ACCESS TO SAFE DRINKING-WATER IN THE NATIONAL CAPITAL DISTRICT- PAPUA NEW GUINEA

OFFICE OF THE AUDITOR-GENERAL
OF PAPUA NEW GUINEA
PERFORMANCE AUDIT REPORT No. 01/2012

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PAPUA NEW GUINEA

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Performance Audit Report No. 01/2012

ACCESS TO SAFE DRINKING-WATER IN THE NATIONAL CAPITAL DISTRICT- PAPUA NEW GUINEA

Department of Environment and Conservation

National Department of Health

Water PNG (formerly PNG Waterboard)

NCD Water and Sewerage Pty Ltd (trading as Eda Ranu)

The Auditor-General's Office of Papua New Guinea

AUDITOR GENERAL'S OFFICE
PAPUA NEW GUINEA

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21st February 2013

The Honourable Theodore Zurenuoc, MP
Speaker of the National Parliament
Parliament House
WAIGANI
National Capital District
Papua New Guinea

Dear Mr. Speaker,

In accordance with the provisions of *Section 214 of the Constitution* of the Independent State of Papua New Guinea, and the *Audit Act 1989 (as amended),* I have undertaken a performance audit on the effectiveness of the actions taken by a number of public entities to ensure access to safe drinking-water in Papua New Guinea, with particular interest in the National Capital District.

I submit the report of this audit and the report is titled ***"Access to Safe Drinking-Water in the National Capital District – Papua New Guinea."***

Following its tabling in Parliament, the report will be placed on the Auditor-General's Office website – http://www.ago.gov.pg

Yours sincerely

PHILIP NAUGA
Auditor-General of Papua New Guinea
Port Moresby, NCD
21st February, 2013

AUDITING FOR PAPUA NEW GUINEA

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ABBREVIATIONS

ADB	Asian Development Bank
ADRA	Adventist Development and Relief Agency
AGO	Auditor-General's Office
AusAID	Australian Agency for International Development
CBO	Community-Based Organizations
CCC	Contingency Control Centre (of Eda Ranu Ltd)
CSO	Community Service Obligations
DEC	Department of Environment and Conservation
DNP&RD	Department of National Planning and Rural Development
EIA	Environment Impact Assessment
ICCC	Independent Consumer and Competition Commission
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICP	Inductive Coupled Plasma
IDI	INTOSAI Development Initiatives
INTOSAI	International Organization of Supreme Audit Institutions
IPBC	Independent Public Business Corporation
IWRM	Integrated Water Resource Management
JICA	Japanese International Cooperation Agency
Kl	Kilolitres
LOE	Line of Enquiries
MDG	Millennium Development Goal
MLD	Megalitres per Day
MOA	Memorandum of Agreement
MTDS	Medium-Term Development Strategy 2005 - 2010
NasFund	National Superannuation Fund
NCD	National Capital District

NCD WSS Act	National Capital District Water Supply and Sewerage Act 1996
NDES	National Disaster and Emergency Services
NDOH	National Department of Health
NEC	National Executive Council
NGO	Non-Government Organization
NISIT	National Institute of Standards and Industrial Technology
NRW	Non-Revenue Water
NSO	National Statistics Office
NWS	National Weather Service
NWSS Act	National Water Supply and Sewerage Act 1986
P/L	Proprietary Limited
Pacific RAP	Pacific Regional Action Plan (on Sustainable Water Resources)
PASAI	Pacific Association of Supreme Audit Institutions
PGK	Papua New Guinea Kina
PNG	Papua New Guinea
PNG AGO	PNG Auditor-General's Office
PNG SDP	PNG Strategic Development Plan
PNGGS	Papua New Guinea Geological Services
PRAP	Pacific Regional Action Plan (on Sustainable Water Management)
SCADA	Supervisory Control and Data Acquisition
SOPAC	(Applied Geo-science and Technology Division of the) Secretariat of the Pacific Community
UN	United Nations
UNCESCR	United Nations Commission on Economic, Social and Cultural Rights
UNICEF	United Nations International Children Education Fund
WASCOM	Water Supply and Sanitation Committee
WHO	World Health Organization
WTP	Water Treatment Plant

GLOSSARY

The following terms are useful to understand the subject matter of this audit – *access to safe drinking-water*. They have been adopted from documents produced by the World Health Organisation (WHO) and the Applied Geosciences and Technology Division of the Secretariat of the Pacific Community (SOPAC).

Bacteria	A group of organisms that are regarded as the simplest form of life. They reproduce by cellular division. Bacteria can reproduce quite rapidly if conditions are optimal. Some of the group are disease causing, e.g. Salmonella Typhi, a bacteria that causes Typhoid Fever.
Catchment area	The area within which water drains to a particular water source such as a river, lake or reservoir and which may also recharge an aquifer.
Chlorine residual or free available chlorine	The amount of freely available chlorine still present in water at any time during reticulation.
Coagulation	Use of metallic salts, for example, aluminium or iron based, to aggregate fine suspended material and particles causing them to clump together to form large, settleable particles.
Coliform bacteria	Coli form bacteria are a commonly used bacterial indicator of sanitary quality of food and treated water. Coli forms are abundant in the faeces of warm–blooded animals, but can also be found in the aquatic environment, in soil and on vegetation. Their presence is used to indicate possible re-contamination of treated water.
Contamination	The introduction of 'agents' that cause deterioration of drinking-water, making the drinking-water unsafe for human consumption.
Drinking-water Safety Plan	A Drinking-water Safety Plan is a holistic, systematic, and integrated management approach used to identify and prioritize potential threats to water quality at each step in a specific system's water supply chain – from catchment to consumer – and implement best practices to mitigate those threats and ensure quality drinking-water. It is a written document.
Drinking-water supply	The provision of safe water intended for human consumption.
E.coli	The most commonly used bacterial indicator for faecal contamination. Presence would indicate possible presence of pathogens.
Filtration	A drinking-water treatment process that removes suspended particles from water by passing the water through a sand bed, cartridge or membrane. Some forms of filtration can also remove colour, odour, taste and suspended organic material.

Flocculation	The drinking-water treatment process of gathering together coagulated clumps of suspended material into floc.
General Comment 15	UN General Comment 15 on the rights adopted in 2002 by the UN Committee on Economic, Social and Cultural Rights, a committee of experts elected by those States that have ratified the ICESCR. Although General Comments No. 15 is not legally binding, it is an authoritative interpretation of the provisions of the ICESCR.
Groundwater	Water contained beneath the land surface in zones of saturated soil, which can be extracted as a drinking-water source.
Inductive Coupled Plasma (ICP) Machine	Chemical analysis equipment to test treated water for the presence of bacteria and contaminants in drinking-water.
International Convention on Economic, Social and Cultural Rights (ICESCR)	A treaty that 157 countries have ratified as of October 2007, making it legally binding upon them in international law. The Covenant is the primary basis for the human right to water and sanitation and other economic, social and cultural rights.
Millennium Development Goals (MDGs)	MDGs are targets agreed by nations under a UN Resolution. Goal 7, Target 7C aims to: '*halve, by 2015, the proportion of people without sustainable access to safe drinking-water and basic sanitation.*'
Mixing Zone	A discrete body of water into which water is discharged at which the prescribed water quality criteria does not required to be met and the protection of aquatic life not guaranteed.
Monitoring	The process of inspection and sampling and analysing drinking-water samples to verify consistent supply of safe drinking-water. Monitoring is also used to demonstrate compliance with National Drinking-water Standards or other relevant legislation, where applicable. Can be operational monitoring which is done by the water provider or can be surveillance monitoring which is done by the regulator.
Pathogen	An organism capable of causing disease in humans.
pH	Measure of the relative acidity or alkalinity of water.
Potable water	Water suitable, on the basis of both health and aesthetic considerations, for drinking or cooking purposes.
Raw water	Surface or ground water that is available as a source of drinking-water but has not received any physical or chemical treatment.
Safe water	Water that is free of any harmful substance (contaminants) including physical, chemical, biological and microbiological agents that may cause serious health effects.
Surface water	Water found on the land surface usually as a result of run-off

	or precipitation. It can be running (rivers and streams), or quiescent (lakes, reservoirs and impoundments).
Turbidity	A measure of the suspended particles in water that causes the water to lose its clarity by scattering light.
Water borne diseases	Infectious diseases transmitted through pathogens transported in drinking-water.
Water distribution	The method of distributing water to consumers is another important component of the water supply system. The product, delivered to the point of consumption, is called fresh water if it receives little or no treatment or drinking-water if the treatment achieves the water quality standards required for human consumption. Once treated, chlorine is added to the water and it is distributed by the local supply network. Water is usually distributed by circular pipes typically constructed of plastic, ferrous, or concrete. However, other "pipe" shapes and material may be used, such as square or rectangular concrete boxes, arched brick pipe, or wood. Near the end point, the network of pipes through which the water is delivered is often referred to as the *water mains*.
Water quality	'Water quality' is used to describe the microbiological, physical and chemical properties of water that determine its fitness for a specific use. These properties are determined by substances which are either dissolved or suspended in water.
Water supply system	A water supply system or water supply network is a system of engineered components which provide water supply to consumers.
Water treatment	Water treatment occurs before the product reaches the consumer and this consists of three steps: clarification, filtration and disinfection. *Clarification* refers to the separation of particles (dirt, organic matter, etc.) from the water stream. *Filtration* refers to the process to refine the water: sand, anthracite or activated carbon filters refine the water stream, removing smaller particulate matter while other methods of *disinfection* exist; the preferred method is via chlorine addition. Chlorine effectively kills bacteria and most viruses and maintains a residual to protect the water supply through the supply network.
Water treatment plant	The processes involved in making drinking-water fit for human consumption. It includes all chemical, biological, physical and mechanical processes used to enhance the quality of drinking-water and eliminate or control risks to human health.

EXECUTIVE

SUMMARY

EXECUTIVE SUMMARY

Background

Drinking-water is essential for life, but the water must be accessible and safe. It is a basic human need and necessary to ensure good public health and economic development.

The lack of access to safe drinking-water has severe adverse effect on human health, exacerbates poverty and undermines economic development and the lack of it is also the major contributing factor to serious illness such as diarrhoea, cholera and typhoid.

There are serious challenges to be tackled within Papua New Guinea (PNG) regarding the protection and management of drinking-water. Significant health issues are faced currently as a result of unsafe drinking-water, despite having an abundance of fresh water.

The Government holds the responsibility to take steps necessary to minimise environmental and social issues which poses risks to sufficiency, safety, quality and quantity of water and the impact of it on the public health.

Coverage

Based on an agreement in 2008 by the Pacific Association of Supreme Audit Institutions (PASAI) as part of the Regional Audit initiative to conduct a program of cooperative performance audits, the 13th PASAI congress in July 2010 endorsed the performance audit on access to safe drinking-water. The Congress also endorsed the specific audit objective.

The objective of this audit was to assess the effectiveness of actions taken by key government agencies concerned with access to safe drinking-water in PNG, with particular interest in the National Capital District (NCD). The audit was conducted based on three lines of enquiry:

1. *Is there existence of a legal and policy framework on access to safe drinking-water in the country;*
2. *What are the processes by which the legal and policy framework is implemented within the NCD; and*
3. *Is there a monitoring arrangement in place to ensure compliance of implementation of the framework and demonstration of improvements to access to safe drinking-water?*

The audit centres on the Department of Environment and Conservation (DEC), the National Department of Health (NDOH), NCD Water Supply and Sewerage Pty Ltd (trading as Eda Ranu) and Water PNG (formerly the PNG Waterboard).

The audit focused primarily on these entities as they play a major role in ensuring access to safe drinking-water in PNG. The DEC is responsible for the allocation and protection of water resources and the NDOH is responsible for the control, monitoring and surveillance of the drinking-water quality standards. The two water suppliers are Water PNG and Eda Ranu. Water PNG is assigned the responsibility to provide water supply and sanitation services in the urban areas, while Eda Ranu is mandated to provide water supply and sanitation services in the NCD.

Under line of enquiry one, the audit assessments on the legal and policy framework covered PNG; however, the scope of audit was limited to the NCD for line of enquiries two and three. Thus, actions taken by Water PNG were excluded.

Key Findings

Existence of a legal and policy framework (Chapter 2)

A comprehensive legal framework exists in PNG to ensure that the population have access to safe drinking-water. The framework adequately covers the institutional arrangements on allocation and protection of water resources, control and monitoring of drinking-water quality and provision of water supply services.

Millennium Development Goal (MDG) targets and the *Pacific Regional Action Plan* (PRAP) were appropriately adopted and incorporated into the *Medium-Term Development Strategy*(MTDS) and the Action Plan on sustainable water resource to support the legal framework.

However, inequalities in access to safe drinking-water by the population were reflected in the enabling Acts on the provisions of water supply services. The mandated water suppliers are limited by the virtue of provision in their respective Acts from providing water supply services to rural communities, informal settlements in urban areas and urban fringe areas.

Further, a central agency has not been identified in the legal framework for overall coordination, monitoring and control of water supply and sanitation services in the country.

