point is needed.

Ideally market research could be carried out to estimate how low the price would need to be to make a substantial difference to illegal water usage given customers' ability to pay. However such research is often difficult to carry out. In the Commission's view, a live market trial will have relatively little risk. The Commission has therefore chosen to set the price point for the initial quantity of water at 30 toea per kilolitre. To be consistent with this, the Commission has set the price point for the initial quantity of sewerage at 0.10 per kilolitre.

The Commission has also decided to carry out a review in 2017, to see what impact this price point has had. The objective of the review will be to test

- Whether or not 30 toea is high or too low.
- Whether or not the price point has supported decreased illegal usage.
- Whether or not the price point has created any capacity issues for Eda Ranu or Water PNG.

To be clear the Commission believes that the price point by itself will not result in a decrease in illegal usage. To decrease the level of illegal usage will involve a multi-faceted campaign. But having a price which customer cannot afford, will work against the objective

The Commission has decided to set prices for initial quantities as shown in the following table. In 2017 the Commission will carry out a review of these price points.

Table 96: Prices for initial quantities of water and sewerage.

	Eda Ranu	Water PNG
Initial Quantity Per Month	35 kilolitres	20 Kilolitres
Maximum Water Price	0.30	0.30
Maximum Sewerage Price	0.10	0.10

Other Observations about incremental costs

What the incremental costs analysis also tells the Commission is that;

- As new network is built, or assets are replaced, there are likely to be substantial average price increases.
- There is value for both Eda Ranu and Water PNG to improve their understanding of network economics so that they can, more cost effectively design their networks, so that customers can afford them.

Providing Water to customers in settlements

One option for delivering water to a settlement area is to deliver it to a single point and allow the community leaders within the settlement to arrange distribution from that point.

If under this scenario, Eda Ranu needed to extend its network with say a 450mm pipe for 2 km, then the costs would be as outlined in the following table.

Table 97: Cost of connecting a settlement with a 2km 450mm pipe

Capital Investment (K million)	3.4
Annualised cost of pipe (kina / year)	136,000
Maximum flow – Kilolitres per hour	572
Peak hours per year (5 hours per day, 365 days per year)	1,825
Pipe cost per peak hour (Kina per hour)	74.52
Pipe Cost per kilolitre	0.13
Water Treatment cost per kilolitre	0.11
Total cost per kilolitre	0.24

From the above we can see that the incremental cost of delivering water to a settlement area via this method would be less than 30 toea per kilolitre.

This analysis relies upon the assumption that peak consumption in the settlement is going to be at different times from peak hour consumption in Eda Ranu's large mains and storage tanks. If this is true then settlement consumption would not drive any additional investment in capacity in any other part of Eda Ranu's network.

14.2. Water Availability and Minimum Charges

The Commission noted that from time to time there are water availability issues due to network outages. The Commission observed particular situations where customers were expected to pay minimum charges even though they were not receiving water. In the Commission's view this is a violation of consumer rights.

If service reliability is high, then minimum charges and access rentals are reasonable pricing structures. They reflect that there is a cost for being connected even if no water is consumed. But these pricing structures are only reasonable if a customer can choose to consume water if they desire to do so.

Because water availability is too often an issue, the Commission has decided to abolish fixed monthly charges or minimum charges of any kind for both Eda Ranu and Water PNG. This is to ensure that consumers are protected. Where fixed charges currently exist, the revenue stream from these charges will be replaced by revenues from higher usage charges.

At such time as either Water PNG or Eda Ranu can demonstrate improved reliability in their networks, the Commission will review this position.

Final Determination:

The Commission has determined to abolish minimum monthly charge or access fee. That means under no circumstances neither can Eda Ranu nor Water PNG charge a domestic customer a minimum monthly charge or access fee. Instead customers can only be charged for the actual quantity of water or sewerage used as determined by their water meter.

14.3. Water Wastage

In discussions with Water PNG, it raised the issue that low prices for the initial 20 kilolitres of water might lead to water wastage. Water PNG's argument was that, if water is that cheap, customers will simply waste it.

Also the National Research Institute in its submission wrote;

> *"A relatively lower price for the provision of water services, as indicated in the Draft report, may not be justified of efficient water use when considering costs associated with water over-use and illegal water use."*[5]

The Commission accepts that this is a valid concern. If water is wasted then this requires additional investment in storage and catchment resources. Therefore the Commission has considered the issue. There are two possible situations.

1. A customer uses more than 20 kilolitres of water.
2. A customer uses less than 20 kilolitres of water.

If a customer is using more than 20 kilolitres of water, then on any additional water that they use, they will be paying Water PNG's top price for water. At this price, the more water the customer consumes the better off Water PNG will be. This is because the price exceeds the marginal cost of providing the additional water. For a large user of water the low price for the first 20 kilolitres is not driving their consumption.

The average small user on Water PNG's network uses less than 5 kilolitres of water per month. However the current minimum charge is K16 and for this the customer is entitled to 12 kilolitres. So while small customers are paying for 12 kilolitres they are using less than 5 kilolitres. The reason for this can be easily explained if one considers what happens if the customer exceeds 12 kilolitres. If they do, then their bill will immediately increase from K16 to K21.10. For every additional kilolitre they use their bill will increase by a further K5.1. For someone earning minimum wage, this is a risky outcome. The minimum wage in PNG is currently K3.20 per hour. Customers on low incomes are likely to be careful with their water usage because, if they waste water, they may very quickly incur a bill which they may struggle to afford.

With the introduction of a water rate of 30 toea per kilolitre for the first 20 kilolitres, a customer can now use up to 20 kilolitres of water for only K6. If the incremental price for volumes greater than 20 kilolitres is K6.00, then for K16, which was the previous minimum

payment, they can now use about 21.6 kilolitres. However once the customer exceeds 21.6 kilolitres their bill will increase by an additional K6.00 for every additional kilolitre. For customers on a low income, this will inhibit their usage in the exact same way as the current pricing structure does.

Overall the Commission is of the view, that while customers may consciously decide to use more water because of the lower prices, they are unlikely to simply waste it.

The Commission has forecast an 11% increase in demand without any price changes over the regulatory period. If the volume of water used by low water users doubles, then the total volume of water consumption would increase by an additional 5.5%. To counter this, the average price for Eda Ranu is forecast to increase by 26%. So it is possible that some larger customers might decide to use less water because of these higher prices. Overall the Commission does not expect that the low price point for the first 20 kilolitres will drive any major new investment for Water PNG other than the investment which Water PNG is already planning.

14.4. Eda Ranu Base Revenue Requirement

This report has already identified the proposed operating costs, the opening RAB and the depreciation amounts to be used by the Commission. These are combined in the following tables to show the revenue requirement for Eda Ranu.

The average real regulatory asset base (RAB) was calculated by using the opening RAB and continuing to depreciate the assets over the regulatory period. Each year the approved capital spending was added to the RAB. The result is shown in the following table.

Working capital was provided for by assuming creditor days of 30 and debtor days of 60.

Table 98: Eda Ranu Capital Allowance

(K 000's)	**2015**	**2016**	**2017**	**2018**	**2019**
Average Real RAB	274,527	273,885	273,329	272,768	272,137
Working Capital	10,456	10,360	10,229	10,088	10,017
Total Capital	284,983	284,245	283,557	282,856	282,155

Table 99: Eda Ranu Revenue Requirement

(K 000's)	**2015**	**2016**	**2017**	**2018**	**2019**
Return on Assets	29,040	28,965	28,895	28,824	28,752
Return of Assets	6,713	6,605	6,566	6,637	6,730
Operating Expenditure	54,205	53,647	53,549	53,597	52,828
Revenue Requirement	89,958	89,217	89,010	89,058	88,310

The table above shows the Commission's estimation of the revenue required for Eda Ranu to continue to operate in an efficient manner.

14.5. Eda Ranu's X Factor

The combination of the initial prices and the X factor will determine the slope of the revenue curve. The following graph shows how the revenue requirement is changes over the regulatory review period. The drop off in 2019 is due to the expiration of the contract with PNG water limited.

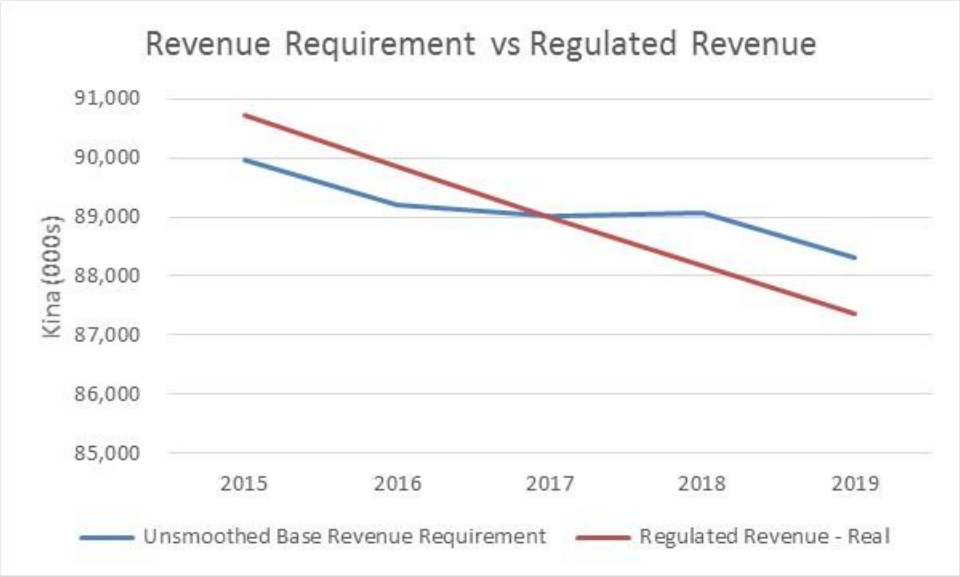
As can be seen from the graph below, the Commission has set initial prices and the X factor so that the gap between revenue Eda Ranu receives and the revenue requirement is not too great.

The Commission has;

- decreased the average price by 18.5%,
- increase the average sewerage price by 5%, and
- set X factor to be negative 4.21%

to achieve the forecast regulated revenue.

Figure 19: Base revenue requirement compared to base revenue



Note: the graph does not include the Service Performance Premium.

For 2015, the Commission has set the service performance price premium for Eda Ranu as K0.57/kilolitre for water and K0.17/kilolitre for sewerage. The following tables shows what the water and sewerage MAPs will be using the 2015 service performance price premium. This will change in future years depending upon Eda Ranu's actual service performance.