This has led to overlapping responsibilities assigned to Water PNG and Eda Ranu and a National Drinking-Water Policy and Plans not being developed to support the legal framework. The absence of National Drinking-water Plans has resulted in international and regional conventions/goals/framework not being adopted and incorporated to improve access to safe drinking-water. At the departmental level, the recommendations of the Samoa Commitments[1] have yet to be adopted and incorporated in the NDOH Corporate Plans and the DEC has yet to formulate an environmental policy on water.

To remedy the absence of a central agency, a National Water and Sanitation Committee was established, with the NDOH as the Chair, to act as a consultative forum on water and sanitation activities for government and donor agencies and NGOs. However, supporting documents such as the meeting minutes of the Committee were not provided by NDOH to indicate that the meetings were held on a regular basis.

The absence of National Drinking-Water Policy and Plans, inequality in access to safe drinking-water and lack of identification of a central agency to coordinate and regulate water supply activities could result in PNG's overall performance falling below the MDG 2015 target.

[1]The Samoa Commitments to Achieving Health Islands stem for the 6th meeting of the Ministers of Health for the Pacific Island countries held in March 2005. They provide a systematic framework that countries will utilise to address public health issues. The Commitment identifies pivotal actions that are required to further the Health Islands visions and enhance the health of Pacific people.

Process by which legal and policy framework is implemented (Chapter 3)

The roles and responsibilities of each government agency concerned with access to safe drinking-water are clearly defined. Even though a central agency has yet to be identified for the overall coordination across key government agencies, there is effective coordination between the water supplier and regulatory agencies in the NCD in implementing the framework to ensure the population has access to safe drinking-water.

In the NCD, Eda Ranu has appropriate technology, structure and facilities in place to support the extraction of raw water, treatment and distribution to the population. Risks associated with access to and quality of drinking-water are adequately identified and incorporated in the company's Operational Contingency Plan developed to ensure the quality and the sustainability of the quantity of drinking-water.

Also, the company has an adequate pricing policy and structure to recover service supply costs. In the last four years, profits were made by the water supplier and thus, the company is financially viable to sustain its operations in the long-term.

Furthermore, Eda Ranu has developed strategies in its Strategic Corporate Plan to conduct awareness on operational matters and water-related issues to internal and external stakeholders. However, there was inadequate implementation of the identified strategies due to insufficient staff in the Public Affairs Section caused by vacancies of positions.

Risks associated with drinking-water quality are adequately identified by the NDOH and are set out in the National Drinking-Water Quality Standards to ensure safety of drinking-water supplied by water supplier to the population. However, limited resources, such as staff and finance, allocated to the Water and Sanitation Section within the NDOH, impact on the effectiveness of implementation.

This has led to inadequate dissemination of information related to drinking-water quality to the public.

Monitoring the effectiveness of implementation and demonstration of improvements (Chapter 4)

Eda Ranu has prepared and submitted Annual Management Reports to the Minister responsible for Public Enterprises for the years 2007 to 2009 on the effectiveness of actions it has taken.

Effective water quality testing, analysis and monitoring are also established by the company to ensure water supplied to the population comply with the National Drinking-Water Quality Standards. Also, water samples are collected from raw water sources, water treatment plants and the distribution network and sent to an accredited laboratory for further analysis.

Further, key performance indicators (KPIs) are established to measure its performance for a given period of time against the set strategies. Over a four year period, Eda Ranu has demonstrated improvements in network efficiency, non-revenue water (NRW), water treatment plant (WTP), total capacity of water, water assets and facilities, testing and monitoring of water, and customer billing system.

The company has predicted water demand for 2020 to be 184 mega litres per day (MLD); however, the predictions were not supported with relevant data such as climate forecasts and population projections.

The NDOH has in place a laboratory equipped with appropriate equipment and trained staff to undertake bacteriological and microbial analysis. Hence, samples of water forwarded to the Department from a water supplier are analysed and examined in the laboratory.

However, the Department has not undertaken independent testing of water in the supplier's WTP and distribution network to ensure safety of water supplied to consumers. Thus, the monitoring and surveillance of drinking-water quality standards were not consistent.

Audit Recommendations

During the course of this report, the AGO has provided fourteen (14) recommendations. The various recommendations were directed to the four entities audited, the DEC, Water PNG, Eda Ranu and the National Department of Health.

The various audit recommendations and shortened responses follow. Only two entities out of the four acknowledged and supported the recommendations in the AGO report. The full texts of the responses made to the recommendations by the respective entities are contained in the body of the report under the heading of audit findings/conclusions, and ***Appendix 1***.

Chapter 2

Recommendation No.1, page 40

To support the existing legislation on the protection of water, in particular drinking-water, AGO recommends the DEC gives priority with the formulation of the environmental policy on water in close consultation and coordination with relevant government agencies concerned.

Management's Comment

The management responses/comments were yet to be received from DEC at the time of preparing this Report in March 2012.

Recommendation No.2, page 44

The AGO recommends that Water PNG and Eda Ranu:

(i) review the regulatory roles assigned to them to exercise control over private water supply and sanitation services for the possibility of separating the functions; and

(ii) in close consultation with the NDOH, DEC and other government agencies, donor agencies and NGOs, identify and establish a central agency to assume the role of regulating and coordinating all water supply and sewerage activities in the country.

Management's Comment

Water PNG response: Agreed with qualification.
Refer to the above Chapter for details.

Eda Ranu response: Agreed.
Refer to the above Chapter for details.

Recommendation No.3, page 46

AGO recommends that Water PNG and NDOH take the lead to coordinate and consult with government agencies such as DEC, Eda Ranu, donor agencies and NGOs concerned with access to safe drinking-water in the country to formulate:

(i) A National Drinking-Water Policy to support the legal framework to ensure integrated implementation throughout the country, and

(ii) National Drinking-Water Plans to support the legal and policy framework to map out the focus areas of improvement in access to safe drinking-water.

Management's Comment

Water PNG response: Agreed with qualifications.
Refer to the above Chapter for details.

Eda Ranu response: Agreed.
Refer to the above Chapter for details.

Recommendation No.4, page 48

The AGO recommends that the NODH considers reviewing its corporate plans to ensure the Department prioritises the monitoring and control of drinking-water quality activities in its plans.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March, 2012.

Recommendation No.5, page 49

The AGO recommends that Water PNG, Eda Ranu and the NDOH consult with each other and identify agencies at national, provincial and local government levels and coordinate with these agencies to facilitate access to safe drinking-water to the rural communities, squatter settlements and urban fringe areas in the country.

Management's Comment

Water PNG response: No comments.

Eda Ranu response: Qualification with comments.
Refer to the above Chapter for details.

Recommendation No.6, page 49

The AGO recommends that Eda Ranu and Water PNG take steps necessary to ensure that informal settlements in the urban and the urban fringe areas have access to safe drinking-water facilities. The steps may include: community participation, Provincial Governments, Local Level Government and political will, commitment and involvement.

Management's Comment

Water PNG response: Agreed with qualifications.
Refer to the above Chapter for details.

Eda Ranu response: Qualification comments.
Refer to the above Chapter for details.

Recommendation No.7, page 53

AGO recommends that NDOH adopts and incorporates the Samoa Commitments into its National Health Policy and ensure that recommendations are implemented in the country.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Chapter 3

Recommendation No.8, page 61

The AGO recommends Eda Ranu ensure that:

(i) the Public Affairs Section coordinates effectively with departments within the company to identify the vital information that is necessary to be disseminated to the public to appreciate the efforts and initiatives put in by the company to improve access to and protection of safe drinking-water in the NCD; and

(ii) information on operational matters such as costs related to extraction of raw water, treatment, storing and distribution and costs of non–revenue water is incorporate in the awareness programs and made available to the public for information.

Management's Comment

Eda Ranu response: Agreed.
Refer to the above Chapter for details.

Recommendation No.9, page 61

The AGO recommends that Eda Ranu:

(i) reviews the staffing level in the Public Affairs Section and the job descriptions to assign adequate and competent staff to align with the assigned responsibilities; and

(ii) fills the vacant positions in the Public Affairs Section immediately with qualified persons.

Management's Comment

Eda Ranu response: Agreed.
Refer to the above Chapter for details.

Recommendation No.10, page 63

The AGO recommends that Eda Ranu:

(i) maintains adequate filing systems and files all communication materials developed to map out the awareness activities on a yearly basis to ensure consistency in information made available cross sections of the population on its operational matters and water related issues; and

(ii) updates its website regularly to ensure effective communication and updated information is made available to the public.

Management's Comment

Eda Ranu response: Agreed to take necessary action.
Refer to the above Chapter for details.

Recommendation No.11, page 69

The AGO recommends that the NDOH reviews and allocates sufficient financial resources and manpower to the Water and Sanitation Section to facilitate and ensure effective coordination of control and monitoring of water quality supplied by water suppliers.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Chapter 4

Recommendation No.12, page 75

The AGO recommends that the NDOH:

(i) plans and carries out independent testing of drinking-water supplied by a water supplier to ensure safety of water consumed by the population; and

(ii) liaise with relevant Provincial Governments and public health authorities and ensure that sufficient financial resources and logistic support is provided to Provincial Health Inspectors to carry out independent testing of water supplies.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Recommendation No.13, page 78

The AGO recommends that the NDOH revisits its strategies in its Corporate Plan and prioritise monitoring and surveillance responsibility and have in place KPIs, backed up with plans of action, to fully discharge its mandated responsibilities.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Recommendation No.14, page 80

The AGO recommends that Eda Ranu coordinates with the National Weather Service (NWS) and National Statistics Organisation (NSO) to obtain reliable data on weather pattern forecasts and population projections to assist it to accurately predict the future water demands for the NCD.

Management's Comment

Eda Ranu response: Agreed with qualification.
Refer to the above Chapter for details.

Overall Conclusion

In PNG, there is abundance of freshwater available for domestic purposes. Consequently, most of the rural communities and the informal settlements in the urban areas have a *basic level of access* to water from surface water. A few rural communities, especially in the coastal areas and islands have a *service level of no access* and usually the source of water is from underground.

The urban population, where there are adequate water supply facilities provided Water PNG in the provinces and Eda Ranu in the NCD, enjoy the *service level of optimum access* to water.

It may be seen from above that the access to safe drinking-water in the rural areas is not an issue but the management and protection of the catchment areas to sustain water sources and drinking-water quality are critical issues that needs to be addressed. On the contrary, in the urban areas, access to and the affordability of safe drinking-water are the main concerns for the population.

To address these issues and at the same time improve access to safe drinking-water, the government holds the primary responsibility. This requires government and donor agency partnerships, NGOs involvement, political will and community participation through legislative implementation and the development and adoption of a national water policy and supporting strategies.

At the national level, a comprehensive legal framework is established to ensure access to safe drinking-water and has adequate institutional arrangements on allocation of water, its protection, drinking-water quality and the provision of water supply services.

However, drinking-water is not afforded a high priority by the National Government. Unless government agencies take appropriate remedial actions to improve access to, and to protect the sufficiency, safety and acceptability of drinking-water, PNG may fall below the MDG 2015 target and the quantity and quality of freshwater available may be depleted.

AUDIT OBSERVATIONS

&

CONCLUSIONS

1 BACKGROUND & CONTEXT

1.1 Introduction

This section provides the institutional arrangements on access to safe drinking-water in the country, the background information, its impact on public health and the challenges faced.

1.2 Definition of Safe Drinking-Water

Having access to safe drinking-water is about generating better health of the population through the fulfilment of Goal 7, Target 10 of the *UN Millennium Development Goal (MDG)* which aim at halving by 2015 the portion of people without sustainable access to safe drinking-water and basic sanitation. The WHO and UNICEF provide the UN Systems of monitoring the progress on the MDG Target 10 and define safe drinking-water as follows:

- Drinking-water is water used for domestic purposes, drinking, cooking and personal hygiene;
- Access to drinking-water means that the source is less than 1 kilometre away from its place of use and that it is possible to reliably obtain at least 20 litres per member of a household per day;
- Safe drinking-water is water with microbial, chemical and physical characteristics that meet WHO guidelines or national standards on drinking-water quality;
- Access to safe drinking-water is the proportion of people using improved drinking-water sources: household connection; public standpipe; borehole; protected dug well; protected spring; rainwater.

1.3 Institutional Arrangements on Access to Safe Drinking-Water in PNG

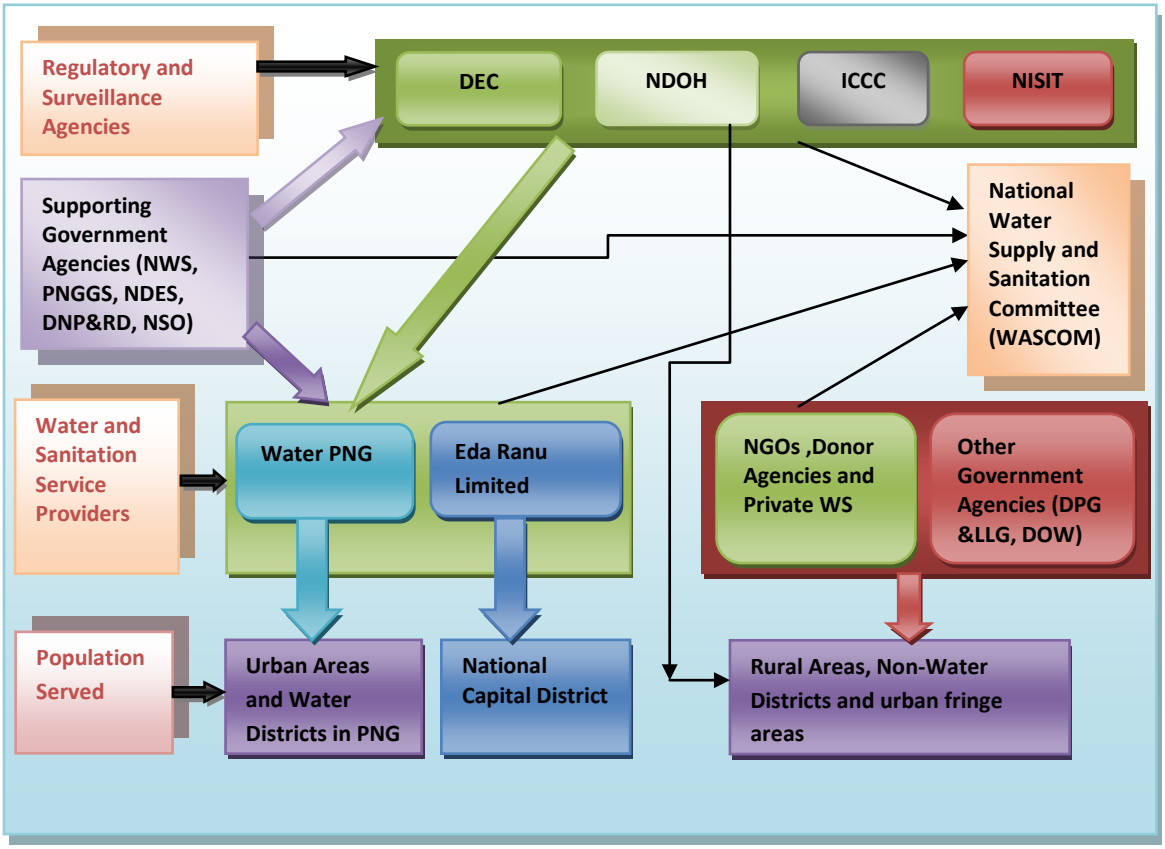
Various Government agencies and institutions are assigned specific responsibilities to directly or indirectly ensure access to safe drinking-water in PNG.

The institutional framework on Water Supply and Sanitation activities are presented in **Figure 1.1** below as stipulated above.

The agencies which are involved to ensure access to safe drinking-water are classified into three categories; *Regulatory and surveillance agencies, Water service providers* and *Supporting or advisory agencies.*

The regulatory and surveillance agencies are assigned the roles and responsibilities to set standards, regulate the water supply activities and monitor compliance of the standards and regulations. The functions of each category of agencies are presented in **Table 1.1** below also.

Figure 1.1 PNG Institutional Framework on Water Supply and Sanitation



Source: PNG AGO (2011)

Table 1.1 Functions of agencies involved in ensuring access to safe drinking-water

Category of Agencies	Functions
Regulatory and Surveillance	Set standards and regulation to regulate service provision and also monitor compliance of the legal framework
Service Providers	Plan, provide water supply services and manage water supply facilities
Supporting or Advisory	Support service providers to facilitate effective delivery of water services by providing financial support and data for planning

Source: PNG AGO (2010)

1.4 Essence of Water

"Water is the essence of life and human dignity. Without water, human beings cannot live for more than a few days. It plays a vital role in nearly every function of the body, protecting the immune system (body's natural defences) and helps remove waste matter."[2]

Water is also essential for domestic purposes including for drinking, personal and household hygiene, growing and preparation of food, keeping animals, rest, exercise and relaxation and for a variety of social and cultural reasons. But to do

[2] Quoted from Chapter 1: Water as Human Rights; The Right to Water, page 6; WHO (2003).

this effectively, water must be accessible and safe. Access to safe drinking-water is a basic human need and necessary to ensure good public health.

Drinking-water is not only a limited natural resource and a critical public good, but also stated as a human right by the International Convention on Economic, Social and Cultural Rights (ICESCR).[3] This right entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water which must be enjoyed without discrimination and equally by men and women.

Further, the Millennium Declaration by the United Nations Summit on MDG has also given prominence to access to safe drinking-water in one of its eight goals and targets. *MDG Goal 7*: *Target 7C* aims to "*by 2015, reduce by half the proportion of people without sustainable access to safe drinking-water*."

The lack of access to safe drinking-water has severe adverse effects on human health and it exacerbates poverty and undermines economic development. To recognise the importance of water, Governments hold the responsibility to take steps necessary to realise everyone's right to water as guaranteed by the ICESCR. In order to fulfil this responsibility in realising the right guaranteed by the Convention and the achievement of the Millennium Declaration, Governments are expected to adopt and incorporate the Convention and MDG target in their legal and policy frameworks on access to safe drinking-water.

Concept of Accessibility to Drinking-Water

Accessible water[4] typically means water services and facilities that are accessible within, or in the immediate vicinity, of each household, educational institution and workplace. Access to safe drinking-water alone is not expected to fulfil the Convention on the human right to water.

It is also desired that water is sufficient and continuous, is free from hazardous substances that could endanger human health, whose colour, odour and taste are acceptable, is affordable and is provided without discrimination on racial or gender grounds or on geographical location.

Service Levels of Access to Drinking-Water

In practice, the amount of water collected everyday by households is largely determined by how far the source of water is from home. The World Health Organisation (WHO) has stated that there are four service levels of access to safe drinking-water, and the likely quantity of water collected is determined by these levels. These are presented in **Table 1.2** hereunder.

[3] ICESCR has recognised water as a human right in *Article 12.1. General Comment No.15*, adopted by the UN Committee on Economic, Social and Cultural Rights (CESCR) in 2000, and which clarifies the rights guaranteed and National Governments' responsibilities under the treaty.

[4] Accessible water as defined in Chapter 2: Overview of Human Rights to Water and Sanitation; Manual on the Right to Water and Sanitation, page XV; COHRE, AAAS, SDC and UN-HABITAT (2007).

Table 1.2 Levels of Services in Access to Drinking-Water

Service Level	Distance/Time	Likely volume of water collected	Needs met
No Access	More than 1 km/ more than 30 minutes round trip	Very low, often below 5 litres per capita per day	Consumption cannot be assured. Hygiene practice comprised Basic consumption may be comprised.
Basic Access	Within 1 km/ within 30 minutes round trip	Average unlikely to exceed 20 litres per capita per day	Consumption may be assured. Hygiene may be comprised. Laundry may occur off-plot.
Intermediate Access	Water provided on–plot through at least one tap (yard level)	Average of approximately 50 litres per capita per day	Consumption assured. Hygiene should not be comprised. Laundry likely to occur on-plot.
Optimal Access	Supply of water through multiple taps within the house	Average of 100–200 litres per capita per day	Consumption assured. Hygiene should not be comprised. Laundry will occur on-plot.

Source: Rights to Water; WHO, 2003; page 13

1.5 Levels of Access to Water in PNG

In Papua New Guinea, there is an abundance of fresh water for domestic purposes in the form of surface water (such as creeks, springs, streams, rivers and lakes), groundwater and rainwater. The types of freshwater accessed by the population depend on the geographical location in which they are situated.

Most of the population has access to water from surface water sources. Groundwater sources are heavily relied upon by the coastal communities, especially in the island atolls. Along the coastal regions most of the communities, particularly in the southern region, depend on shallow groundwater wells for domestic purposes. Residents in some major coastal urban centres, such as Lae, Vanimo, Rabaul and Kavieng, also rely on groundwater.

Rainwater, on the other hand, is harvested from residential rooftops in some of the rural communities and in some urban centres by residents who do not have access to town water supply.

Despite the abundant availability of freshwater in PNG, only 30%[5] of the total population (of 6.6 million) has access to potable water – this translates to approximately 4.6 million people not having access to potable water.

In the urban areas, only 60% of the total urban population has access to potable water; predominantly in the 12 provincial towns served by Water PNG,[6] in the NCD served by Eda Ranu and in Goroka operated by Goroka Town Council. In other provincial towns like Kerema, Mendi and Vanimo, no reticulated water services exist. These urban areas have access to water from water sources such as rainwater tanks, private bores and creeks. Others have limited reticulated water services available or dilapidated reticulated water supply.

[5]Water PNG Corporate Plan 2006 -2015; page 7
[6]Previously, and in the enabling legislation, called PNG Waterboard.

Reticulated water supply services are provided in most of the rural district centres, a legacy of the colonial administration, now entrusted by law to the Local Level Governments. However, most of these reticulated systems are in a dilapidated state, needing urgent repairs and upgrades.

In the rural areas (including rural district centres) where approximately 80% of the country's population reside, it is estimated approximately 20% of that population has access to potable drinking-water. The main sources of potable water in these areas are rainwater tanks, shallow wells, springs and creeks. These sources all have their own water quality problems.

During audit, Water PNG also informed the AGO that access to safe water in urban areas is high but low in rural areas. Many different figures have been quoted but the truth is no one knows. These are guesses as actual data is not available. There is urgent need to collect and compile realistic and factual figures.

1.6 Impact on Public Health

Having access to water has major benefits to public health. Availability of access to sufficient quantity and quality of water improves the general health and hygiene of communities.

The lack of water is the major cause of serious illness, such as diarrhoea, cholera, and typhoid, which kills millions of people every year throughout the world. Contaminated water, whether drunk or used to cook food, harms the health of the population. Lack of access to safe drinking-water has a major effect on the people's health, and poor health constrains individual's development and poverty alleviation opportunities.

At the international level, it is estimated that at any time nearly half the population of developing countries is suffering from health problems linked to inadequate water and sanitation. Approximately 4 billion cases of diarrhoea each year cause 2.2 million deaths, mostly among children under five.[7]

Global analysis also infers that access to basic sanitation, safe drinking-water supply and good hygiene behaviours has the potential to prevent at least 1.9% of the disease burden or 6.3% of all deaths in the world's developing regions. Children suffer a disproportionate share of this burden, as the percentage of total deaths is more than 20% up to 14 years of age.[8]

Illness and deaths arising from drinking unsafe water have continuing impact on communities throughout the world, and PNG is no exception. The burden of disease in PNG is predominantly from infectious diseases. There is significant morbidity and mortality from water–borne diseases due to lack of proper water supply systems, inadequate safe drinking-water, poor sanitation as well as unhygienic practices. Of the infectious diseases, diarrhoea is ranked as the number one cause of mortality

[7] Statistic and analysis quotes from "Executive Summary" – *Manual on the Right to Water and Sanitation*; COHRE, AAAS, SDC and UN-HABITAT (2007), page XI.V.

[8] Statistics quoted from: *Sanitation, hygiene and drinking-water in the Pacific Island countries– Converting Commitments into Action*; WHO and SOPAC (2008); page 1.

and morbidity in PNG. The death rate from diarrhoea is reported as 1,610 per 100,000 of the population.[9] Typhoid is by far the most serious of the diseases and is endemic in a number of provinces. It accounts for 2.9% of all deaths in the country.

In early November 2010, more than 4,351 cases with 83 deaths from cholera were confirmed and reported throughout the country.[10] This was attributable to the lack of safe drinking-water and inadequate sanitation or insufficient hygiene. The situation was described by "***The National***" newspaper on 3rd January 2011 as an unfolding disaster and time bomb.

Further, outbreaks of cholera cases were reported in Daru, Fly River Province and the NCD during December 2010. The prevention of the disease requires access to clean, drinkable water and basic hygiene.

1.7 Challenges to Access to Safe Drinking-Water

There are serious challenges to be tackled with regard to drinking-water to contribute to a healthy environment for the entire population – especially the requirement to take steps necessary to ensure that everyone enjoys sufficient, safe, accessible and affordable water.

Within PNG there are also a number of specific environmental and social issues which pose challenges to the sufficiency, safety, quality and sustainability of water. These include:

- *Rapid population growth;*
- *Rapid rise of squatter settlements in the urban areas;*
- *Competing land use for various economic activities;*
- *Pollutant laden discharges (from mining, logging, agriculture, infrastructure development and industrial processing) entering surface and underground water sources;*
- *Climate change, natural disasters (such as floods, droughts resulting from El Nino phenomenon, landslides, and volcanic eruptions) and man–made disasters (such as deliberate and unplanned water pollution); and*
- *Inadequate sanitation and unhygienic practices as well as ineffective solid waste management.*

The above challenges have severe impacts on the quantity and quality of freshwater available for domestic purposes. The effects are variable within the different regions of the country and also within the rural and urban areas.

Water PNG informed the AGO that in the last twenty five years, there has been lack of political will, sector fragmentation and lack of adequate and sustainable sector

[9] Figure quoted from "Water and Sanitation in PNG – the State of Affairs": Water PNG –Strategic and Medium Term Corporate Plan 2006 –2015; Water PNG, page 7.
[10] Extract from "**The National**" Newspaper, Monday 3rd of January, 2011 – Dealing with cholera in PNG; page 30.

funding. As a result, the Water Sector is fragmented. Water PNG recognised these challenges and accordingly advised the Government of the need for a Water Sector reform. Subsequently, the NEC under DEC No. 72/2005 directed Water PNG to develop a National Policy for Water Supply and Sanitation Services. In 2007 Water PNG finalised the Draft National Water Policy and submitted to IPBC.