Table 100: Eda Ranu Maximum Average Price for Water Services

	2015	2016	2017	2018	2019
Water Revenue (K 000s)	71,210	70,514	69,831	69,162	68,507
Regulatory Volume (million litres)	26,087	26,966	27,876	28,818	29,794
Average Base Price (K/kilolitre)	2.73	2.61	2.51	2.40	2.30
Service Price Premium (K / kilolitre)	0.57	0.57	0.57	0.57	0.57
Water MAP (K / kilolitre)	3.30	3.18	3.08	2.97	2.87

Table 101: Eda Ranu Maximum Average Price for Sewerage Services

	2015	2016	2017	2018	2019
Sewerage Revenue (K 000s)	19,500	19,333	19,168	19,006	18,846
Regulatory Volume (million litres)	21,649	22,416	23,211	24,034	24,886
Average Base Price (K/kilolitre)	0.90	0.86	0.83	0.79	0.76
Service Price Premium (K / kilolitre)	0.17	0.17	0.17	0.17	0.17
Sewerage MAP (K / kilolitre)	1.07	1.03	1.00	0.96	0.93

14.6. Eda Ranu Prices

The average income of households in Port Moresby varies significantly. While there are many people on good incomes, there are others whose incomes are very low. The Commission is therefore concerned that as many households as possible should be able to afford to connect to the water network and pay for Eda Ranu's services. The Commission has also already raised the issue that while Eda Ranu's staff receives a wide range of allowances, most of its domestic customers possibly do not.

The Commission also notes that Eda Ranu has had on-going campaigns to discourage illegal connections and encourage legal ones. However if a potential customer simply cannot afford Eda Ranu's services then the incentive to connect illegally is always going to be strong.

The Commission has also noted from information supplied by Eda Ranu, that while large customers typically use more than 150 kilolitres per month, most domestic customers typically use less. Therefore if prices for small quantities are set low and prices for larger quantities are set at higher levels, the effect will be that poorer households will pay less and large customers and government departments, who have more resources, will pay more.

For these reasons the Commission has decided to put the following limitations on Eda Ranu's pricing structures.

- For domestic customers' Water and Sewerage charges can only be for the actual amount used on the meter. There can be no minimum monthly payments charged to domestic customers.

- Lower per kilolitre prices will be set for volumes up to 35 kilolitres.
- For quantities up to 35 kilolitres there will be no price adjustment made during the five year regulatory period. This means that the X factor will not apply to these price points and neither will the CPI adjustment nor the service performance premium.
- A maximum average price (MAP) will be adopted for both sewerage and water. Eda Ranu may choose to vary individual prices to customers as long as the volume weighted average of all its prices does not exceed the MAP.
- The Commission also notes that Eda Ranu receives additional revenue for various sundry charges such as connections, head work etc. The Commission has split this revenue so that 70.89% of this revenue is included in the Water MAP calculation and 29.11% is included in the Sewerage MAP calculation.

The Commission has determined that the following prices points are adopted for all customers.

Table 102: Eda Ranu regulated prices for initial quantity

	Water (Kina / kilolitre)	Sewerage (Kina / kilolitre)
Up to 35 kilolitres	0.3	0.1

For quantities larger than 35 kilolitres Eda Ranu may choose which price to set as long as the Maximum Average Price is not exceeded.

In the Draft Report, the Commission proposed that the quantity which attracts the lower price should be 50 kilolitres per month. However the average domestic customer used just 39 kilolitres per month. So the Commission as reduced the amount accordingly. The Commission has used 35 kilolitres because this is the end of the price band currently used by Eda Ranu and so the Commission is confident that Eda Ranu's billing system will support this requirement.

Eda Ranu made the following submission in response to the Draft Report;

> *"The proposed rate of 30 toea per kilolitre of treated water for the first 50 kilolitre consumed by each domestic customer is not sufficient to even cover the operating costs of the business. The Commission's attention is drawn to the fact that this proposed rate is also lower than the 1997 rate approved by the then price Controller when Eda Ranu commenced operations eighteen years ago in 1996."*[6]

The Commission acknowledges that if 30 toea per kilolitre were charged for all Eda Ranu's billed water then it would not cover Eda Ranu's operating costs. However the Commission also makes the following observations;

- Eda Ranu estimates that 30% of its water is stolen. The Commission expects that a large portion of this will be stolen by customers who cannot afford to pay for it. If just 10% of this water were paid for at the low price of 30 toea per Kilolitre, then Eda Ranu would be K500,000 better off than it is now. While simply having a lower price

will not be enough by itself, to get more customers to pay for water, the Commission expects that having a lower price for low users will help.

- The full pricing structure set by the Commission does cover all of Eda Ranu's reasonable operating costs. Because the Commission has set these particular price points lower, this means that Eda Ranu can charge other larger customers more. So this means that Eda Ranu is no worse off than it would have been if these particular price points were higher.

As already discussed, Eda Ranu may choose its own individual price points for its customers as long as the average price does not exceed the MAP specified by the Commission and provided that the first 35 kilolitres for each customer does not exceed the amount specified by the Commission. However, the Commission has included the following table to illustrate what a simple set of prices might look like. These prices have been CPI adjusted later in this section of the report.

Table 103: Possible Price list for 2015 (before CPI Adjustment)

	Water (Kina / Kilolitre)	Sewerage (Kina / Kilolitre)
Band 1 (0 to 15kl)	0.30	0.10
Band 2 (15.1kl to 35kl)	0.30	0.10
Band 3 (35.1kl to 50kl)	1.49	0.48
Band 4 (50.1kl to 75kl)	1.49	0.48
Band 5 (75.1kl to 100kl)	1.49	0.48
Band 6 (100.1kl to 150kl)	2.87	0.94
Bank 7 (more than 150 kl)	3.67	1.20

The Commission notes that there a many reasons why Eda Ranu may choose to offer different price points to different groups of customers, such as schools or charitable organisations. Eda Ranu has the liberty to continue to carry out such pricing distinctions under the new form of regulation as determined by this report, provided they conform to all legal requirements.

Final Determination:

The Commission has determined the following price points apply to all Eda Ranu's customers:

	Water (Kina / kilolitre)	Sewerage (Kina / kilolitre)
Up to 35 kilolitres per month	0.3	0.1

These price points will not be subject to any X factor adjustment, or CPI adjustments or Service Performance Premium adjustment over the regulatory period.

14.7. Water PNG Revenue Requirement

This report has already identified the proposed operating costs, the opening RAB and the depreciation amounts to be used by the Commission. These are combined in the following tables to show the revenue requirement for Water PNG.

The average real regulatory asset base (RAB) was calculated by using the opening RAB and continuing to depreciate the assets over the regulatory period. Each year the approved capital spending was added to the RAB. The result is shown in the following table further below.

Working capital was provided for by assuming creditor days of 30 and debtor days of 60. Water PNG proposed that creditor days should be 90 and that debtor days should be 120. While the Commission understands that this level of slow payment is common in PNG, it is still not acceptable and reflects very poor business practice. In the Commissions opinion all PNG businesses need to manage their customer relationships to ensure that they receive payment in a reasonable time frame. Furthermore Water PNG needs to also pay its creditors in a timely manner.

Table 104: Water PNG's Regulatory asset base.

(K millions)	**2015**	**2016**	**2017**	**2018**	**2019**
Average Real RAB	338.3	350.9	342.9	335.2	327.2
Working Capital	14.7	11.2	11.6	12.0	12.4
Total Capital	353.0	362.1	354.5	347.2	339.6

Table 105: Water PNG's Revenue Requirement

(K millions)	**2015**	**2016**	**2017**	**2018**	**2019**
Return on Assets	36.9	36.1	35.4	34.6	33.8
Return of Assets	13.4	13.3	13.2	13.2	13.0
Operating Expenditure	47.5	47.5	47.5	47.5	47.5
Revenue Requirement	97.8	96.8	96.1	95.2	94.3

The Commission notes that this is an increase from the current revenue levels. In 2013 revenues were K74 million and the forecast revenue for 2014 was K82 million. The increased revenue requirement has come from the Commissions assessment of the value of the RAB, as the Commission has assessed the operating expenditure downwards.

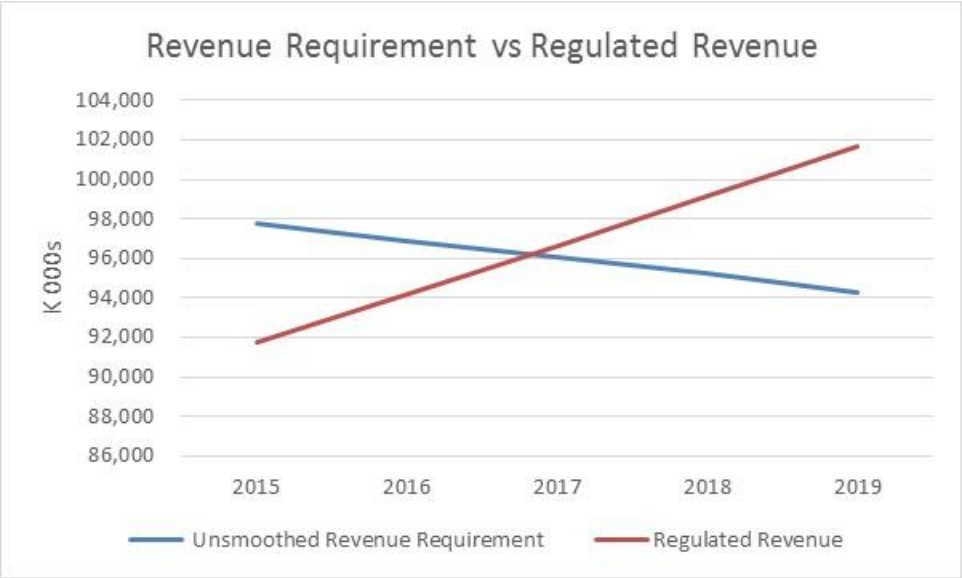
14.8. Water PNG's X Factor

The combination of the initial prices and the X factor will determine the slope of the revenue curve. The following graph shows how the revenue requirement is changes over the regulatory review period. The X factor has been set so that the NPV of the base regulatory revenue is equal to the NPV of the base revenue requirement. The term base regulatory revenue refers to the revenue received when the volumes are multiplied by the base price component of the MAP.

As can be seen from figure 20, the base revenue requirement is higher than current revenue levels (K82 million), but declines over the forecast period. So the Commission has increased the initial maximum price and then set the X factor at a relatively low rate. The Commission generally wants to avoid a situation where prices get too high in 2019 and a large price drop is required in 2020.

The Commission has increased initial prices by 21% and set the X factor to be positive 0.47%.

Figure 20: Water PNG base revenue requirement compare to base regulated revenue



For 2015, the Commission has set the service performance price premium at 0.43 for water and 0.24 for sewerage. This will result in the MAP's shown in the following tables using the 2015 service performance price premium. However the MAP will change in the following years according to Water PNG's actual service level performance.