However, at the time of audit in March 2012, the Water PNG was yet to receive feedback from IPBC on the Draft National Water Policy submitted.

1.8 Audit Objective and Scope

Audit Objective

The audit objective was to assess the effectiveness of actions taken by key agencies to improve access to safe drinking-water with a focus on the NCD. The audit was conducted based on three lines of enquiries:

- *The existence of a legal and policy framework on access to safe drinking-water in the country;*
- *The process by which the legal and policy framework is implemented within the NCD; and*
- *Monitoring arrangements in place to ensure compliance of implementation of the legal and policy framework and the demonstration of improvements to access to safe drinking-water.*

Audit Scope

The AGO examined the existence of the legal and policy framework on access to safe drinking-water in the country and regulatory roles functions performed by the key Government Agencies in relation to various aspects of the audit subject. The agencies covered or consulted were:

- *The Department of Environment and Conservation (DEC) as the regulator and allocator of water resources in the country[11];*
- *The National Department of Health (NDOH) as the water quality surveillance agency for the country;*
- *Water PNG[12] as water supplier in all urban areas (except the NCD); and*
- *NCD Water and Sewerage P/L trading as Eda Ranu Ltd as water supplier in the NCD.*

[11]AGO had planned to assess the actions taken by the DEC to allocate and protect water used for water supply, however ,fieldwork was not undertaken due to lack of cooperation from the Department. The observations made by AGO for the department are based on the review of the legal framework.

[12]In the review of the legal framework, the roles and responsibilities of Water PNG were reviewed; however, it was excluded in the review of the process of implementation and monitoring compliance.

In respect to implementation and management of access to safe drinking-water, Port Moresby was selected as a case study, focusing on the roles of Eda Ranu which is the supplier of water for the city.

1.9 Limitation of Scope

Although, the audit objective was limited to the effectiveness of actions taken by key agencies to improve access to safe drinking-water within the NCD, the audit observations under existence of legal and policy framework ***(Chapter2)*** covered the arrangements in place to facilitate or provide safe drinking-water throughout the country. Consequently, the discussions included legal provisions of the *NWSS Act* which enables the provision of water supply and sanitation services throughout the country. Hence, the comments made under this area apply nationally.

The discussions on the process by which the legal and policy framework on access to safe drinking-water are implemented and monitored excluded the actions taken by Water PNG to improve access to safe drinking-water at the national level.

The audit scope also excluded the review of actions taken by NGOs, donor agencies and private water suppliers to ensure access to safe drinking-water and the coordination between them and the key government agencies involved in ensuring access to safe drinking-water.

The AGO was unable to perform audit of the DEC due to lack of cooperation by the management. This entity will be adequately covered in the future during an audit of Water PNG.

1.10 Audit Methodology

To gain an understanding of broader issues of sufficiency, accessibility and safe drinking-water; the measures taken to ensure access to safe drinking-water; and also to identify the primary issues and evidence necessary to support an audit conclusion, the AGO used the following evidence–gathering techniques:

Technique	Types of Evidence Reviewed
Documentary reviews	Legislations, Policies, Corporate and Strategic Plans
Conducted interviews	Departmental Heads and line managers
Developed and issued questionnaires	Key thematic areas of audit
Analysis of data assessments	Financial statements
Physical verifications and site visits	Water treatment plants, reservoirs, water pump–stations
Research on Internet	Literatures related to access to safe drinking in PNG

1.11 About the Audit

The Pacific Association of Supreme Audit Institutions (PASAI) Congress in 2008 agreed, as part of a Regional Pacific Audit Initiative sponsored by the Asian Development Bank (ADB), there would be benefits in conducting a program of

cooperative performance audits to promote auditing and increase capacity by learning from each other.

Performance audits are concerned with audit of economy, efficiency and effectiveness, and embrace:

- *audit of the economy of administrative activities in accordance with sound administrative principles and practices, and management policies;*
- *the efficiency of utilisation of human, financial and other resources, including examination of information systems, performance measures and monitoring arrangements, and procedures followed by audited entities for remedying identified deficiencies; and*
- *the effectiveness of performance in relation to achievement of objectives of the audited entity, and audit of the actual impact of activities compared with the intended impact*.

Cooperative audits involve the audit institutions of multiple countries working together on a single audit – joint planning but different approaches, standards and methods in each jurisdiction and producing individual reports. However, the requirement of PASAI is that the final reports of the respective participating institutions will be consolidated.

Based on that agreement, the 13th PASAI Congress in July 2010 endorsed the performance audit on Access to Safe Drinking-Water. The Congress also endorsed the specific audit objective of the cooperative performance audit. The Supreme Audit Institutions involved in the cooperative performance audit include: Cook Islands, Federated States of Micronesia, Fiji, Palau, Papua New Guinea, Samoa, Tonga and Tuvalu.

The arrangements for the conduct of the cooperative performance audit in the region were co-funded by the International Organisation of Supreme Audit Institutions (INTOSAI) Development Initiative (DI) and the Asian Development Bank (ADB).

1.12 Audit Reporting Structure

The structure of the remainder of this report is presented in the following manner:

- *Chapter 2 covers Audit Objective One, that is the existence of a legal and policy framework on access to safe drinking-water in the country;*
- *Chapter 3 deals with Audit Objective Two that examines the process by which the framework is administered and implemented; and*
- *Chapter 4 covers Audit Objective Three and covers the effectiveness of monitoring compliance of the framework and the demonstration of improvements to access to safe drinking-water.*

Audit criteria were established for each audit objectives specified under the three lines of enquiries, followed by audit work performed, the associated audit findings and the audit issues observed.

This is followed by the causes of audit issues observed and their associated risks; backed up by the appropriate audit recommendations for improvements and remedial actions. Management responses received from the respective audited agencies are highlighted under each audit recommendation.

2 EXISTENCE OF LEGAL & POLICY FRAMEWORK ON SAFE DRINKING-WATER

2.1 Introduction

This section discusses the existence of a legal framework on water allocation; its protection, quality and supply services; National Drinking-Water Policy and Plans; equality in access to safe drinking by citizens and the committee on water supply and sanitation.

The International and Regional Conventions/framework on access to safe drinking-water are also discussed.

2.2 Legal Framework on Water Allocation, its Protection, and Quality

Audit Criteria

A legal and policy framework should be established in the country to ensure its population has access to safe drinking-water. The framework should include the institutional arrangements on water allocation, its protection and quality as well as water service provision.(Pacific RAP, Key Thematic Area 5 –Institutional Arrangements.)

Audit Findings

The key pieces of legislation which exist to ensure the population have access to safe drinking-water comprise the *Environment Act 2000*, *Public Health (Drinking-Water) Regulation 1984*, *National Water Supply and Sewerage* (NWSS) *Act 1986* (as amended in 1996) and *NCD Water Supply and Sewerage* (NCD WSS) *Act 1996*. The applicable legislation and their administering agencies, responsibilities and jurisdictions are summarised in **Table 2.1** below.

Table 2.1 Applicable Legislations and Administering Agencies

Applicable Legislations	Administering Agency	Responsibility	Coverage
Environment Act 2000	Department of Environment and Conservation (DEC)	Allocation of water resources protection of water resources	National Level
Public Health (Drinking-water) Regulation) 1984	National Department of Health (NDOH)	Drinking-water quality and monitoring	National Level
National Water Supply and Sewerage Act 1986	Water PNG	Provision of water supply services	National Level
NCD Water Supply and Sewerage Act 1996	NCD Water and Sewerage P/L (trading as Eda Ranu)	Provision of water supply services	Provincial Level

Source: PNG AGO (2011)

The above Table also shows that a legal framework on the allocation and protection of the water resources, drinking-water quality and provisions of water supply services exists in PNG to ensure the population have access to safe drinking-water.

Detailed discussions of the above enabling legislations are made in the subsequent paragraphs.

Environment Act 2000

Prior to the enactment of the *Environment Act 2000*, the *Water Resources Act 1982* had existed to provide for the management of national water resources in the country; however on the enactment of the former Act, the latter Act was repealed and replaced in 2000.

The preamble of the Environment Act 2000 provides the objects of the Act to:

- *provide for the protection of the environment in accordance with the 4th National Goal and Directive Principle (National Resources and Environment) of the Constitution;*
- *regulate the environmental impacts of development activities in order to promote sustainable development of the environment and the economic, social and physical well-being of the people by safeguarding the life-supporting capacity of air, water, soil and ecosystems for present and future generations;*
- *provide for protection of the environment from environmental harm; and*
- *provide for the management of national water resources and the responsibility for their management*.

The applicable provisions in the *Environment Act 2000,* which are related to the arrangements on allocation and protection of water resources, are further discussed in the following paragraphs.

Water Allocation

To ensure effective management of national water resources, the rights to use, flow and control of water is vested in the State by the virtue of *Section79 (1)* of the Act**.** This is subject to *Subsection (2)* which specifies that this does not affect rights to the use of water by citizens resident in the area in which the customary rights are exercised. The rights of the owner of land near watercourse are detailed in *Section 81* of the Act.

Further, *Section 80* provides that a person may take water without charge for domestic purposes, watering stock and fire–fighting from a watercourse or lake to which the public has free access by road or from an area of land reserved for the use of the public.

The vestment of rights to the State enables it to allocate water for various activities including mining, agriculture, power generation, industries and most importantly for supply of drinking-water. This right to allocate water resources is delegated to the DEC which is the administering agency of the *Environment Act 2000*.

The allocation of water resources are achieved through the issuance of *Environmental Permits* specified under *Part 5 Sections 41–73* of the *Act*.[13]Amongst others, the Part 5 sets out the procedures for applying for the permits, the criteria

[13] The function of allocation of water resources is centrally controlled by the DEC at the national level.

and conditions that should be met prior to issue of the permit, and the procedures of reviewing the applications, approval and the issuance of the permits.

Specific rights conferred by permits relating to water use are provided under *Section 82* of the Act. These rights relate to the right to construct, operate and maintain works in accordance with the plan and program approved by the Departmental Head, the right for taking water for the purpose specified in the permit at a rate not exceeding the maximum rate specified, and the right to release water in accordance with prescribed conditions and standards.

The *Act* also makes provisions for the payment of compensation to owners and occupiers of, and any person with customary rights in, any private land in relation to entry on land, or occupation of the land by the water permit holder under *Section 87*. Amongst others, the water permit holder is liable to pay compensation for the rights to water customarily associated with land and rights of way and easements.

AGO is of the view that the procedures and processes detailed in the *Environment Act 2000* on the allocation of water for various activities, including for drinking-water are adequate and comprehensive.

Protection of Water

The protection of water resources is centred on the guiding principles of the 4th Goal of the *National Constitution* which stipulates for *"Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of all and are replenished for the benefit for the future generations.*" It is also the guiding principle of the *Environment Act 2000* which entails provisions on protection of water resources.

The protection of water resources is regulated through the formulation of Environment Policy under *Section 31 (2) (h)* of the *Act* which specifies that DEC may formulate policy on the whole environment, or segments or elements of the environment such as land, air or water quality, for its protection. The criteria and conditions are contained in *Sections 65* and *66* respectively of the Act for the issuance of *Environmental Permits.*

Among others, the criteria for granting of permits specifies that the Departmental Head may grant a permit where he is satisfied that "*the activity which is the subject of the permit will be carried out in the manner which is consistent with all relevant Environment Policies and the Regulations*" [*Section 65 (a)*] and "*all reasonable steps will be taken to minimise any risk of environmental harm as a result of the activity*" [*Section 65 (b)*].

In addition, the conditions in the permits generally commit the permit holders to take certain actions to minimise the risk of environmental harm to water and ensures all reasonable steps will be taken by permit holders to minimise any risks of environmental harm as a result of an activity.

Further, the DEC has formulated an *Environment (Water Quality Criteria) Regulation 2002*, which came in force in January 2004. The *Regulation* specified the water quality criterion for the protection of freshwater and marine aquatic life

and the maximum permitted criteria of ammonia-nitrogen for protection of fresh water aquatic life. The water quality criteria are detailed in Schedule 1 attached with the Regulation.

It also states a person shall not discharge into, or use, water where any discharge, or use, would cause a lowering of water quality below the prescribed water quality criteria, except as permitted under the Regulation or the terms and conditions of a permit. The Regulation further may provide a mixing zone that allows discharge from various activities, through the terms and conditions of the Environmental Permits issued, into freshwater.

The AGO concludes the legal framework on the protection of water, including water used for domestic purposes, to be sufficient except that that DEC has yet to formulate a specific environmental policy on water by utilizing *Section 31* of the *Environment Act 2000* to protect and sustain the drinking-water sources as mandated.

The absence of the environment policy on water is an indication of lack of coordination with stakeholders and government agencies concerned with access to safe drinking-water. It is also suggestive of a lack of priority and attention to the sustainable management of water resources in the country.

The absence of clear and specific environmental policy on water resources could lead to environmental health risks such as polluted water sources or destruction of water resources.

Audit Recommendation

Recommendation No. 1

To support the existing legislation on the protection of water in particular drinking-water, AGO recommends that the DEC gives priority with the formulation of the environmental policy on water in close consultation and coordination with relevant government agencies concerned.

Management's Comment

The management responses/comments were yet to be received from DEC at the time of preparation of this Report in March 2012.

Public Health (Drinking-Water) Regulation 1984

Water quality[14] standards for drinking-water are covered in the *Public Health (Drinking-Water) Regulation 1984*. The Regulation has established the National Drinking-Water Quality Standard for both raw water and treated water used for drinking purposes under *Sections 4* and *5* respectively. The Standards for Raw Water and Treated Water are set out in *Schedule 1* and *2* in the Regulation.

[14] The term 'w*ater quality'* is used to describe the microbiological, physical and chemical properties of water that determines its fitness for a specific use. These properties are determined by substances which are either dissolved or suspended in water.

The standards for raw water specified the accepted levels on micro–biological, toxic contaminant and aesthetic quality. Likewise, the standards on treated water specified the accepted micro–biological levels for chlorinated or disinfected water supplies and non–disinfected water supplies, toxic contaminants as well as aesthetic and other qualities. The drinking-water quality standards are attached as ***Appendix 2***.

The drinking-water standards are adopted from WHO standards where applicable and NDOH is the administering agency of the Regulation.

In addition to establishing drinking-water standards, amongst others, the Regulation requires:

- *a water supplier who intend to install or construct any plant for treating raw water for drinking purposes to obtain prior approval from Departmental Head of NDOH [Section 2]*
- *a water supplier to ensure drinking-water supplied to consumers or has in his distribution system complies with the standards established by the Regulation. A non–compliance penalty fee of K100.00 or imprisonment for a term not exceeding three months or both is imposed on both situations [Section 6];*
- *a water supplier to forward the laboratory water samples from raw water source, water treatment plant and distribution network at a regular time interval for analysis and examinations. The number of samples and frequency at which the samples are to be taken depends on the number of population served by the water supply, [Sections 7 & 8];*
- *the Departmental Head of NDOH to direct the water supplier by written notice to take such corrective measures as are specified in the notice where it is established by analysis and examination that drinking-water supplied by a water supplier does not comply with drinking-water quality standards, [Section 10 (1)];*
- *the analysis of any water should be effected in accordance with methods set out in the National Technical Standards PNGS 1025-82 established under National Institute of Standards and Technology Act 1993, [Section 12]; and*
- *the Departmental Head or a person authorised by him to enter on any premises for the purpose of inspecting any water treatment plant or any water distribution system.*

The AGO noted that the Regulation has adequately spelt out the duties of a water supplier, the procedures and process of monitoring drinking-water quality in a water supply system and the coordination arrangement between the drinking-water quality regulator and a water supplier.

The Regulation also sets out the frequency rates of water samples a water supplier is expected to collect and submit to NDOH to test water quality in a water supply system. The number of sample to be collected and submitted depends on the size

of the population served by a water supply. This is set out in *SCHEDULE 3* of the Regulation and is attached as ***Appendix 3***

Further, the NDOH has informed the AGO that the Regulation was revised by the Department and was forwarded to the First Legislative Council for endorsement and awaits approval for the amendments at the time of audit fieldwork in January 2011.

Nevertheless, NDOH did not make available any copies of the amended Regulation for the AGO to confirm that the Regulation was amended and determine the sections affected. As such, the AGO was unable to make further comments with respect to amendments of the Regulation made by NDOH.

Water PNG informed the AGO during audit that the existing *National Drinking-Water Quality Standards* are governed under Drinking-Water Quality Regulations under the Public Health Act. The standards have been adopted from the WHO Drinking-Water Quality Guidelines. Water PNG and NDOH with guidance of the WHO, reviewed the obsolete Standards but are yet to be regularised by the NDOH.

It was emphasized that an Apex Body can address this situation. There is also a need for the NDOH to develop a *National Water Safety Plan* as advocated by the WHO.

National Water Supply and Sewerage Act 1986 and NCD Water Supply and Sewerage Act 1996

The extraction, treatment and distribution of drinking-water and collection, treatment and discharge of wastewater are assigned to Water PNG[15] at the national level and Eda Ranu at the provincial level (in the NCD only). These functions are assigned through the *National Water and Sewerage (NWSS) Act 1986* and the *NCD Water Supply and Sewerage (NCD WSS) Act 1986* respectively.

Both water suppliers are State Owned Enterprises established through the virtue of each enabling Act, and their operations are overseen by Board of Directors.

Amongst others, the functional responsibilities assigned by the respective Acts to Water PNG and Eda Ranu are shown in **Table 2.2** below.

[15]At the time of audit in December 2010, Water PNG was known as PNG Waterboard. The name of the entity was changed in January 2011.

Table 2.2 Roles and Responsibilities of Water PNG and Eda Ranu

Applicable Acts	Water Supplier	Assigned Roles and Responsibilities	Population Served
National Water Supply and Sewerage Act 1986	Water PNG	*Provision of water supply in urban areas throughout the country [S.5 (b);* *Promote water supply and sanitation in rural and urban fringe areas through community participation [S.5 (b)];* *Exercise control over private water and sanitation service providers in the country [S.56 (d)];* *Advise the National Executive Council (NEC) on all matters relating to water supply and sanitation services [S.5 (f); and,* *Engage in research related to water supply and sanitation services [S.5 (g)].*	Provincial Town and Districts declared as Water Districts according to this Act
NCD Water Supply and Sewerage Act 1996	NCD Water Supply and Sewerage P/L trading as Eda Ranu Ltd	*Provide, construct and maintain such catchment areas, reservoirs and other works required for collection, production, supply and use of water for the NCD [S.3 (b)];* *Manage and work water and sanitation owned and constructed by the Company [S.3 (e)];* *Exercise control over private water supply and sanitation services in NCD [S.3 (f)]; and,* *Abide by such water quality standards as are from time to time in force [S.3 (g)]*	In and for the NCD

Source: Extracted from NWSS Act 1986 and NCD WSS Act 1996

The relevant Sections and Subsections which spell out the specific roles and responsibilities of each water supplier are also shown in **Table 2.2** referred to above.

Water PNG is charged with the responsibility of coordinating the planning, design, construction and management of water supply and sewerage services in urban areas (except the NCD) and districts; which are declared as Water and/or Sewerage Districts (*under Sections 27 and 28 of the NWSS Act*) at the national level.

On the other hand, Eda Ranu is mandated the responsibility to provide water and sewerage services in and for the NCD at the provincial level. The general provisions relating to the supply of water are provided under *Section 5* of the *NCD WSS Act 1996*. These include the responsibility to distribute to all persons a constant supply of water unless prevented by drought or other unavoidable cause or accident. Subject to the preceding the company may, on terms and conditions as it determines, supply water to any persons who enters into contract with the Company.

Even though the enabling Acts for the provision of water supply services have clearly identified the roles and responsibilities of Water PNG and Eda Ranu, the AGO is concerned that a lead agency has not been identified by the respective Acts to coordinate, monitor and exercise control over water supply and sanitation activities in the country.

Instead, the respective Acts have assigned the role to exercise control over private water supply and sanitation service providers to both water suppliers; Water PNG at the national level and Eda Ranu in the NCD.

This has led to duplication of roles and responsibilities when both the water suppliers are providing water supply services and at the same time, are exercising control over private water supply and sanitation services providers. Ideally there should be a clear separation between these responsibilities.

The lack of identification of a lead agency to coordinate, monitor, regulate and control water supply and sanitation services by the legislative arrangements may have led to both water suppliers performing dual functions.

The dual role played by Water PNG and Eda Ranu could impair their independence and could place a significant burden on the respective agencies, leading to ineffective discharge of mandated responsibilities or overloading of responsibilities.

Audit Recommendation

Recommendation No. 2

The AGO recommends that Water PNG and Eda Ranu:

(i) review the regulatory roles assigned to them to exercise control over private water supply and sanitation services with the possibility of separating the functions; and

(ii) in close consultation with the NDOH, the DEC and other government agencies, donor agencies and NGOs, identify and establish a central agency to assume the role of regulating and coordinating all water supply and sewerage activities in the country.

Management's Comment

Water PNG response: Agreed with qualification.

Refer to Fig 1.1 of this Report. This is a regulatory function by the Government (either DEC or NDOH). Regulatory functions performed by the service providers (such as Water PNG) can be seen as a conflict of interest as they can be seen as a referee and a player. A Central Agency must take lead to be supported by service providers such as Water PNG. An Apex Body (such as a National Water Authority) will address this situation.

Eda Ranu response: Agreed.

Eda Ranu agreed that an entity should be set up to coordinate, monitor and control all activities of water supply and sanitation at the national level.

2.3 National Drinking-Water Policy

Audit Criteria

A National Drinking-Water Policy should be in place to support the legal framework on access to safe drinking-water to facilitate coordinated and effective implementation by responsible government agencies. (The Guidelines: a framework for safe drinking-water; National drinking-water policy – paragraph 2.3; WHO.)

Audit Findings

The AGO noted that a National Water Drinking-water Policy is yet to be formulated for the country to support the legal framework to ensure access to safe drinking-water for the population.

This may have resulted from lack of coordination and communication amongst key government agencies such as DEC, NDOH, Water PNG and Eda Ranu as well as other stakeholders. The absence of a policy on drinking-water could lead to fragmented implementation of legal framework and may inhibit improvements to access to safe drinking-water in the country.

Audit recommendation on the need for a National Drinking-Water Policy and the management responses are covered under Recommendation No. 3 of this report.

2.4 Action Plans to Support Legal and Policy Framework

Audit Criteria

The legal framework on access to safe drinking-water should be supported by National Plans of Action/Strategies which include monitoring arrangements to ensure citizens have access to safe drinking-water.(Pacific RAP, Key Thematic Area 5 – Institutional Arrangements)

Audit Findings

National Strategies/Plans of Actions on Safe Drinking-Water

A National Action Plan on Integrated Water Resource Management was formulated as a result of a National Water Seminar convened in August 2003. The plan was adopted from the *Pacific Regional Action Plan (Pacific RAP) on Sustainable Water Management*[16].

The action plan outlined the priority activities to improve water resources and wastewater management in the country. It addresses the six thematic areas under the Pacific RAP: water resource management; PNG vulnerability; awareness; technology; institutional arrangements; and finance. The components of the plan comprise the key strategies, actions required, and the agencies responsible.

[16]Extracted from:*A compilation of HSA, SA and DCP Documents prepared as part of the SOPAC coordinated GEF PDF Stage B submission for the Sustainable Integrated Water Resources and Wastewater Management Project in Pacific Island Countries, (Narau Lovai; Department of Environment and Conservation(2007*))

The key components of the action plan were linked to key Millennium Development Goals (MDG) and were incorporated in the *Medium Term Development Strategies (MTDS) 2005-2010*, which focuses on the strategic areas of the overall development of the country.

The MTDS preceded formulation of the PNG Vision 2050 to map out the overall government focus on the development of the country which was launched in 2010. A twenty year plan called the '*PNG Strategic Development Plan 2010–2030'* was developed from the PNG Vision 2050.

The AGO noted that the promotion of a sustainable environment was one of the key areas in the national vision developed, however, the focus was not on management of water resources in the country. Also, strategies to improve access to safe drinking-water and the MDG goals were not adopted and incorporated.

It appears from the above observations that a National Drinking-Water Plan is yet to be developed by the key government agencies concerned with ensuring access to safe drinking-water to incorporate *MDG Goal 7: Target 7C*. Even though the MDG was adopted into the MTDS, this national plan lapsed in 2010.

The exclusion of strategies to improve access to safe drinking-water in the national plans of actions and the lack of formulation of a national drinking-water plan to support the legal and policy framework may have resulted from the lack of coordination across concerned key government agencies. These could lead to PNG's overall performance falling below the MDG 2015 targets.

Audit Recommendation

Recommendation No. 3

AGO recommends that Water PNG and NDOH take the lead to coordinate and consult with government agencies such as DEC, Eda Ranu, donor agencies and NGOs concerned with access to safe drinking-water in the country to formulate:

(i) a National Drinking-Water Policy to support the legal framework to ensure integrated implementation throughout the country; and,

(ii) National Drinking-Water Plans to support the legal and policy framework to map out the focus areas for improvement in access to safe drinking-water.

Management's Comment

(i) Water PNG response: Agreed with qualification.

The NEC has directed Water PNG to develop a National Policy for Water Supply and Sanitation services under NEC Decision 72/2005. Water PNG finalised the Draft National Water Policy and submitted to IPBC in 2007.

The Draft National Water Policy recommended an Apex Body (such as National Water Authority) to undertake the leadership of the Water Sector and address many conflicting functions and duplications of roles. The Apex Body would oversee commercial service providers (Eda Ranu & Water PNG), establish non-commercial water operations (WS to rural areas and urban

fringes), undertake national WS planning, undertake regulatory functions and formulate policies such as funding Community Service Obligations (CSO).

Eda Ranu response: Agreed.

Eda Ranu agreed and endorses the setting up of the National Drinking-water Policy

(ii) Water PNG response: Agreed with qualification.