Table 106: Water PNG's – Maximum Average Water Price

	2015	2016	2017	2018	2019
Water Revenue (K millions)	79.7	81.7	83.8	86.0	88.2
Regulatory Volume (million litres)	14,090	14,390	14,697	15,012	15,334
Average Base Price (K/kilolitre)	5.65	5.68	5.71	5.73	5.75
Service Price Premium (K / kilolitre)	0.43	0.43	0.43	0.43	0.43
Water MAP (K / kilolitre)	6.08	6.11	6.14	6.16	6.18

Table 107: Water PNG's - Maximum Average Sewerage Price

	2015	2016	2017	2018	2019
Sewerage Revenue	12.1	12.4	12.8	13.2	13.5
Regulatory Volume (million litres)	6,344	6,481	6,622	6,765	6,897
Maximum Average Price (K/kilolitre)	1.91	1.92	1.93	1.94	1.96
Service Price Premium (K / kilolitre)	0.24	0.24	0.24	0.24	0.24
Sewerage MAP (K / kilolitre)	2.15	2.16	2.17	2.18	2.20

14.9. Water PNG's Prices

In the same way that the Commission has placed restrictions on Eda Ranu's pricing, the Commission has also placed restrictions on Water PNG's prices.

Specifically the Commission requires that;

- For domestic customers', water and sewerage charges can only be for the actual amount used on the meter. There can be no minimum monthly payments or monthly rentals charged to domestic customers.
- Lower per kilolitre prices will be set the first 20 kilolitres consumed by a customer at a single premise in any particular month.
- For quantities up to 20 kilolitres per month there will be no price adjustment made during the five year regulatory period. This means that the X factor will not apply to these price points and neither will the CPI adjustment or the service performance price premium.
- A maximum average price (MAP) will be adopted for both sewerage and water. Water PNG may choose to vary individual prices to customers as long as the volume weighted average of all its prices does not exceed the MAP.
- The Commission also notes that Water PNG receives additional revenue for various sundry charges such as connections head work etc. The Commission has decided that the revenue received from these activities must be included in the MAPs. This

means that these charges must be classified as either water or sewerage related. Based upon the information supplied by Water PNG the Commission has classified 100% of this as relating to water. This revenue has been included in the calculation of the MAP.

The Commission has determined that the following prices points are adopted for all customers.

Table 108: Water PNG regulated prices for initial quantity

	Water (Kina / kilolitre)	Sewerage (Kina / kilolitre)
Up to 20 kilolitres per month	0.3	0.1

For quantities larger than 20 kilolitres per month Water PNG may choose which price to set as long as the Maximum Average Price is not exceeded and the other pricing restrictions are met. However the Commission has included the following list of prices which Water PNG may choose to adopt if it wishes. These prices have been CPI adjusted later in this section of the report.

Table 109: Water PNG possible price list (before CPI adjustment)

	Water (Kina / Kilolitre)	Sewerage (Kina / Kilolitre)
Band 1 (0 to 20kl)	0.30	0.10
Band 2 More than 20 kl.	6.21	2.17

The Commission notes that this is a substantial increase above current prices and that Water PNG has in the past chosen not to increase its prices up to the maximum allowable price. Water PNG continues to have the discretion to choose to set its prices at levels which are below the maximum price.

Final Determination:

The Commission has determined the following price points apply to all Water PNG's customers:

	Water (Kina / kilolitre)	Sewerage (Kina / kilolitre)
Up to 20 kilolitres per month	0.3	0.1

These price points will not be subject to any X factor adjustment, or CPI adjustments or Service Performance Premium adjustment over the regulatory period.

14.10. MAP Calculation

The following example illustrates how the Commission will assess whether or not a party has exceeded the MAP.

		Example 1	Example 2
Revenue from Water Usage	Kina	5,000,000	5,100,000
Miscellaneous Charges including connections	Kina	100,000	100,000
Total Water Revenue	Kina	5,100,000	5,200,000
Total Billed Water Volume	Kilolitres	851,419	851,419
Average Price (= Total Water Revenue divided by Total Billed Water Volume)	Kina / Kilolitre	5.99	6.11
MAP	Kina / Kilolitre	6.00	6.00

If the average price is less than the MAP then the regulated entity has not exceeded the MAP. So in example 1 above the company has not exceeded the MAP, but in example 2 they have.

14.11. Price Comparison

The following tables provide comparison of prices between Eda Ranu and Water PNG as well has the changes from 2014 to 2015.

Table 110: Comparison of water prices

(kina per kilolitre)	Eda Ranu	Water PNG
2014 average water price	4.05	5.03
New base MAP	2.73	5.65
Service performance premium	0.57	0.43
MAP	3.30	6.08
% Change in average water price	-19%	21%

Table 111: Comparison of sewerage prices

(kina per kilolitre)	Eda Ranu	Water PNG
2014 average sewerage price	1.02	1.46
New base MAP	0.90	1.91
Service performance premium	0.17	0.24
MAP	1.07	2.15
% Change in average sewerage price	5%	47%

From the above comparisons we can see that the gap between Eda Ranu and Water PNG prices has increased. There are four main reasons for this.

1. Eda Ranu has higher volume and a higher concentration of customers on its network than Water PNG. So overall Eda Ranu is able to deliver water to its customers at a lower cost per kilolitre than Water PNG can. This effect will be even greater as Water PNG continue to build networks in small communities.
2. Water PNG has continued to invest in its network at a faster rate than its network is depreciating. So its capital costs have continued to drive up its prices. In contrast Eda Ranu has been investing at a lower rate than its depreciation costs and so its capital costs have continued to fall.
3. The Commission understands that during the last regulatory period Water PNG have not always increased its prices to the maximum allowed by the Commission. This means that Water PNG's 2014 prices were lower than what was required for it to cover its capital costs. In contrast Eda Ranu, has kept its prices at the maximum allowable, but has invested less in its network than was approved in the 2009 regulatory review. This has contributed to the need to adjust prices downwards.
4. For both Eda Ranu and Water PNG the Commission did not approve all their requested costs. However this effect has been greater for Eda Ranu than for Water PNG. The following tables provide a comparison of the operating expenditures requested and the amounts which the Commission have included in the price path.

    - Customer service costs allowed for under the previous regulatory period are likely to have been higher by about 3 million kina.
    - There was K50 million spent in 2006 under the facility fee arrangement that the Commission did not accept. This means that the capital costs are lower than they may have previously been assessed.

Table112: Comparison of requested cost allowances and approved cost allowances for Eda Ranu

Operating Costs	Eda Ranu Requested (K million)	Commission Allowance Provided (K million)	Commission Approved 2015 (K million)
Water Treatment	18.0	18.1	18.1
Administrative	1.7	1.7	1.7
Customer Service	9.0	5.3	5.3
Direct	7.6	5.9	5.9
Labour (base component)	25.4	10.2	10.2
Labour costs (Service Component)		15.1	12.1
Miscellaneous	25.1	13.0	13.0
Maintenance (Service Component)		8.0	6.4
Total Operating Costs	86.7	77.3	72.7

Financing Costs	Actual (K million)	Commission Allowance (K million)	Commission Approved 2015 (K million)
Return on Capital		29.0	29.0
Return of Capital	4.0	6.7	6.7
Facility	22		
Other Finance Costs	0.1		
Total Finance Costs	26	36	36

Total Cost Allowance	112	113	108

Table 113 Comparison of requested cost allowances and approved cost allowances for Water PNG

Operating Costs	Water PNG Requested (K million)	Commission Approved (K million)	Commission Approved (K million)
Labour (base component)	33.8	17.7	17.7
Labour costs (Service Component)		16.1	7.6
Direct	17.2	16.0	16.0
Miscellaneous	16.2	13.7	13.7
Total Operating Costs	67.2	63.6	55.0

Financing Costs		Commission Approved (K million)	Commission Approved (K million)
Return on Capital		36.9	36.9
Return of Capital		13.4	13.4
Total Finance Costs		50.3	50.3

Total Cost Allowance		113.9	105.3

14.12. De-averaged national prices for Water PNG

In the Draft Report, the Commission discussed the merits of de-averaging Water PNG's price by geographic area. In discussions with Water PNG it expressed its view that this would simply have the effect of driving up prices in smaller centres to a level where customers could not afford the service. Water PNG thought that this would be the case despite even where customers were not charged for the use of gifted major assets.

However in its written submission Water PNG noted the idea and said, "*We have to study the impact of this application and advise the ICCC of our decision accordingly".*[4]

The Commission also understands that currently Water PNG receive positive financial contributions from three of the centres it operates in and make losses in the other areas. Because overall Water PNG is making a profit, this means that effectively the three profitable centres are subsidising the other centres.

Assets which are gifted to Water PNG are usually given so that a particular community which does not have a reticulated water network can get one. The Commission also observes that when assets are gifted to Water PNG, for the benefit of a particular community, then the benefit of this gifting is averaged across all Water PNG's customers at the price that all Water PNG's customers pay. There are two possibilities here.

1. The cost of owning and operating the new network (after deducting the cost of the gifted assets) is higher than the average network cost per kilolitre.
2. The cost of owning and operating the new network (after deducting the cost of the gifted asset) is lower than the average network cost per kilolitre.

If the first possibility is true, then the rest of Water PNG's customers are paying a higher proportion of the capital costs of the whole network compared to the customers on the new network. But if the second possibility is true then the rest of Water PNG's customers are paying a lower proportion of the network capital costs as a result of the gifting. At this time, the Commission does not have sufficient reliable information or the budget to carry out the analysis required to determine which of these possibilities is true. Nor has Water PNG provided any evidence that smaller networks cost more than other networks after allowing for gifted assets.

The Commission understands that Water PNG experiences the same problems with illegal connections in small centres as it does in larger centres. Also in smaller centres, many customers may choose to install their own storage tanks. When the water in their tank runs out, then they connect to Water PNG's network. This means that Water PNG may not be receiving sufficient revenue from water usage in an area to cover the cost of operating that area, as customers are in effect only paying for water during the dry season. The Commission sees this situation as problematic. Reasons for customers installing their own storage tanks might include, being cheaper or because Water PNG's network is unreliable. The Commission did see some evidence of this later issue on site visits. Whatever the reasons are, it appears that Eda Ranu needs to engage more with local communities to establish why many residents are not using their network.

Water PNG classifies its water centres according to their scale as follows.

Table 114: Water PNG classification of its water centres

Type 1	Large Centre – 1 centre – Lae
Type 2	Medium sized centres – 12 centres
Type 3	Small sized centres - 5 Centres

With the "Millennium Targets", the Commission expects that the number of Type 3 centres operated by Water PNG will increase. And that at some point, Water PNG will no longer be

able to cross subsidise these unprofitable centres. If these new centres are not profitable, then in order for Water PNG to continue to operate as a commercial entity, it will need to either;

- Stop building networks in new centres or
- Find a new business model for delivering service to new centres.

New business models might include;

- Community operation and ownership of assets facilitated by Water PNG.
- Government funding of CSOs (Community Service Obligations).
- Providing communities with clean water sources which do not include reticulated networks.
- Partial private ownership of some network assets (such as water storage tanks on private property).

Whatever business model is chosen for new networks, the Commission is required under law to protect both the interests of consumers and the interests of Water PNG as a commercial entity. If consumers in Lae are paying large cross subsidies then their interests are not being protected. Equally if Water PNG is building unprofitable new networks then it is not behaving as an efficient commercial organisation.

The current value of gifted assets on Water PNG's books equates to a cost of K2.30 kina per kilolitre. So in effect, gifting has reduced prices for all Water PNG's customers by this amount. However without knowing the incremental costs of providing water to Type 3 centres, the Commission is not in a position to estimate the current level of subsidy, if any, between networks.

While the Commission accepts the situation for now, it expects to carry out a more in depth review of the costs of cross subsidies when it carries out the 2019 price review. The Commission is therefore now providing Water PNG with advance warning that Water PNG will be expected to be able to separate its assets and its direct operating costs by geographic area and to provide this information to the Commission in a timely manner in 2019.

14.13. CPI Adjustments for 2015

The prices calculated in this report are based upon 2014 PNG Kina values. Every year the Commission makes adjustments to regulated prices to reflect the effect of inflation. The Commission's standard method of doing this is to use the PNG Consumer Price Index excluding alcohol tobacco and betel nut. The following formula applies;

$$CPI_t = \left(\frac{CPI\ March_{t-1} + CPI\ June_{t-1} + CPI\ Sept_{t-1} + CPI\ Dec_{t-2}}{CPI\ March_{t-2} + CPI\ June_{t-2} + CPI\ Sept_{t-2} + CPI\ Dec_{t-3}} \right) - 1$$

Where:

year t is the year for which tariffs are being set
year t-1 is the previous regulatory year
year t-2 is the previous regulatory year two years previous
year t-3 is the previous regulatory year three years previous

The result of this calculation using latest data for Sept 2014 is 3.94%. Thus the Commission has made the CPI adjustments to the pricing outputs of this report.

Table 115: 2015 CPI adjusted numbers

	Eda Ranu 2014	Eda Ranu 2015	Water PNG 2014	Water PNG 2015
Water MAP (K/ kilolitre)	3.30	3.43	6.08	6.32
Sewerage MAP (K / kilolitre)	1.07	1.11	2.15	2.23
100% of water Service Performance Premium (K / kilolitre)	0.709	0.737	0.914	0.950
100% of sewerage Service Performance Premium (K / kilolitre)	0.214	0.222	0.507	0.526
Awarded water Service Performance Premium (K / kilolitre)	0.57	0.59	0.43	0.45
Awarded sewerage Service Performance Premium (K / kilolitre)	0.17	0.18	0.24	0.25

The following tables below illustrate how Eda Ranu and Water PNG might choose to set their prices after allowing for the CPI adjustment.

Table 116: Eda Ranu 2015 Price List after CPI adjustment

	Water (K / kilolitre)	Sewerage (K/kilolitre)
Band 1 (0 to 15kl)	0.30	0.10
Band 2 (15.1kl to 35kl)	0.30	0.10
Band 3 (35.1kl to 50kl)	1.55	0.50
Band 4 (50.1kl to 75kl)	1.55	0.50
Band 5 (75.1kl to 100kl)	1.55	0.50
Band 6 (100.1kl to 150kl)	2.98	0.97
Band 7 (more than 150 kl)	3.81	1.25

Table 117: Water PNG 2015 Price List after CPI adjustment

Band	Water Price (K / kilolitre)	Sewerage Price (K/ kilolitre)
Step 1	0.30	0.10
Step 2	6.46	2.25

Final Determination:

The Commission has set pricing parameters for each water company.

	Eda Ranu	Water PNG
2015 Water MAP (Maximum Average Price) – Kina per kilolitre	3.43	6.32
2015 Sewerage MAP (Maximum Average Price) – Kina per kilolitre	1.11	2.23
2015 Water Service Performance Premium – Kina per kilolitre	0.59	0.45
2015 Sewerage Service Performance Premium – Kina per kilolitre	0.18	0.25
X Factor	Negative 4.21%	Positive 0.47%

This means that average prices have changed by the following amounts.

Initial Water Average Price Change	Negative 18%	Positive 21%
Initial Sewerage Average Price Change	Positive 5%	Positive 47%

15. Service Levels

Currently both Eda Ranu and Water PNG each have different service level measures for water and sewerage service quality. This has come about because, when the original service quality measures were chosen, the Commission felt it was better to allow each organisation to develop its own measures of performance. The logic was that each organisation would choose targets which it was able to achieve and then improve on. The Commission continues to hold the view that if an organisation can't measure its performance, then it cannot improve its performance.

15.1. Current service level measurement

The following list of measures are currently monitored and reported on by Eda Ranu and Water PNG.

Water Reliability Measures

Eda Ranu has the following reliability measures for its water network.

- Water leaks/breaks per 1000 rateable properties per year.
- Unplanned interruptions per 100km main per year
- % Service Restored within 5 hours for unplanned interruptions

Water PNG has a more comprehensive set of reliability measures;

- Reliability target (>97% of total hrs/month)
- Unplanned interruptions per 100km/month.
- Unplanned interruptions per 1000 customer
- Optimum pressure (95% >10 head).

Water Quality Measures

Eda Ranu has a more comprehensive set of water quality measures;

- Compliance with WHO water drinking guidelines
- Drinking water quality complaints per 1000 rateable properties/ year
- Drinking water quality Incidences/year

Water PNG has the following water quality measures;

- Turbidity Compliance (90% <5ntu)
- FAC Compliance (Chlorine Residual).

Sewerage Reliability Measures

Eda Ranu has the following sewerage reliability measures;

- Total Sewerage Overflows per 100km main per year
- Sewerage overflows to customer property per 1000 rateable properties per year

- Eda Ranu says it is considering replacing this with a different measure. As a possibility it is considering “Annual Volume of Leakage”.
- Service main breaks and chokes per 100 km main / year

Water PNG does not currently appear to have sewerage service quality measures in place.

Sewage Treatment Quality

Neither Eda Ranu nor Water PNG measures sewage treatment quality.

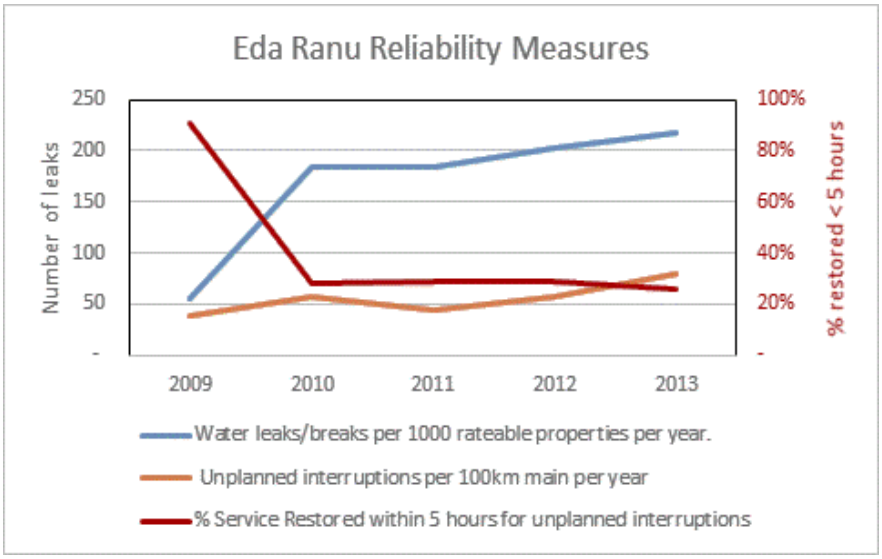
15.2. Past performance

While the companies apply differing approaches to water quality measurement, both demonstrate a clear commitment to the measurement and publication of service quality. Current key issues are:

1. Poor water availability in a number of areas for both companies.
2. High levels of water loss through leakage, illegal connections and sustained non-payment of water invoices.
3. A lack of automation of water system performance measurement, leading to a reliance on manual assessment of performance which in turn is likely to be subject to error.
4. Complete lack of measurement of sewage treatment quality.

Eda Ranu Water Reliability

Figure 21: Eda Ranu reliability measures



Eda Ranu has become less reliable over the regulatory period. The number of leaks in its network is increasing on both per customer and distance based measures. In addition Eda Ranu is taking longer to restore service when there are interruptions.

Water PNG Water Reliability

Water PNG did not provide figures for 2013 when requested. However the Commission does have access to 2012 results. Results were only produced for 13 of the 19 locations in which it operates.

Of these 13 locations 5 did not achieve the target of 97% availability. 97% availability represents 22 hours per month with no water. In the Commission's opinion this should not be a difficult target to achieve and exceed. In Alotau, Water PNG only achieved 78% availability, which equates to 158 hours in a month with no water.

The Commission is of a view that 99% availability would be a more appropriate target and invited Water PNG to comment on what would be required to achieve this target. Water PNG however did not provide any comment.

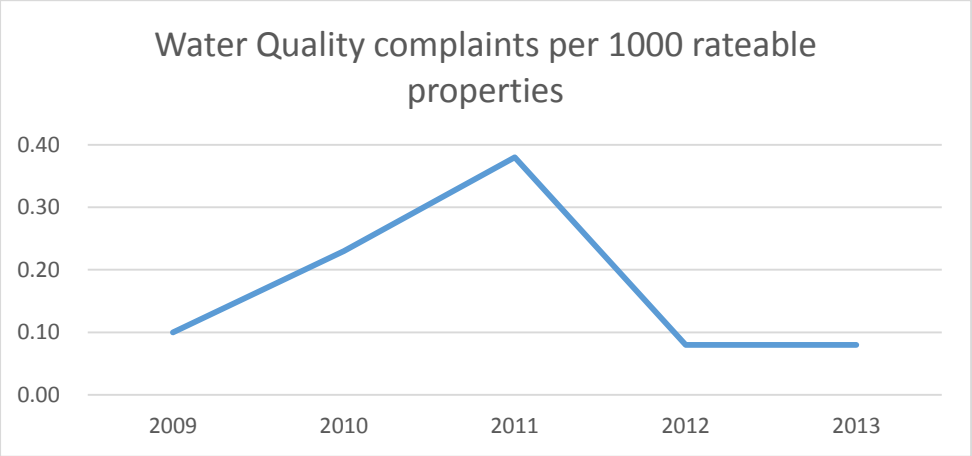
In 2012 Water PNG experienced an average of 8 unplanned outages per 100km and an average of 1 unplanned outage per 1000 customers. This compares to Eda Ranu who had 58 leaks per 100 km of main and 200 leaks per customer in 2012. (The Commission notes that these two measures are not directly comparable.) However, it would also appear that given the high level of unavailability, some of these unplanned outages may have taken a long time to fix.

In the Draft Report the Commission requested that Water PNG report on its current level of performance. However the Commission has still not received a response to this request.