It is not the lack of plan but lack of funding. In 2006, Water PNG prepared a 15 year three-prolong Water Supply and Sanitation Development Plan: for Provincial Towns, District Towns and Rural Communities launched by the Government. Unfortunately, lack of funding support resulted in little progress to date. Water PNG also pointed out that their 2006-2015 Development Plan is being updated to align with Government MTDS and Vision 2050.

Further, Water PNG agreed that under its legislative function, it has a "promotional" role in terms of extending safe drinking-water access in rural areas. Again, a National Water Policy setting up an Apex Body will address this situation.

Line Level Plans of Actions/Strategies

Even though there are no plans of actions at the national level to support the legal framework on access to safe drinking-water, each Government Agency under audit review have formulated five-year *Strategic Plans and Annual Plans of Actions* to assist them in taking steps necessary to improve access to safe drinking-water.

At Eda Ranu, a *Five-year Corporate Strategic Plan 2008-2012* was developed and this document sets out the strategies on key areas such as upgrade and maintenance of water assets, public awareness and reduction of non-revenue water. Expected outcomes are specified for each strategy. Abstracts of the key strategies, action plans and expected outcomes of the core areas are disclosed as ***Appendix 4.*** The set strategies were appropriately translated into annual management plans to facilitate the effective implementation of the long-term plans.

Similarly, the NDOH has in place a *Five-year Corporate Plan*, however, issues relating to monitoring and surveillance of the quality of drinking-water were not incorporated in the plan. Therefore, the AGO is of the view that the Department has yet to prioritize its strategies on the monitoring and surveillance of the drinking-water quality in a water supplier's distribution system.

The lack of proper planning by the Department could lead to ineffective monitoring and surveillance of drinking-water quality supplied by water suppliers and thus, the safety and quality of the drinking-water in a distribution network could be comprised.

Audit Recommendation

Recommendation No. 4

The AGO recommends that the NDOH considers reviewing its corporate plans to ensure the Department prioritises the monitoring and control of drinking-water quality activities in its plans.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparation of this Report in March 2012.

2.5 Equality in Access to Water by the Public

Audit Criteria

Established legal and policy framework on access to safe drinking-water should apply equally to all citizens to ensure they all benefit.(Manual on the rights to Water and Sanitation- Executive Summary; Chapter 5: Non-discrimination to vulnerable and marginalised groups – WHO)

Audit Findings

The review of the enabling legislation on the provision of water supply services indicated inequality in access to safe drinking-water by the population in the rural communities, informal settlements in urban areas and urban fringe communities. Both water suppliers, Water PNG and Eda Ranu are restricted from providing these services to these segments of the population by virtue of the provisions in their respective Acts as shown in **Table 2.3** below.

Table 2.3 Provisions which limits equal distribution of drinking-water

Water Supplier	Relevant Section	Provisions in Enabling Acts
Water PNG	*Section 5 (b) of NWSS Act 1986*	*To promote water supply and sanitation in the rural areas and urban fringe areas through community participation on self-help basis and where necessary with the help of loans, grants or aid.*
Eda Ranu	*Section 22 (3) of NCD WSS Act 1996*	*The company may levy water rates or sewerage rates in respect of any rateable land.*

Source: PNG AGO (2011)

The above Table reveals that Water PNG may promote water supply and sanitation in the rural areas and urban fringe areas but is not required to provide water supply services to these segments of the population. On the other hand, Eda Ranu has a duty to levy water rates in respect of land that is rateable-meaning land that is formally apportioned and leased by the Department of Lands and Physical Planning to ratepayers. The company is limited from levying water rates on land which is not rateable.

The squatter settlements and urban fringe areas dwell on land that is not rateable, therefore, water supply services could not be provided to them in accordance with *Section 22 (3)* of *NCD WSS Act 1996*.

Furthermore, the legal framework has not clearly identified an agency to coordinate the provision of water supply services to the rural population where more than 80% of the population live.

It appears from the provisions made in the enabling Acts of the water suppliers, access to safe drinking-water in the rural areas and urban fringe areas may not be a priority to the Government due to the perception that '*there is abundance of fresh water in the country'* and the rural communities naturally have access to water.

The inequality to access to safe drinking-water by citizens in the rural communities, squatter settlements and urban fringe areas could have severe effects on public health, exacerbate poverty and undermine rural economic development.

Audit Recommendations

Recommendation No. 5

The AGO recommends that Water PNG, Eda Ranu and the NDOH consult with each other and identify agencies at national, provincial and local government levels and coordinate with these agencies to facilitate access to safe drinking-water to the rural communities, squatter settlements and urban fringe areas in the country.

Management's Comment

Water PNG response: No comments.

Eda Ranu response: Qualification comments.

Eda Ranu does not support the collaboration with Water PNG and NDOH, as it is a local challenge which Eda Ranu has tried to address with politicians, NCDC and the community but without success due to political interest and free handout mentality of receiving free service. CSO is recommended to be developed and implemented. No service should continue to be given free unless someone pays for it.

Recommendation No. 6

The AGO recommends that Eda Ranu and the Water PNG take steps necessary to ensure that informal settlements in the urban and the urban fringe areas have access to safe drinking-water facilities. The steps may include community participation, Provincial Governments, Local Level Governments and political will, commitment and involvement.

Management's Comment

Water PNG response: Agreed with qualification.

Under the NEC Directive No. 72/2005, Water PNG prepared a Draft National Water Policy in 2007 and submitted to IPBC. Water PNG has been advised that the

formulation of a National Policy is the function of a Central Agency not a Sectoral Agency such as Water PNG.

Water PNG concurs that a National Water Policy is necessary, supported by a legislation clearly demarcating roles and responsibilities are prerequisites to holistic and equitable development of safe water supply for the Nation.

They also concur with the AGO that political will and commitment to providing sufficient funding in the next 15 to 20 years is necessary to make an impact. Otherwise, policies and plans will come to nothing.

Eda Ranu response: Qualification comments.

Community participation, NCDC and political will is a failure, and unless there is a CSO assistance or funding is provided for infrastructure and sustainability, there will be no further services. However, small improvements are being made now for private vendoring service in each community.

2.6 National Water Supply and Sanitation Committee

Audit Criteria

A National Committee on water should be established as a consultation forum for government agencies and stakeholders concerned with providing access to safe drinking-water in the country.(Pacific RAP, Key Thematic Area 5 –Institutional Arrangements.)

Audit Findings

A national Water Supply and Sanitation Committee (WASCOM) was formed in 1990[17] to be the main consultation forum on water supply and sanitation activities in the country; especially in the rural or District towns and Local Level Government areas.

The Committee is comprised of the NDOH (as Chair), the DNP&RD, the DEC, Water PNG, NDES, WHO, UNICEF, AusAID, European Union, NWS, the Department of Mining, the DPG&LLG, National Capital District Commission, PNG University of Technology, the Department of Works and Implementation, Eda Ranu and various NGOs.

Each province has a Provincial Water Supply and Sanitation Committee consisting of related stakeholders in the provinces.

The existence of WASCOM was confirmed by Eda Ranu, however, supporting documents such as the Meeting Minutes of the Committee were not provided by the NDOH to indicate that Meetings were held on a regular basis. As such, the AGO was unable to comment further on the effectiveness of the WASCOM.

[17]National Integrated Water Resource Management Diagnostic Report PNG; DEC (2007) In some literature, WASCOM was formed in 1991. On the other hand, Water PNG states that the Committee was formed in 1982 as shown in their management comments above. Due to this varying views on the establishment of WASCOM, Audit cannot ascertain the exact year in which the Committee was formed

During the audit, Water PNG informed the AGO that it has been supportive and an active member of WASCOM since its establishment in 1982, however, the Committee has been inactive for some years now.

Eda Ranu also advised the AGO that WASCOM is in existence, but is non-functional due to poor leadership. However, it should still exist as a National Committee.

2.7 International and Regional Conventions

Audit Criteria

International and Regional Conventions/framework on safe drinking-water should be adopted and incorporated in the National Drinking-Water Policy and Plans.(PNG AGO 2012)

Audit Findings

The International and Regional Conventions applicable to PNG for ensuring access to safe drinking-water comprise: the International Convention on Economic, Social and Cultural Rights (ICESCR), the Millennium Development Goals, the Pacific Regional Action Plan (Pacific RAP) on Sustainable Water Management and the Pacific Framework for Action on Drinking-Water Quality and Health. The relevant provisions under each of these conventions are discussed below.

International Convention on Economic, Social and Cultural Rights

Article 12.1 of ICESCR recognises water as a human right. *General Comment No. 15* was adopted by the UN Committee on Economic, Social and Cultural Rights which clarifies the rights guaranteed to individuals.

The General Comments entitles everyone to sufficient, clean, physically accessible and affordable water which must be enjoyed without discrimination and equally by men and women. It also holds the Governments responsible for ensuring the realisation of this right by taking steps necessary to respect, protect and fulfil this right guaranteed by the Convention.

Generally, the rights to water guaranteed to individuals and the duties assigned to the Government by the ICESCR have recognised and been incorporated in the existing legal framework on access to safe drinking-water in PNG. The following enabling Acts recognises the rights of individuals to water and fulfilled the government's duties in the following manner:

(i) *Environment Act 2000 provides protection of water resources by regulating activities of its institutions, agencies and representatives from interfering directly or indirectly with the enjoyment of the rights to water;*

(ii) *Public Health (Drinking-Water) Regulation 1984 protects the individual right to water by regulating the safety of drinking-water supplied by water suppliers; and,*

(iii) NWSS Act 1986 and NCD WSS Act 1996 fulfil the rights of individuals to water by ensuring accessibility to safe drinking-water.

Millennium Development Goals

The Millennium Development Goals (MDGs) and targets are part of the Millennium Declaration which was agreed by 189 countries in September 2000. One of the eight goals developed in the MDG, Goal 7, aims for the sustainability of the natural resources for now and future generations.

A resolution adopted by the UN General Assembly in 2005 complemented these targets. Of these, Goal 7: Target 7C aims to *"by 2015, reduce by half the proportion of people without sustainable access to safe drinking."*The goals and targets have committed each State to adopt and incorporate these in their respective Government policy framework on drinking-water.

At the regional level, at the 1st Asia-Pacific Water Summit held in Beppu City, Japan in 2007, Government representatives from the region reiterated their commitment to reduce by half the number of people who do not have access to safe drinking-water by 2015, and have further aimed to *reduce that to zero by 2025*.

The MDG 2015 target was adopted and incorporated in *PNG's MTDS 2005–2010* as observed under **Section 2.4** above.

Further, Eda Ranu has adopted the MTDS and MDG target in its *Corporate Strategic Plan 2008–2012*. The Company has strategised to meet the UN MDG by 2015 under Stakeholder Expectation strategies and has set the target to support Government's efforts to meet the target of water supply to 90% of population in the NCD by 2015.

Water PNG has also strategised to ensure all provincial town water supply infrastructure services are developed by 2015 and water supply is accessible to all urban population under Action Plan 2 (Core Business Focus).

Pacific Regional Action Plan (Pacific RAP) on Sustainable Water Management

Pacific RAP on Sustainable Water Management was adopted by 18 Pacific Island countries including PNG in Sigatoka, Fiji in 2002. The meeting was attended by 150 participants including Ministers, senior representatives of governments, multilateral and bilateral agencies, representatives of civil societies including community based organisations (CBOs), and the private sector.

The Action Plan is structured around six thematic areas: Water Resources Management, Island Vulnerability, Awareness, Technology, Institutional Arrangements, and Finance. Under each theme there are key messages to stakeholders with supporting statements drawn from the discussions. Under each key message, the required actions are listed including the parties deemed most appropriate to be responsible for implementation.

As observed under **Section 2.4** referred to above, the Pacific RAP was adopted by the DEC and has been developed into a '*National Action Plan on Sustainable Water Management'*.

Pacific Framework for Action on Drinking-Water Quality and Health

The *'Pacific Framework for Action on Drinking-Water Quality and Health'* was endorsed by the Health Ministers for the Pacific Island Countries in the '*Samoa Commitment'* in March 2005. Twenty-one recommendations were set out in the framework for implementation in the respective countries.

AGO is of the view that the recommendations of the '*Samoa Commitment'* are appropriate and relevant to the PNG. However, AGO noted that the recommendations have not been adopted and incorporated in the NDOH National Health Policy and Corporate Plan 2009–2013 to ensure that the Commitment is realised.

Water PNG informed the AGO during audit that the Government of PNG has been a signatory or a party to many of the International Conventions such as ICESCR, MDGs and Pacific RAP; however, the implementation has not been forthcoming owing to lack of political will, government commitment and funding.

Water PNG also pointed out that it was involved in the development of the Pacific RAP in 2002 and with the Government of PNG support; it is committed to implement the commitments of International Conventions relating to the water sector.

Audit Recommendation

Recommendation No. 7

The AGO recommends that the NDOH adopts and incorporates the Samoa Commitments into its National Health Policy and ensure the recommendations are implemented across the country.

Management's Comment

The management responses were yet to be received from NDOH at the time of compilation of this Report in March 2012.