Eda Ranu Water Quality

Eda Ranu reported to the Commission that it has consistently met the WHO standards for drinking water quality and that the number of water quality incidents has been consistently below 5 per year. The following chart shows that the number of complaints did increase but has now declined again.

Figure 22: Eda Ranu water quality complaints per 1000 rateable properties



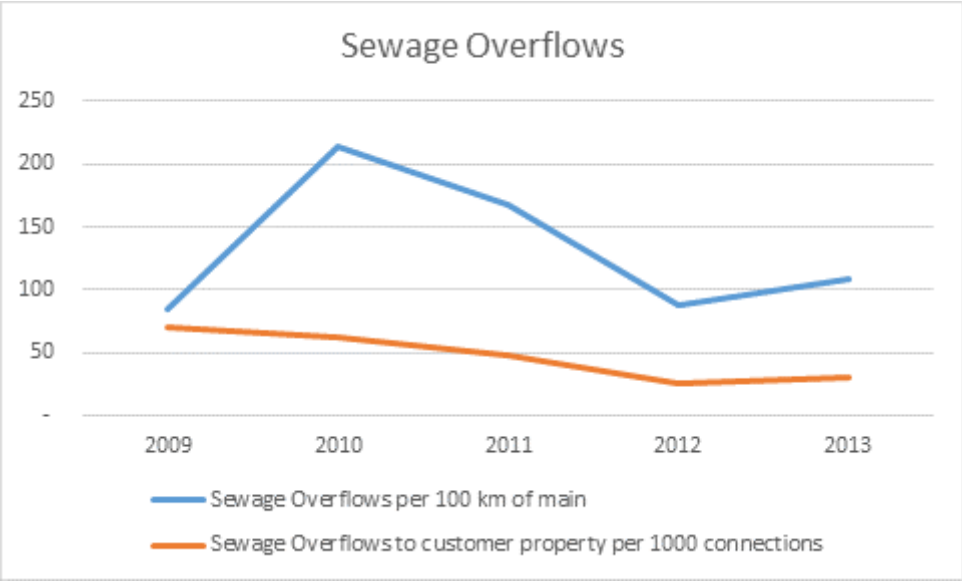
Water PNG Water Quality

In 2012, 8 of the 13 areas to which Water PNG provide service failed quality measures. Only 5 centres achieved the turbidity compliance measure and 3 centres failed the chlorine residue test.

Eda Ranu Sewerage Reliability

The number of Eda Ranu sewerage overflows increased early in the regulatory period, but has returned to earlier levels now.

Figure 23: Eda Ranu sewerage overflows



15.3. A common set of measures

In the Draft Report, the Commission proposed that a single common set of measurements would be beneficial for consumers in Papua New Guinea. The Commission envisaged that Eda Ranu and Water PNG form a joint working party to agree on common standards for the measurement and reporting of water and sewerage services. The Commission has since held a meeting with both Eda Ranu and Water PNG to discuss the matter and both parties agreed in principle to having a common set of measures. While there has been some discussion about what the measures might be, the agreed measures have yet to be formalised.

The Commission recommends that Water PNGs measurements of water reliability are more comprehensive than those of Eda Ranu and should be the basis for common measures. Likewise the Commission thinks that Eda Ranu's measurements for water quality are more comprehensive than those of Water PNG and these should become the basis for a common set of measures for water quality. In addition, the Commission recommends that any adopted World Health Organisation (WHO) compliance standards should be specifically stated. The Commission recommends all adopted tests are carried out monthly by pumping / water tank service area.

Sewage treatment service levels are recommended to be based on the standards used by Eda Ranu, with an agreed set of WHO sewage treatment measurement standards.

The Commission also of a view that as environment issues become more important over time, some focus will need to be brought on sewage treatment quality. The Commission has discussed this with Eda Ranu and Water PNG and it has been agreed to introduce some measurement of the quality of outflows from their sewage treatment facilities.

Upon receipt of the report proposing a common set of water and sewerage service level measurements for Eda Ranu and Water PNG, the Commission will review and comment on the proposal for unified water and sewerage service levels within three months of receipt of the report. The Commission reserves the right to amend the agreed common set of water and sewerage service levels if it believes that the proposed service levels are not adequate to provide safe and improving water and sewerage service quality measurements.

Most service levels are manually measured and the Commission believes that some important areas of service quality reporting may be missed at times where staff shortages or delays in responding to problems could lead to inaccurate reporting.

The Commission believes that service level reporting, and the ease of independent verification, would be enhanced if key performance characteristics were captured and reported automatically and in real time through the use of telemetry systems.

15.4. Price linkages to service performance

As previously discussed the Commission is linking the price which customers pay to service quality provided by Eda Ranu and Water PNG. The Commission has decided to set the total allowance for service quality to the Service Performance Premiums shown in the following table. These have been calculated as shown in the table.

Table 118: Calculation of Service Performance Price Premium

	Eda Ranu	Water PNG
Allocated performance value (K million)	23.1	16.1
Total Water Volume 2015 (million kilolitres)	26.1	14.1
Total sewage volume 2015 (million kilolitres)	21.6	6.4
Weighting on Water (%)	80%	80%
Weighting on Sewerage	20%	20%
Water performance allocated value (K million)	18.5	12.9
Sewage performance allocated value (K Million)	4.6	3.2
Water Service Performance Premium (K per kilolitre)	0.709	0.914
Sewage Service Performance Premium (K per Kilolitre)	0.214	0.507

Because 2015 will be a transition year, while Eda Ranu and Water PNG set up their systems and processes to measure the required performance measures, the Commission has decided to set the Service Level Premium for 2015. These have been set as shown in the following table (Table 120).

Table 119: Service Level Premium for 2015

	Eda Ranu	Water PNG
Approved 2015 Transition	80%	47%
Water Service Performance Premium (K per kilolitre)	0.57	0.43
Sewage Service Performance Premium (K per Kilolitre)	0.17	0.24

This means that the Commission has decided that for 2015, Eda Ranu will receive 80% of the total service performance premium in their prices. And Water PNG will receive 47% of the service performance premium in their prices.

In setting these premiums, the Commission has considered the current level of financial stress, which each organisation might face given, the various decisions made by the Commission in this determination.

It should be noted that these Service Performance Price premiums will only apply in 2015. In 2016 to 2019, the Service Performance premium will depend upon each organisations actual performance. If either organisation fails to put in place adequate measures of performance,

then the Service Performance Premium will either be set at zero or will be constrained by the particular measures which each organisation has put in place.

The Commission has decided that there should be service measures which cover;

- Water Reliability
- Water Quality
- Sewerage Reliability
- Sewerage Treatment Quality

Each service quality measure will be weighted to determine what proportion of the price premium is driven by each measure. The Commission is proposing to use the performance measures with the weightings shown.

Table 120: Service Measure Weightings

Water Reliability	Weighting % of Total	Weighting % of Water Price Premium	Weighting % of Sewerage Price Premium
Water Breaks per 1000 rateable properties	10%	12.5%	
Unplanned Interruptions per 100 km of main	10%	12.5%	
% service restored within 5 hours	20%	25%	
Water Quality			
Incidents per 1000 rateable properties	40%	50%	
Sewerage Reliability			
Sewage Overflows per 100 km of main	5%		25%
Sewage Overflows to customer property per 1000 connections	5%		25%
Sewage Treatment Quality			
Test Failures	10%		50%

For each measure the Commission has created a sliding scale. The service provider's performance against each measure will determine how much of the available price premium it will be able to charge for the following 12 months. To provide an incentive to improve performance levels, the Commission has set the Premium so that up to 120% of the allowance can be earned on any particular measure. The following table shows the measures which the Commission has proposed and the % premium that can be earned by achieving each level of service.

The Commission has decided to use the following scales for this purpose.

Table 121: Performance Standards – Sliding scales

% Premium Earned	10%	20%	30%	40%	60%	80%	90%	100%	110%	120%
Water Reliability										
Water Breaks per 1000 rateable properties	200	150	110	90	70	60	50	40	30	20
Unplanned Interruptions per 100 km of main	75	70	65	60	55	50	45	40	35	30
% service restored within 5 hours	40%	45%	50%	65%	70%	75%	80%	85%	90%	95%
Water Quality										
Incidents per 1000 rateable properties	0.67	0.60	0.53	0.47	0.40	0.33	0.27	0.20	0.13	0.07
Sewerage Reliability										
Sewage Overflows per 100 km of main	150	116	97	80	65	52	41	32	25	20
Sewage Overflows to customer property per 1000 connections	59	49	40	32	25	19	14	10	7	5
Sewage Treatment Quality										
Test Failures	78	66	55	45	36	28	21	15	10	5

The following is an example of how the Commission will use these scales for a single measure.

Table 122: Example of price premium calculation.

Water Breaks per 1000 rateable properties		
	% Weighting	10%
Times	Performance standard achieved = 49	80%
Equals	Proportion of premium earned	8%
Times	Value of Premium (toea)	71
Equals	Premium earned (toea)	5.7

So in this example, if the company has 49 water breaks per 1000 rateable properties, then this means that it has achieved 80% of the service standard. The weighting for this particular service standard is 10%. The two numbers are multiplied together to calculate the proportion of the total premium earned. In this case, 5.7 toea per kilolitre of water.

The same calculation would be applied to all the service measures to identify what the total Service Performance Premium would be. So for example if Eda Ranu achieved the results shown in the following table, the service price premium for Eda Ranu would be set at 44.6 toea per Kilolitre.

Table 123: Example of calculation of total service price premium for Water

	Weighting	Achievement	% Premium Earned	Price Premium (Toea / Litre)
Water Breaks per 1000 rateable properties	12.5%	74	50%	4.4
Unplanned Interruptions per 100 km of main	12.5%	54	60%	5.3
% service restored within 5 hours	25%	80%	90%	16.0
Incidents per 1000 rateable properties	50%	0.20	100%	35.5
Total Water Service Price Premium				61.2

Table 124: Example of calculation of total service price premium for Sewerage

Sewage Overflows per 100 km of main	25%	41	90%	4.8
Sewage Overflows to customer property per 1000 connections	25%	19	80%	4.3
Sewerage Test Failures	50%	15	100%	10.7
Total Sewerage Service Price Premium				19.8

As previously described, the Service price premium will be added to the base price component for all prices, except for the low user prices.

Final Determination:

The Commission's Final Determination is to impose service measures against water quality and reliability; and sewerage treatment quality and reliability.

Final Determination:

The Commission has determined that the following service level premium will apply in 2015, the initial year of the five-year regulatory period:

	Eda Ranu	Water PNG
Approved 2015 transition	80%	47%
Water Service Performance Premium (K per kilolitre)	0.57	0.43
Sewage Service Performance Premium (K per Kilolitre)	0.17	0.24

15.5. Report on proposed service level measurement

The Commission requires that Eda Ranu and Water PNG report in detail on their plans for the installation of telemetry systems that will support the automatic collection of service quality information. Where Telemetry systems already exist the report should describe their adequacy for the task. This report is to be provided by 1st July 2015.

This report should include the following.

- A detailed description and definition of each measurement and how it will be measured.
- A description of how the results can be independently verified.
- Where capability does not already exist to carry out the proposed measures, then a detailed plan and timeline to implement the capability to measures make the proposed measurements must be included.
- If appropriate each party may also propose to the Commission that the sliding scales be changed. For example, in discussions with Water PNG it was proposed that separate standards be applied to some parts of Water PNG's network. The Commission would therefore expect Water PNG to outline in detail in their report to the Commission on exactly how standards should vary for different parts of their network.
- The Commission may choose to accept, reject or modify any proposal made by either party.

The Commission notes that if either party fails to present the required report, then no service price premium will be awarded by the Commission for 2016 or subsequent years or until such time as the report is presented.

Once it is established and agreed exactly how performance measurement will be carried out, then results should be published monthly by pumping station and water tank. Monthly Reports should include all reasons for loss of service – planned and unplanned.

16. Related Issues

Access to affordable and reliable clean water and sanitation can contribute significantly to the wellbeing of Papua New Guinea's population which in turn can translate into increased productivity and hence economic growth for the country. There are a number of social and health related benefits to accessing sufficient water for household purposes and for basic hygiene requirements. There are also other benefits associated with the long-term economic development of PNG which are directly linked with the prudent management of water resources.

These benefits are referred to as positive externalities as they are benefits which occur in the secondary market which cannot be directly quantified. Therefore, it is important to note that water can be regarded as both an economic and social good and the effective management of water resources can have important development, economic and environmental implications. This section discusses these important interrelationships, their impacts on the PNG economy, and importantly the impact that these relationships have on the costs of managing the water networks.

16.1. Social

In the 2009 Review of water and sewerage charges, the Commission noted that access to these services was essential throughout PNG more importantly for the urban areas. Desirably all Papua New Guineans, wherever they reside, should have access to potable water of an appropriate standard and access to appropriate sewage collection and treatment facilities. However, the geography of the country makes this scenario impossible. The Commission expects Eda Ranu and Water PNG to submit capital expenditure plans which will in large part address the potential extension of the current networks beyond their existing boundaries, but in a manner which takes recognition of the limited financial resources available and the geographic circumstances of PNG.

The Commission considers this to be an ongoing task for each service provider.

The positive externalities discussed above often accrue in the form of social benefits. These benefits include reduction in water borne diseases, which in turn contribute to reduced pressure and demand on the public health system. Indeed there are numerous international and national water quality standards with which both Eda Ranu and Water PNG are required to observe and comply.

However, the Commission has recognised 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.

16.2. 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 direct impact of water tariffs upon inflation appears to be minimal, 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 as an input in the production of other goods, 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 in the hotel, food processing and manufacturing sectors, including soft drink production and breweries.

The Commission has not received any submissions on the impact of increase in the water tariff on the prices of goods in secondary markets and therefore is of the view that the approach which the Commission adopts to set the prices for water is reflective the efficient costs of providing the services and the prices may not have a great impact on other sectors of the economy.

16.3. Environmental

In addition to the traditional economic and social issues associated with water pricing, the Commission notes the increasing importance of environmental issues associated with the provision of water and sewerage services. These environmental issues particularly relate to the provision and treatment of sewage disposal through the ocean outfalls which are dotted along the PNG coastline. Furthermore, the Commission notes that the potentially high environmental costs of creating dams for 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 potential impacts on the environment.

Discussion

Water PNG stated that it follows conventional method of treating sewage in all its centres though the coverage of its sewerage system is as low 10% of the total water connections. In adopting the conventional method of treatment, the following are the advantages and disadvantages:

- Very effective at stabilising organic wastes in confined natural manner
- May cause odour nuisance or insect breeding if banks are not regularly cleared of grass and other growth and if periodic scum/sludge removal is not done.
- Virtually maintenance free & minimal operation and maintenance costs

- Requires effluent discharge to reasonably sized river to ensure proper dilution and dispersion.
- Ability to balance variable wastewater flows
- Requires large area of land, preferably, located away from developed areas.
- Suitable for sites with ample flat areas, at least 5 km downwind from developed areas
- Requires chlorination of effluent to meet acceptable bacterial standard.

The conventional method is used in big centres such as Lae, Madang and Mt. Hagen. Nevertheless, Water PNG submitted that there are alternate approaches as custom designed mechanical plants, package sewage treatment plant which are effective in treating sewage but at a very high cost and which need engagement of highly skilled manpower. Water PNG uses mechanical plant in Kundiawa while for the rest of its centres it uses large septic tanks where the system is very small and the whole population is not sewered.

Eda Ranu submitted that there can be improvement in the method of treatment of sewage and it is working with the National Government to improve the sewerage services in Port Moresby, particularly on the coastal strip. Eda Ranu currently treats the majority of collected sewage at the Waigani Swamp where it receives secondary treatment before it is discharged into the Swamp, which acts as a natural treatment plant by breaking down any remaining wastes via normal biodegradation. The remaining sewerage not treated at the Waigani treatment plant is given primary treatment before being pumped out to sea along a three kilometre ocean outfall pipeline.

The Commission notes that Water PNG is faced with challenges on how best to treat sewage to minimise environmental impact because of different sewerage networks through the centres it operates. In addition, the Commission notes that the Water PNG's ability to employ advanced technology to treat sewage is limited in the short run given its diverse networks in the country, and the high cost of such plant. However, Water PNG must seek to ensure that the sewage is treated in compliance with the international and national health standards to minimise environmental damage, and danger to downstream human populations.

As for Eda Ranu, the Commission notes that it is in the process of improving its sewerage network as it is currently negotiating the loan arrangement for the Port Moresby Sewerage System Upgrade. This project, if implemented will be the largest capital expenditure program for Eda Ranu and will improve the sewage treatment in Port Moresby. The Commission notes that in the next regulatory period from 2014 to 2019, Eda Ranu has not included the capital expenditure requirements for this project in its cost forecasts. This suggests the project will not be implemented before 2019. Given that the project was originally forecast to occur in the period from around 2006 to 2008, the Commission would encourage Eda Ranu to work towards the projects implementation in a shorter time than is currently envisaged.

The Commission recognises that there is an on-going need to treat sewage but improvement in the current sewage treatment has not been provided for the capital expenditure requirements.

16.4. Illegal Connections

A major issue faced by both Water Utilities is illegal connections particularly in settlement areas. In Port Moresby, alone it is very hard to address the issue of illegal connections in the settlement areas. Water PNG has come up with the idea of using a prepaid card for the customers to use at the settlement areas and access water. The Commission understands that Eda Ranu run various programs to address this issue, with varying levels of success.

The National Research Institute wrote in its submission;

> *"These are serious issue faced by Water PNG and Eda Ranu in the wake of rapid development of squatter settlements in urban centres, especially Port Moresby… it was indicated that a pre-paid card system is being implemented by Water PNG to curtail this issue. But how could this address the issue and isn't it the case of non-payment of bills? How this is reflected in the operating costing of the water providers and that those responsible for such problems accruing costs are ongoing challenges the water utilities' grapple with. However the conventional approach has treated this as a fixed cost of network operations, and hence it would be relevant to factor that in the deliberations."*[5]

The Commission can do little to assist Eda Ranu and Water PNG in regard to illegal connections. However the Commission is of the view that the regulatory regime in place gives both parties clear natural incentives to reduce illegal activity.

For Eda Ranu, the Commission has specifically recognised illegal water usage as a variable cost and set targets for its reduction over the regulatory period. The Commission has not done the same for Water PNG because Water PNG does not pay a third party for water on a per kilolitre basis. However Water PNG also has a natural incentive to reduce the level of illegal water usage.

17. Cost Pass-Through Arrangements

Cost pass through events and processes are sometimes included in price control arrangements to allow the regulator to factor in the effects of unanticipated events which either raise or lower costs for the regulated business in a substantial manner. This is necessary to ensure that the regulated water entities are not severely disadvantaged by changes in circumstances which have not been accommodated for appropriately in the price path agreed and set.

In its 2009 Final Determination, the Commission allowed both Water PNG and Eda Ranu in making their annual tariff submissions to request tariff adjustments to incorporate effects of a pass through event seen during the regulatory period. Pass through events allowed for consideration by the Commission were;

- a change in taxes;
- an act of terrorism;
- major natural disaster; or
- an augmentation event requiring capital expenditure which was not forecast during the regulatory reset.

The Commission believes these pass through events are still relevant. When Eda Ranu and Water PNG are migrated to regulatory contracts, then provisions will be included in these contracts to allow for such events. Until then the current arrangements will remain in place.

Final Determination:

The Commission will regard the following as cost pass-through events for the forthcoming regulatory period commencing on the date of publication of the Water and Sewerage Pricing Order in the National Gazette:

- **a change in taxes;**
- **an act of terrorism;**
- **major natural disaster; or**
- **an augmentation event requiring capital expenditure which was not forecast during the regulatory reset.**

18. Reviews

18.1. Capital Reviews

Because the Commission has traditionally pre-approved all major capital spending, the Commission usually carries out some sort of mid-term review. The purpose of the review is to identify whether or not the regulated entities have actually implemented the capital projects as outlined in the pricing review.

Because the current pricing review did not include any major capital spending, a mid-term review of capital spending will not be necessary. Instead the Commission will carry out an annual review of major capital spending if any occurs. As outlined in Section 10.6, titled "treatment of forecast capital expenditure", the Commission is proposing to adjust the RAB annually to reflect completed major capital projects. The Commission will expect both Eda Ranu and Water PNG to present evidence of their actual capital spending and explain how each project conforms with the list of requirements outlined by the Commission in this report and benefits customers.

If any such capital spending is approved in this way, it will result in a price increase over and above the X factor adjustment.

Final Determination:

The Commission will not carry out a mid-term review of capital expenditure because the current review excludes any major capital spending; instead the Commission will carry out an annual review of major capital spending if any occurs.

18.2. Service Performance

The Commission has decided to continue to carry out annual reviews of the service performance of both Eda Ranu and Water PNG. As discussed earlier in this report the Commission has introduced a price component that is dependent upon actual performance against a list of performance measures. The level of performance achieved on each of these measurements will determine the service price premium. This premium will be added to the respective regulated entities' prices.

A review will be carried out at the end of each year to determine the service price premium for the following year. Both Eda Ranu and Water PNG will be required to demonstrate that they have systems and processes in place to accurately measure their performance against each measure. If they cannot demonstrate accurate and reliable measurement against any of the required measurements then they will not be awarded any part of the service price premium allowance for that particular measure.

Final Determination:

The Commission will carry out annual reviews of the service performance of both Eda Ranu and Water PNG to determine the service price premium for each following year throughout the forthcoming regulatory period.