2.8 Conclusion

A comprehensive legal framework exists in PNG to ensure that the population have access to safe drinking-water. It adequately covers the institutional arrangements on the allocation and protection of water resources, control and monitoring of drinking-water quality and provision of water supply services.

MDG targets and the Pacific RAP were appropriately adopted and incorporated in the MTDS and the Action Plan on sustainable water resource to support the legal framework.

However, a central agency has not been identified in the legal framework for the overall coordination, monitoring and control of water supply and sanitation services in the country.

This has led to overlapping of responsibilities assigned to the water suppliers, Water PNG and Eda Ranu, and National Drinking-Water Policy and Plans not being

developed to support the legal framework. The absence of National Drinking-Water Plans has resulted in international and regional conventions/goals/framework not being adopted and incorporated to improve access to safe drinking-water.

To remedy the absence of a central agency to coordinate, monitor and regulate water supply and sanitation activities, a Water and Sanitation Committee was established with the NDOH as the Chair to act as a consultative forum on water and sanitation activities for government, donor agencies and NGOs. However, the meetings of the Committee have been irregular.

The absence of National Drinking-Water Policy and Plans, inequality in access to safe drinking-water and the lack of a central agency to coordinate and regulate water supply activities in the country could result in PNG's overall performance falling below the MDG 2015 target.

3 PROCESS BY WHICH THE LEGAL & POLICY FRAMEWORK IS IMPLEMENTED

3.1 Introduction

This section addresses the audit observations and recommendations made under the process by which the legal and policy framework on access to safe drinking-water are implemented, focused on the:

- *effectiveness of water resource management;*
- *effectiveness of the management of island vulnerability;*
- *adequacy of awareness programs on water related issues made available to the public*
- *appropriateness of technology used; and*
- *adequacy of financial resources and the financial viability of water suppliers*.

3.2 Water Resource Management

Roles and Responsibilities of Key Government Agencies

Audit Criteria

The roles and responsibilities of each government agency concerned with providing/facilitating access to safe drinking-water should be clearly defined in the implementation phase to ensure responsibilities are not duplicated.(Pacific RAP, Key Thematic Area 1 –Water Resource Management.)

Audit Findings

The AGO noted that three government agencies play major roles with regard to access to safe drinking-water to the population in the NCD. The roles and responsibilities of each responsible agency in the implementation of the legal and policy framework on access to safe drinking-water were considered to be clearly identified and were within the scope of their enabling Acts.

Appendix 5 shows that the roles and responsibilities of each government agency concerned with access to safe drinking-water in the NCD are clearly identified in the implementation phase and are not duplicated.

Coordination Arrangements across Government Agencies

Audit Criteria

Established legal and policy framework should be effectively coordinated across key government agencies and instrumentalities to ensure the population have access to safe drinking-water. (Pacific RAP, Key Thematic Area 5 –Institutional Arrangement.)

Audit Findings

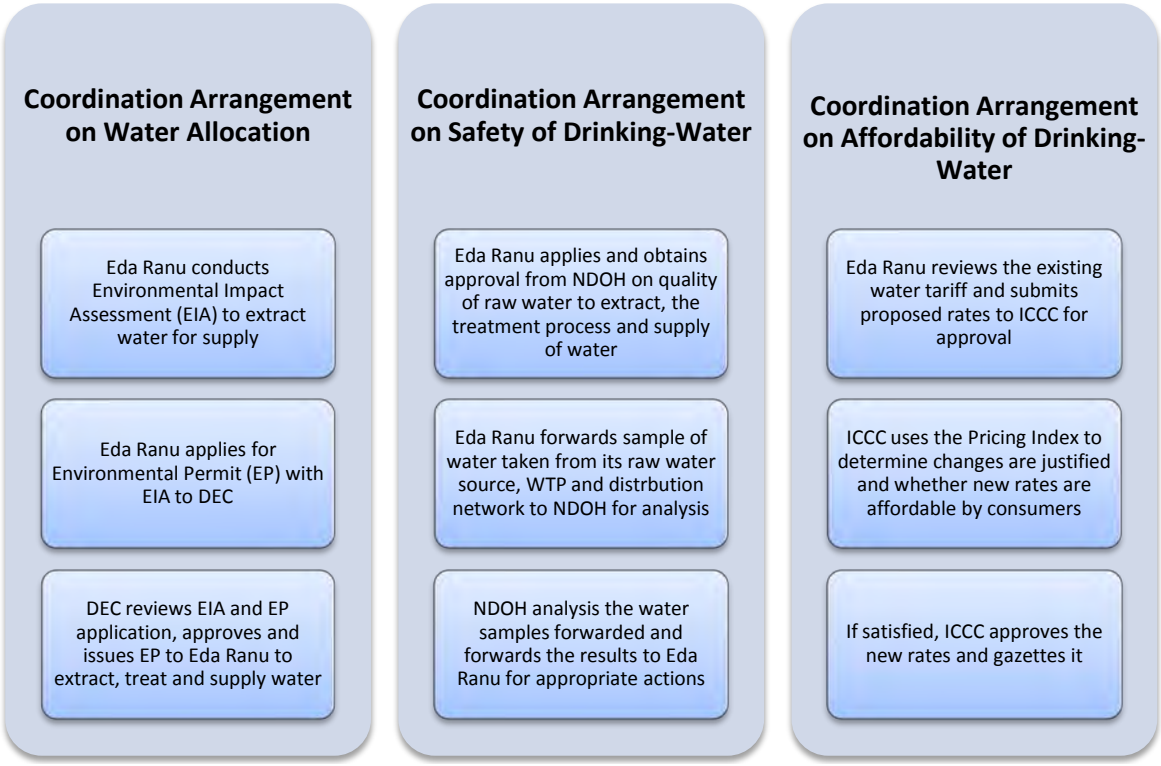
AGO noted that the key government agencies that play a major role in terms of coordination with arrangements for water allocation, ensuring safe drinking-water, and the affordability of drinking-water in the NCD are: the DEC, NDOH, Eda Ranu and ICCC.

Figure 3.1 below shows the process by which the main roles and responsibilities of the DEC, the NDOH, Eda Ranu and the Independent Consumer and Competition Commission (ICCC) are coordinated to ensure accessibility, safety and affordability of safe drinking-water in the NCD.

Allocation of water to facilitate supply of water is coordinated between Eda Ranu and the DEC; safety of drinking-water is coordinated between Eda Ranu and the NDOH, while the affordability of access safe drinking-water by consumers is coordinated between Eda Ranu and the ICCC.

Although a central agency has not been identified in the legal and policy framework, for the overall coordination and monitoring of activities related to water supply as observed under **Section 2.2** above, the AGO considers that coordination within the key government agencies to be appropriate.

Figure 3.1 Process of Coordination between Key Government Agencies



Source: PNGAGO (2011)

3.3 Island Vulnerability

Disaster Preparedness and Adaptability Plans

Audit Criteria

The Disaster Preparedness and Adaptability Plans with respect to risks associated with access to and quality of drinking-water should be based on reliable data and updated regularly.(Pacific RAP, Key Thematic Area 2 –Island Vulnerability.)

Audit Findings

Eda Ranu has in place a Disaster Preparedness and Adaptability Plan called the Operational Contingency Plan. Its objective is to make best use of a limited water supply in the event of a declared *'Crisis Situation'* or a major shutdown, and to safeguard city residents against health issues arising from limited or contaminated water supplies in the NCD. The Contingency Plan was last revised in 2007.

AGO noted that Eda Ranu has appropriately addressed the following issues in their Disaster Preparedness and Adaptability Plan:

- *Possible scenarios which would give rise to disaster situations or major shutdowns and strategic remedial plans of action for each of the possible scenarios;*
- *Emergency operational and management procedures;*
- *Establishment of a Contingency Control Centre (CCC) to assume control over the entire operations of Eda Ranu upon declaration of a crisis situation;*
- *Identification of a CCC team headed by the Managing Director of Eda Ranu; and*
- *Attached as appendices lists of equipment to be held at the CCC, key Eda Ranu crews, media contact details, supplier contacts, and private water cart operators within the NCD, companies/organisations with waterhole and locations, and NCD doctors, clinics and hospitals.*

AGO is of the view that the contingency plan prepared by Eda Ranu is adequate and comprehensive, with the exception that the contingency plan was last revised in March 2007.

Eda Ranu informed the AGO during audit that the Company will review its plan with further improvements to adapt the green environment policy and disaster mitigation strategy.

Identification of Risks associated with Access to and Quality of Drinking-Water

Audit Criteria

Risks associated with access to and quality of safe drinking-water and the monitoring process should be clearly identified and incorporated in the plans for water management and should be monitored on a regular basis. (Pacific RAP, Key Thematic Area 2 –Island Vulnerability.)

Audit Findings

At the national level, AGO was informed that there was no Drinking-Water Management Plan in place to identify and monitor risks associated with access to, sustainability and quality of drinking-water. However, the AGO review of Eda Ranu and the NDOH revealed the following:

Identification of Water Supply Risks by Water Supplier

The risks associated with access to and quality of safe drinking-water and the monitoring process are clearly identified in the Eda Ranu Operational Contingency Plan. The possible risks and the monitoring process are attached as ***Appendix 6.***

These include:

(i) Disruption of raw water sources caused by:

- *No water supply due to natural or man-made problems with water sources and total failure of the Water Treatment Plants;*
- *Treatment plant malfunction due to treatment plants adversely affected;*
- *Major pollution incident which could occur either to the raw water source, at the water treatment plant or in the trunk water mains;*
- *Failure of raw water supply; and*
- *Failure of booster station or gravity main;*

(ii) Disruption to power supply could affect the water and sewerage pumping stations and make them inoperable in case of major power interruptions; and,

(iii) Shutdown of major trunk water mains.

For each of the risks identified, remedial actions were developed and included in the plan. For example, in the situation where there is no water supply due to natural or manmade problems with water or total failure of water treatment plants, the possible remedial plans of actions included use of water carts, rationing of the water supply and public awareness to boil water before drinking.

Eda Ranu informed the AGO during audit that the groundwater needs to be developed further to identify the quality of aquifers and protect the source from contamination.

Identification of Water Quality Risk by NDOH

During the audit, AGO was informed by the NDOH that the Department has no plans in place to identify and monitor the risks associated with access to and quality of drinking-water, although associated risks are adequately defined in the Public Health (Drinking-Water) Regulation 1984. The Department also pointed out that the parameters to identify and monitor the qualities of both raw water and treated water are adequately provided in the standards established by the Regulation.

3.4 Awareness

Audit Criteria

Adequate information on access to safe drinking-water, its usage, protection and allocation is made available to the public on a regular basis. (Pacific RAP, Key Thematic Area 3 –Awareness.)

Audit Findings

AGO noted that Eda Ranu has developed appropriate strategies on public awareness and incorporated these in its Corporate Plan. This is used as a tool to facilitate effective communication to the public and stakeholders. The actions taken by the water supplier to ensure adequate information is available to public in the NCD are shown in **Table 3.1** below.

Table 3.1 Actions and Key Strategies on Awareness for Eda Ranu

Actions Taken	Key Strategies in Corporate Plan
• Formulated a Corporate Strategic Plan 2008-2012 which is converted into Annual Plans of Actions in which awareness strategies are incorporated • Created a Public Affairs Section to implement the planned awareness strategies • Awareness programs and activities to implement the strategies have been developed	• *Develop innovative communication strategies to ensure customers and the general public are well informed on water and sewerage operations and general water issues* • *Ensure effective communication with customers, stakeholders and the general public, and maintain good customer relations*

Source: PNG AGO (2011)

Further, the key strategies on awareness were translated into Annual Action Plans in 2008, 2009 and 2010 Annual Business Operational Plans. The key results areas, strategies and activities outlined in the Annual Business Operational Plans are summarised and presented in **Table 3.2** below.

Table 3.2 Summaries of Eda Ranu Key Results Areas, Strategies and Activities

Key Result Areas	Strategy	Action (Activity)
100% improved stock of communication resource materials	Review existing IEC and promotional materials and identify for development	Plan production, develop text, design and liaise for print and electronic productions
100% well informed internal and external stakeholders on operational matters	Liaise with Executive Managers and Line Managers to gauge operational information and disseminate	Gather information, design and produce the newsletter on a quarterly basis
Increased awareness on water related issues amongst the customers and stakeholders annually	Utilise mainstream media and corporate and local communities	Develop awareness programs proposal on billing, and illegal connections and submit for approval Review MOU document for settlements and villages
100% enhanced corporate image and 100% increased awareness on company's service offers and capabilities	Liaise with management to venture into business opportunities	Provide expertise and communicate with stakeholders

Source: Eda Ranu 2008, 2009, 2010 and 2011 Annual Business Operational Plans

AGO is of the view that the strategies developed in the annual plans of action to make the public aware on water–related issues to be incomplete as certain issues were not strategised to be made available to the public. These issues include:

- *Drinking-water quality;*
- *Protection of raw water sources;*
- *Activities that are detrimental to the safety and quality of drinking-water; and*
- *Water utility, conservation and water sustainability activities*.

The above issues are important information the public in the NCD have a right to know and access, and to enable them to participate meaningfully in ensuring the sustainability and safety of drinking-water.