18.3. Annual Price Adjustments

The Commission has determined to continue to follow a similar process for annual price reviews along the lines of the current process. Both Eda Ranu and Water PNG will apply to the Commission for an annual price adjustment by submitting the information required by the Commission to the Commission by a particular date. The Commission will then assess their application in terms of;

- The X factor to be applied,
- CPI adjustments to be made,
- Price adjustments to reflect capital spending, and
- Price adjustment to reflect current service levels for the previous 12 months.

Final Determination:

The Commission will carry out annual price adjustments whereby Eda Ranu and Water PNG will apply to the Commission for the price adjustment by submitting the information required by the Commission to the Commission by a particular date.

19. Final Price Order

This section details the Commission's Final Price Order for water and sewerage services for the five year regulatory period commencing 1st January 2015; however implementing the water and sewerage tariffs on the date of publication of this pricing order in the National Gazette.

19.1. Period of price direction

The provisions below which will continue to apply to Eda Ranu and Water PNG for a five year (5) period inclusive of 01st January 2015 to 31st December 2019.

19.2 Services to be regulated

The following services will be regulated by the Commission and the price for these services will be subject to the formulas and other arrangements set out in the following sections.

Eda Ranu's services to be regulated	Water PNG services to be regulated
• The provision of water services (including the availability of supply) to domestic, commercial and industrial premises. • The provision of sewerage services (including the availability of supply) to domestic, commercial and industrial premises. • Miscellaneous monopoly services necessary for the provision of water and sewerage services including but not limited to connection fees and reconnection fees and other services such as provision of Public/Community bulk meters.	• The provision of water services (including the availability of supply) to domestic, commercial and industrial premises. • The provision of sewerage services (including the availability of supply) to domestic, commercial and industrial premises. • Miscellaneous monopoly services necessary for the provision of water and sewerage services including but not limited to connection fees and reconnection fees and other services such as provision of Public/Community bulk meters.

19.3 Maximum Average Price formula

$$MAP_{(Y=1)} = (MAP_{(y=0)} - SP_{(y=0)}) \times (1 + CPI \quad + X) + SP_{(y=1)} \times (1 + CPI) \; + OverUnderAdj$$

Where;

$MAP_{(Y=1)}$ = the Maximum average price in the current year

$MAP_{(y=0)}$ = the Maximum average price in the previous year

CPI = the CPI adjustment based upon the inflation in the previous year

$X\ Factor$ = the X factor

$SP_{(y=0)}$ = the Service Price Premium for the previous year

$SP_{(y=1)}$ = the Service Price Premium in the current year

$OverUnderAdj$ = the adjustment to reflect the over or under recovery of the Maximum average price for the previous year.

19.3.1 Eda Ranu's maximum average price

Where X Factor, over the regulatory period is as follows:

Year y	X Factor
2015	-4.21%
2016	-4.21%
2017	-4.21%
2018	-4.21%
2019	-4.21%

The price points to apply to Eda Ranu in the initial year, y = 2015 are as follows:

Water MAP, y=1 (Kina per kilolitre)	3.43
Sewerage MAP, y=1 (Kina per kilolitre)	1.11
Water SP, y=1 (Kina per kilolitre)	0.59
Sewerage SP, y=1 (Kina per kilolitre)	0.18
X Factor	-4.21%

Initial average price change for water is -18% and for sewerage is +21%.

For each other year y over the regulatory period, the MAP will change upon Eda Ranu's actual service performance (SP); and changes in CPI.

CPI for the 12 month period ending 30th September in regulatory year t is calculated as follows:

$$\mathrm{CPI}_t = \left(\frac{\mathrm{CPI\ March}_{t-1} + \mathrm{CPI\ June}_{t-1} + \mathrm{CPI\ Sept}_{t-1} + \mathrm{CPI\ Dec}_{t-2}}{\mathrm{CPI\ March}_{t-2} + \mathrm{CPI\ June}_{t-2} + \mathrm{CPI\ Sept}_{t-2} + \mathrm{CPI\ Dec}_{t-3}} \right) - 1$$

Where:

Year t is the year for which the tariffs are being set
Year t-1 is the previous regulatory year
Year t-2 is the previous regulatory year, two years previous

Year t-3 is the previous regulatory year, three years previous

The result of this calculation using latest data for Sept 2014 is 3.94%. Thus the Commission has made the CPI adjustments to the pricing outputs that will apply in 2015.

Should the CPI data for 30th September for any regulatory year not be available in a timely manner, for whatever reason, the Commission shall have the discretion to vary the formula for calculating the CPI_t accordingly, to that approved by the Commission.

19.3.1.1 Minimum monthly charge or access fee

No minimum monthly charge or access fee shall be charged. Eda Ranu's customers can only be charge for the actual quantity of water or sewerage used as determined by their meter. Eda Ranu will charge a defined quantity at a lower price. This price will not be subject to any X Factor adjustment, or CPI adjustment, or Service Performance Premium adjustment.

Initial Quantity per Month (kilolitre)	35
Maximum Sewerage Price (Kina per kilolitre)	0.10
Maximum Water Price (Kina per kilolitre)	0.30

The Commission will review this price point in 2017.

19.3.2 Water PNG maximum average price

Where X Factor, over the regulatory period is as follows:

Year y	X Factor
2015	+0.47
2016	+0.47
2017	+0.47
2018	+0.47
2019	+0.47

The price points to apply to Water PNG in the initial year, y = 2015 are as follows:

Water MAP, y=1 (Kina per kilolitre)	6.32
Sewerage MAP, y=1 (Kina per kilolitre)	2.23
Water SP, y=1 (Kina per kilolitre)	0.45
Sewerage SP, y=1 (Kina per kilolitre)	0.25
X Factor	+0.47%

Initial average price change for water is +5% and for sewerage is +47%.

For each other year y over the regulatory period, the MAP will change upon Water PNG's actual service performance (SP); and changes in CPI.

CPI_t is as specified above.

19.3.2.2 Minimum monthly charge or access fee

No minimum monthly charge or access fee shall be charged. Water PNG's customers can only be charge for the actual quantity of water or sewerage used as determined by their meter.

Water PNG will charge a defined quantity at a lower price. This price will not be subject to any X Factor adjustment, or CPI adjustment, or Service Performance Premium adjustment.

Initial Quantity per Month (kilolitre)	20
Maximum Sewerage Price (Kina per kilolitre)	0.10
Maximum Water Price (Kina per kilolitre)	0.30

The Commission will review this price point in 2017.

19.4 Service Performance Premiums

The Commission is linking the price which consumers pay to the quality of the service provided by Eda Ranu and Water PNG. The total allowance for service quality has been set to the Service Performance Premiums (SP). The Service Performance Premiums for each water entity is calculated as follows:

19.4.1 Eda Ranu

Allocated performance value (K million)	23.1
Total Water Volume 2015 (million kilolitres)	26.1
Total sewage volume 2015 (million kilolitres)	21.6
Weighting on Water (%)	80%
Weighting on Sewerage (%)	20%
Water performance allocated value (K million)	18.5
Sewage performance allocated value (K Million)	4.6
Water Service Performance Premium (K per kilolitre)	0.709
Sewage Service Performance Premium (K per Kilolitre)	0.214

The Commission has decided to set the Service Performance Premiums for Eda Ranu, for the transition year 2015 as follows:

Weighting on Water (%)	80%
Water Service Performance Premium (K per kilolitre)	0.57
Sewerage Service Performance Premium (K per kilolitre)	0.17

The SP awarded to Eda Ranu for the transitional year 2015, has shown separately here is **not** adjusted for CPI. CPI adjustment to SP is made in the MAP formula, in this case the CPI is +3.94% in 2015 and is reflected in the MAP for Eda Ranu in 2015.

19.4.2 Water PNG

Allocated performance value (K million)	16.1
Total Water Volume 2015 (million kilolitres)	14.1
Total sewage volume 2015 (million kilolitres)	6.4
Weighting on Water (%)	80%
Weighting on Sewerage (%)	20%
Water performance allocated value (K million)	12.9
Sewage performance allocated value (K Million)	3.2
Water Service Performance Premium (K per kilolitre)	0.914
Sewage Service Performance Premium (K per Kilolitre)	0.507

The Commission has decided to set the Service Performance Premiums for Water PNG, for the transition year 2015 as follows:

Weighting on Water (%)	47%
Water Service Performance Premium (K per kilolitre)	0.43
Sewerage Service Performance Premium (K per kilolitre)	0.24

The SP awarded to Eda Ranu and Water PNG for the transitional year 2015, has shown separately here is **not** adjusted for CPI. CPI adjustment to SP is made in the MAP formula, in this case the CPI is +3.94% in 2015 and is reflected in the MAP for Eda Ranu and Water PNG in 2015.

The Commission has decided that the service measure should cover water quality and reliability; and sewerage quality and reliability. The Commission has assigned weights to determine the proportion of the price premium that is driven by the service measure.

Water Reliability	Weighting % of Total	Weighting % of Water Price Premium	Weighting % of Sewerage Price Premium
Water Breaks per 1000 rateable properties	10%	12.5%	
Unplanned Interruptions per 100 km of main	10%	12.5%	
% service restored within 5 hours	20%	25%	
Water Quality			
Incidents per 1000 rateable properties	40%	50%	

Sewerage Reliability			
Sewage Overflows per 100 km of main	5%		25%
Sewage Overflows to customer property per 1000 connections	5%		25%
Sewage Treatment Quality			
Test Failures	10%		50%

The Commission has created a sliding scale so as to determine how much of the available price premium the service provider will be able to charge for the following 12 months. This will depend upon each service provider's performance against each measure. To provide an incentive to improve performance level, the Commission has set the Premium so that up to 120% of the allowance can be earned on any particular measure.

% Premium Earned	10%	20%	30%	40%	60%	80%	90%	100%	110%	120%
Water Reliability										
Water Breaks per 1000 rateable properties	200	150	110	90	70	60	50	40	30	20
Unplanned Interruptions per 100 km of main	75	70	65	60	55	50	45	40	35	30
% service restored within 5 hours	40%	45%	50%	65%	70%	75%	80%	85%	90%	95%
Water Quality										
Incidents per 1000 rateable properties	0.67	0.60	0.53	0.47	0.40	0.33	0.27	0.20	0.13	0.07
Sewerage Reliability										
Sewage Overflows per 100 km of main	150	116	97	80	65	52	41	32	25	20
Sewage Overflows to customer property per 1000 connections	59	49	40	32	25	19	14	10	7	5
Sewage Treatment Quality										
Test Failures	78	66	55	45	36	28	21	15	10	5

19.5 Price approval process

19.5.1 Eda Ranu

On or before the first working day of November each year, Eda Ranu must provide to the Commission the following:

- Proposed tariff which are subject to the MAP price control formula in Section 19.3 of this price direction.
- Information to demonstrate to the Commission that the proposed tariffs must not exceed the MAP and must comply with the requirements of Section 19.3 of this price direction including for the following year:
    - The calculation of CPI_t.
    - The forecast of the number of water and sewerage properties in year t.
    - The forecast of the volume of water to be sold in year t by tariff band.
    - The forecast of the volume of wastewater (sewerage) to be sold in year t by tariff band.
    - The forecast on the number of connections and reconnections and volume of water supplied by public/community bulk meter.
    - A description of assumptions underlying the forecasts including justification for the relevant assumptions made.
    - The calculation of the MAP_t for water and sewerage services.
    - A customer impact statement is also to be prepared.
    - 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 whether the forecasts for year t are reasonable. In such a case, the terms of reference for independent assessment will be specified by the Commission while the costs of the assessment will be borne by Eda Ranu.

As discussed above, the Commission will link service performance to price by awarding a service performance premium depending upon the results provided by the Eda Ranu. Therefore, Eda Ranu is required under this price direction to provide to the Commission a report by the 1st of October 2015.

The report will include the details as described under Section 15.5 of this report. If Eda Ranu fails to provide this report then no service performance will be awarded for 2016 or subsequent year or until such time the report is provided.

19.5.1.1 Commission's consideration

The Commission will advise Eda Ranu prior to 1st December of each regulatory year:

- Whether the tariffs proposed under 19.5.1 comply with this Price Order and; if they do not comply, the reasons for non-compliance. This reason may include that the Commission does not believe that the forecast are reasonable; or

- That the Commission has been unable to determine whether the proposed tariffs comply with the Price Order 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 an advice to Eda Ranu by 31st December in accordance with this section the proposed tariffs will deemed to comply with this Price Order.

19.5.1.2 Eda Ranu's re-submission

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

Within 20 business days of receiving revised tariffs and or additional information from Eda Ranu the Commission will advise Eda Ranu whether the 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 or not the tariffs comply with the price direction.

If the Commission has advised Eda Ranu that the tariffs do not comply or requires additional information, the provisions of this Section, 19.5.1.2 will continue to apply until the Commission approves the tariffs as complying with the price direction.

19.5.1.3 Non-compliance

If by 1st December Eda Ranu has not proposed tariffs to the Commission or the Commission has not approved the proposed tariffs then Section 19.5.3 does not apply;

- If (CPIt + Xt) > 0, prices for water and sewerage services including miscellaneous services will not change on 1st January of the next regulatory year t.
- If (CPIt + Xt) < 0, the Commission may change the tariffs for the water and sewerage services including miscellaneous services on 1st January of the next regulatory year t by CPIt + Xt.

Eda Ranu will be required to adopt these new tariffs for the following regulatory year, or to the date in the following regulatory years specified by the Commission, or until the Commission notifies Eda Ranu of tariffs which comply with the this Price Order.

19.5.2 Water PNG

On or before the first working day of November of each year, Water PNG must provide to the Commission the following:

- Proposed tariff which are subject to the MAP price control formula in Section 19.3 of this price direction.
- Information to demonstrate to the Commission that the proposed tariffs comply with the requirements of Section 19.3 of this price direction including:

- The calculation of CPI_t.
- The forecast of the number of water and sewerage properties in year t.
- The forecast of the volume of water to be sold in year t by tariff band.
- The forecast of the volume of wastewater (sewerage) to be sold in year t by tariff band.
- The forecast on the number of connections and reconnections and volume of water supplied by public/community bulk meter.
- A description of assumptions underlying the forecasts including justification for the relevant assumptions made.
- The calculation of the MAP_t for water and sewerage services.
- A customer impact statement is also to be prepared.
- 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 whether the forecasts for year t are reasonable. In such a case, the terms of reference for independent assessment will be specified by the Commission while the costs of the assessment will be borne by Water PNG.

As discussed above, the Commission will link service performance to price by awarding a service performance premium depending upon the results provided by the Water PNG. Therefore, Water PNG is required under this price direction to provide to the Commission a report by the 1st of October 2015. The report will include the details as described under Section 15.5 of this report. If Water PNG fails to provide this report then no service performance will be awarded for 2016 or subsequent year or until such time the report is provided.

19.5.2.1 Commission's consideration

The Commission will advise Water PNG's prior to 1st December of each regulatory year:

- Whether the tariffs proposed under 19.5.2 comply with this Price Order and; if they do not comply, the reasons for non-compliance. This reason may include that the Commission does not believe that the forecast are reasonable; or
- That the Commission has been unable to determine whether the proposed tariffs comply with the Price Order and; if so, what information the Commission requires from Water PNG in order to form an opinion regarding whether they comply.

If the Commission does not provide an advice to Water PNG by 31st December in accordance with this section the proposed tariffs will deemed to comply with this Price Order.

19.5.2.2 Water PNG's re-submission

If the Commission has advised Water PNG that the tariffs do not comply or has sought additional information, Water PNG must re-submit revised tariffs or additional information to the Commission by a date specified by the Commission.

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

If the Commission has advised Water PNG that the tariffs do not comply or requires additional information, the provisions of this Section, 19.5.1.2 will continue to apply until the Commission approves the tariffs as complying with the price direction.

19.5.2.3 Non-compliance

If by 1st December Water PNG has not proposed tariffs to the Commission or the Commission has not approved the proposed tariffs then Section 19.5.3 does not apply;

- If $(CPI_t + Xt) > 0$, prices for water and sewerage services including miscellaneous services will not change on 1st January of the next regulatory year t.
- If $(CPI_t + Xt) < 0$, the Commission may change the tariffs for the water and sewerage services including miscellaneous services on 1st January of the next regulatory year t by $CPI_t + Xt$.

Water PNG will be required to adopt these new tariffs for the following regulatory year, or to the date in the following regulatory years specified by the Commission, or until the Commission notifies Water PNG of tariffs which comply with the this Price Order.

19.6 Cost Pass-Through events

Eda Ranu and Water PNG may, when submitting proposed tariffs to the Commission for the following year in accordance with Section 19.5 of this price direction, seek to incorporate the proposed tariffs the effects of pass-through events.

The cost pass-through events as stated in Section 17 of this report are those that have occurred or are reasonably anticipated by the water entities to occur that satisfies the materiality test in Section 19.6.4 below. The cost pass-through events are;

- A change in taxes;
- An act of terrorism;
- Major natural disaster; or
- An augmented event requiring capital expenditure which was not forecast during the regulatory reset.

19.6.1 A change in tax

A change in tax event is:

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

- The removal of a relevant tax or imposition of a new relevant tax, which in each case occurs by or payable directly or indirectly by the water entities (Eda Ranu and Water PNG) 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 interests for late payment relating to any tax; and
    - Any tax which replaces the taxes referred to above, where 'tax' includes any rate, duty, charge or other like or similar impost.

19.6.2 An act of terrorism and major natural disaster

A terrorism event or a major natural disaster (including but not limited to fire, flood, volcano or earthquake) which result in costs which are substantially different to those reasonably foreseen by water entities and the Commission and are incorporated in this Price Order

19.6.3 Materiality test

The effect of the change in taxes, terrorism, major natural disaster and augmentation events must be such that the annualised costs incurred by Eda Ranu and Water Board or forecast to be incurred as a result of the event occurring is at least K1 million (in 2015 Kina terms) in any one year above the costs reasonably foreseen by the Commission and the water entities (Eda Ranu and Water PNG) and incorporated into this Price Order.

The annualised cost in any one year is equal to the amount of additional operating expenditure incurred in that year plus 10.19 per cent of the capital expenditure incurred in that year.

19.6.4 Submission by Eda Ranu and Water PNG

Any submission made by the water entities (Eda Ranu and Water PNG) in relation to cost pass-through events identified above must include the following information:

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

19.6.5 Assessment by the Commission

If the Commission receives a submission under Section 19.6 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 the water entities (Eda Ranu and Water PNG).

The Commission must notify the water entities (Eda Ranu and Water PNG) in writing of their decisions under this section by 31st December or within 20 business days of receiving additional information from them, whichever is later. If the Commission does not notify the water entities (Eda Ranu and Water PNG) of its decisions by these dates, the Commission is deemed to have approved their proposed pass-through amount and the basis on which they propose it to apply.

19.6.6 No effect of Compliance

A pass-through amount applied by the water entities (Eda Ranu and Water PNG) is not taken into account in deciding whether proposed tariffs comply with Section 19.3 of each of their respective Price Order.

19.7 Periodic Review

19.7.1 Capital Expenditure Review

As discussed under Section 10.6 of this report, the Commission did not pre-approve major capital expenditures in the price paths of the water entities (Eda Ranu and Water PNG) therefore does not see it necessary to carry out a mid-term capital expenditure review. Instead the Commission will carry out an annual review of major capital expenditure for both water entities (Eda Ranu and Water PNG) if any occurs.

On or before the first working day of November (before 15th December 2015 for assessment for 1st January 2016) each year of the regulatory period, Eda Ranu and Water PNG are required to:

- Present the water entity's evidence of actual capital spending;
- Explain to the Commission how each projects conform with the list of requirements outlined in this report; and
- Explain how each project will benefit customers.

19.7.2 Service Performance

The Commission will carry out annual reviews of service performance of both Eda Ranu and Water PNG.

By 1st October 2015, both water entities must submit to the Commission a report on proposed service level measurements. As previously highlighted under Section 15.5 of this Final Report, this required report should include:

- A detailed description and definition of each measurement and how it will be measured.
- A description of how the results can be independently verified.
- Where capability does not already exist to carry out the proposed measures, then a detailed plan and timeline to implement the capability to make the proposed measurements must be included.
- If appropriate each party may also propose to the Commission that the sliding scales be changed. For example, in discussions with Water PNG it was proposed that separate standards be applied to some parts of Water PNG's network. The Commission would therefore expect Water PNG to outline in detail in their report to the Commission exactly how standards should vary for different parts of their network.
- The Commission may choose to accept, reject or modify any proposal made by either party.

The Commission notes that if either party fails to present the required report, then no service price premium will be awarded for 2016 or subsequent years or until such time as the report is presented.

Once it is established and agreed exactly how performance measurement will be carried out, then results should be published monthly by pumping station and water tank. Monthly Reports should include all reasons for loss of service – planned and unplanned.

20. Appendices

Appendix 1: Submissions to the Draft Report

1. Eda Ranu
2. Water PNG
3. National Research Institute

Appendix 2: Section 21 (2)(a) of the Price Regulation Act Chapter 320 (Amended)

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;

B. the cost of making, producing or supplying the declared goods or services;

C. the desirability of encouraging greater efficiency in relation to making, producing or supplying the declared goods or services;

D. the need to ensure an appropriate rate of return on any investment in relation to the declared goods or services;

E. the borrowing, capital and cash flow requirements of persons making, producing or supplying the declared goods or services;

F. considerations of demand management and least-cost planning;

G. existing standards of quality, reliability and safety of the declared goods or services, and the desirability of encouraging improvements in those standards;

H. the effect any proposed order on general price inflation over the medium term;

I. the economic and social impact of any proposed order; and

J. any other matters the Commission considers relevant.