Further, there is a concern about insufficient staff in the Public Affairs Section to effectively implement the planned strategies and action plans on awareness of Eda Ranu's operational matters and water–related issues to internal and external stakeholders. At the time of this audit reviews, there were five positions in the organisational structure but only three were filled.

The incomplete public awareness strategies may have resulted from lack of coordination within the departments of Eda Ranu to identify the type of operational matters and water-related issues to be incorporated in the annual plans of actions.

This may have led to the annual plans of action not being linked to the company's set strategy to develop innovative communication strategies to ensure the public is well informed on its water operations.

Lack of sufficient information being made available to the public on operational and water–related issues could result in minimum or no participation by the public to improve access to safe drinking-water. Also the allocation of insufficient staff in the Public Affairs Section could lead to overloading of responsibilities and ineffective implementation of the set strategies and Annual Action Plans.

Audit Recommendations

Recommendation No. 8

The AGO recommends Eda Ranu ensure that:

(i) the Public Affairs Section coordinates effectively with departments in the company to identify the vital information that is necessary to be disseminated to the public to appreciate the efforts and initiatives put in by the company to improve access to and protection of safe drinking-water in the NCD and the protection of water; and

(ii) information on operational matters such as costs related to extraction of raw water, treatment, storing and distribution and costs of non–revenue water is incorporated in the awareness programs and made available to the public for information.

Management's Comment

Eda Ranu response: Agreed
The management agreed that further improvements are required.

Recommendation No. 9

The AGO recommends that Eda Ranu:

(i) reviews the staffing level in the Public Affairs Section and the associated job descriptions to assign adequate and competent staff to align with the allocated responsibilities; and
(ii) fill the vacant positions in the Public Affairs Section immediately with qualified persons.

Management's Comment

Eda Ranu response: Agreed.

The management agreed and pointed out that remedial action is being taken to recruit additional manpower in 2011.

Awareness Programs and Activities

AGO has been informed that Eda Ranu has strategized to review the existing stock of communication source materials and plan production, develop text and re-design

new promotional materials and review the Memorandum of Understanding (MOA)[18] documents with settlements and villages.

Even though the awareness programs were not developed, AGO was informed that the Public Affairs Section actively carry out awareness activities to inform the public in the NCD on operational matters and water–related issues. The types of information disseminated together with the medium of communication are presented in **Table 3.3** below.

Table 3.3 Medium of Communication and Types of Information Disseminated

Medium of Communication	Types of Information Disseminated to Public
Weekly Meetings with Communities and stakeholders	Illegal connections, water quality and protection issues, new services, connection of water supply
Media outlets	New services, water rationing, water disruption notices[19], Water Tariff Structures, illegal connections
Loud hailers throughout the City	Water disruption, water rationing times, illegal connections
Weekly Newsletters	Operational matters, health issues, water quality
Flyers/posters/leaflets	New services, awareness on water-borne diseases
Website	Operational matters, water quality

Source: PNG AGO (2011)

AGO noted that even though Eda Ranu is actively involved in awareness activities, there was no documentary evidence such as awareness programs, schedule of awareness activities and copies of flyers/poster/leaflets on file to ascertain the quality and sufficiency of information made available to the public. There was also an indication that the communication source materials were not developed to effectively carry out the awareness programs.

Further, information on operational matters and water quality and the weekly newsletters were posted on the website of Eda Ranu (www.edaranu.com.pg). However, these were not updated regularly for effective communication with public. At the time of audit fieldwork in February, 2012, the website had not been updated since 2005.

The awareness programs were not developed as a result of inadequate staff and existence of vacancies within the Public Affairs Section. This may also have caused

[18] An agreement signed between Eda Ranu and villages and settlements for Eda Ranu to provide water supply to them and for them to pay the rates as a group.

[19] Notices of Water Disruptions are issued to the public when routine maintenance or major upgrades are done on water facilities or there is a breakdown in the treatment plant and distribution network systems. The notice of water disruption is followed closely by the notice of water rationing schedule to maintain water pressure at a maximum level.

the inadequate maintenance of filing systems in the Public Affairs Section and the website not being updated on timely basis.

The lack of supporting documents to substantiate the development of awareness materials and schedule of awareness activities in print form could lead to inconsistency and insufficient information being made available to the public.

Audit Recommendations

Recommendation No. 10

The AGO recommends that Eda Ranu:

(i) maintains adequate filing systems and files all communication materials developed to map out the awareness activities on a yearly basis to ensure consistency in information made available to the public on its operational matters and water related issues; and

(ii) update its website regularly to ensure effective communication and updated information is made available to the public.

Management's Comment

Eda Ranu response: Agreed.

The management agreed with the audit recommendation and is currently taking necessary steps to update its website.

3.5 Technology

Under this subsection, the audit assessed technologies and infrastructure Eda Ranu has in place to extract raw water, treat water, store and distribute water in the NCD are discussed. The discussion also covers the assessment of the equipment the water supplier has to ensure the safety of drinking-water and the appropriate technology the water quality surveillance agency has to monitor the quality of water supplied by the water supplier.

Appropriate Technology Support and Structure

Audit Criteria

Each agency responsible for implementing the plans to facilitate/provide access to safe drinking-water to the population should be adequately supported with appropriate technology and structure. (Pacific RAP, Key Thematic Area 4 –Technology).

Audit Findings

Eda Ranu has a policy statement on the management and operational practices of water infrastructures and facilities to ensure efficiency in provision of water supply services in its *Corporate Strategic Plan 2008 - 2012*. The strategies were translated into Annual Plans of Action from years 2008 to 2010 to undertake major upgrading of water assets.

The strategy to improve and upgrade water supply technology was appropriately translated into action plans in the 2008, 2009 and 2010 Annual Business Plans.

Furthermore, the Company has appropriate water technology and infrastructure to facilitate continuous provision of uninterrupted water services to residents in the NCD. The types of technology and infrastructure in place at the different stages of the water supply are shown in **Table 3.4** below.

Table 3.4 Water Technology and Facilities in place at Eda Ranu

Stages in Water Supply	Description	Technology and infrastructure in place
Raw Water Extraction	Three raw water sources: • *Rouna 1/3 head pond* • *Rouna 4 booster pump* • *Bomana Pump Station*	Gravitational Booster pumps 8 pumps
Water Treatment Plant	Mt Eriama Water Treatment Plant • *Clarifiers (3)* • *Pressure Filter (7)* • *Contact Tank (1)* • *Reservoirs (2)* • *Laboratory* • *Office*	Each clarifiers could hold 39+, 55+ and 96+ MLD 6 pressure filters and 1 open filter Chlorination and pH correction 2 with capacity of 1300m^3 and 9000m^3 Stages of water treatment on line
Distribution Network System	Six trunkmains	Supported with SCADA system to monitor inflows and outflows of treated and water pressure in real-time and is online. Also has IWON systems installed to detect water leakage on-line
Storage	Seven reservoirs • *Boroko.....* • *Hohola.....* • *Waigani.....* • *3 Mile.....* • *Korobosea.....* • *Downtown.....*	*Capacities* 7750 m^3 9000 m^3 9000 m^3 9000 m^3 9100 m^3 9000 m^3 2270 m^3

Source: PNG AGO (2011)

Figure 3.2 Raw Water Storage and Treatment Plant at Mt. Eriama

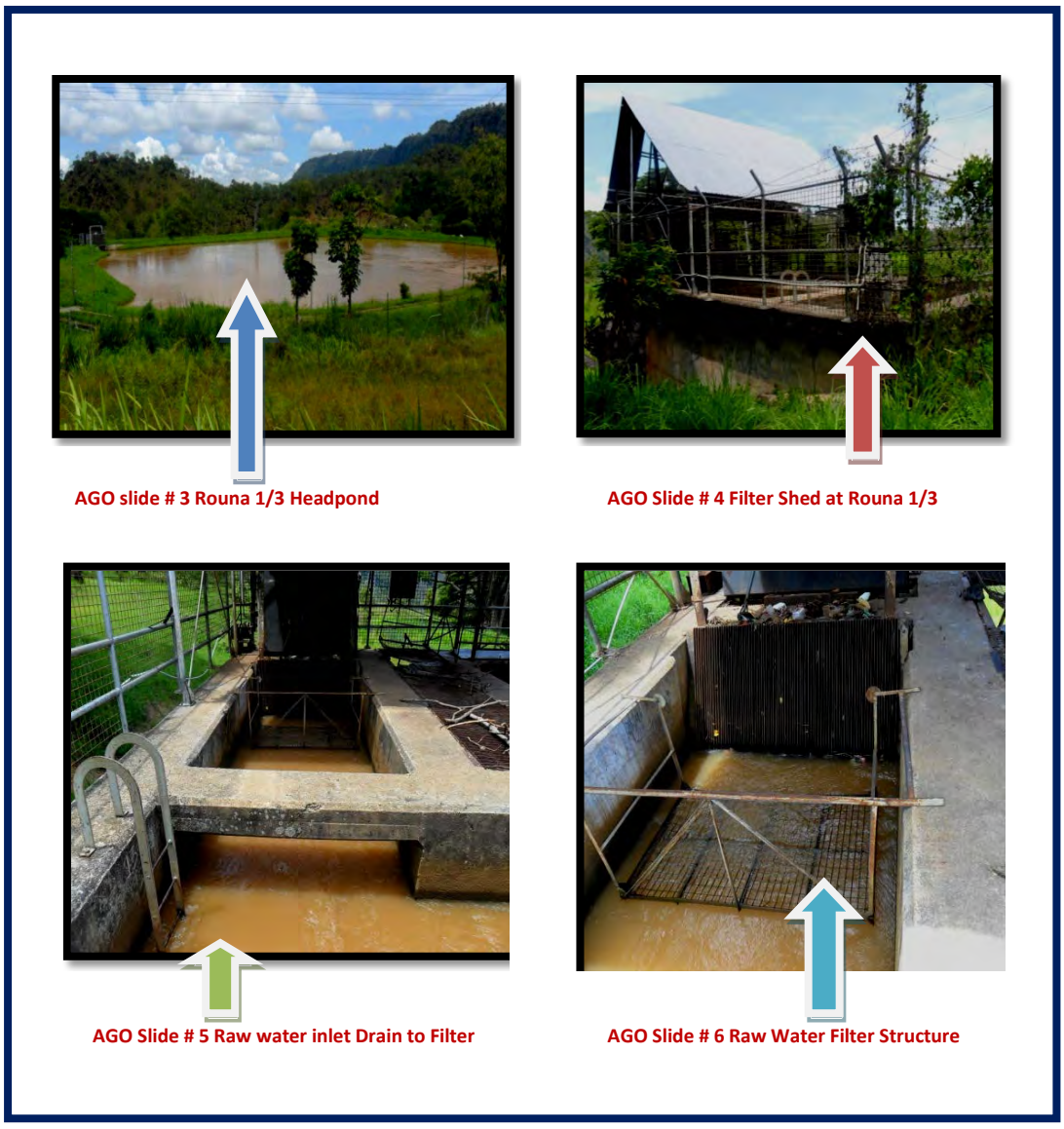
Raw Water Extraction Facilities

Raw water is extracted from three locations along the Laloki River as shown in the above **Table.** The raw water abstracted for Rouna 1-3 and 4 head ponds has been channelled from Sirinumu Dam and has passed through turbines used to generate hydro-electricity by PNG Power (a public utility responsible for supply of electricity service in the country) before extraction. In this process, the raw water is aerated and this helps remove impurities and improves the overall quality of raw water. The Bomana Pump Station is used as a standby or emergency raw water source.

In total, the raw water sources have a capacity of producing 197-268 mega litres per day (MLD).

The pictures of Rouna 1/3 raw water source and the facilities at the head pond are shown in **Figure 3.3** below.

Figure 3.3 Rouna 1/3 Raw Water Head-pond and Extraction Facilities



Water Treatment Infrastructure and Facilities

Raw water extracted is treated at Mt Eriama Water Treatment Plant (WTP) using state of art water treatment technologies. The facilities at the WTP are disclosed in **Table 3.4** above.

Coagulation and segmentation takes place in three clarifiers using aluminium sulphate. Chemicals used for treatment are chlorine gas, alum and hydrated lime. Alum is used as a coagulant while chlorine is used to kill germs and bacteria. Lime is used to control the pH of the drinking-water. The mixing of the chemicals is automated. The systematic diagrams of the process of raw water treatment are disclosed in ***Appendix 7.***

The pictorial presentation of the water treatment facilities at Mt. Eriama Water Treatment Plant are represented in **Figure 3.4** below.

Figure 3.4 Mt Eriama Water Treatment Facilities and Structures

The treatment plant is supported by an on–site building which houses a control room, administration office, conference room, dozing plant and a laboratory. Also sampling taps are located at each sub-treatment unit to collect samples for analysis in the on-site laboratory.

Currently, Mt Eriama WTP has a capacity of producing 184 MLD daily which is more than the current average daily water consumption of approximately 150 MLD in the NCD. The WTP capacity of 184 MLD is the projected water demand for the NCD up to 2020.

Water Distribution Network Systems and Infrastructure

Eda Ranu has six water trunk-mains to channel treated water from the WTP to seven reservoirs with capacities ranging from 2270–9000m^3 located in various locations within the city, as shown in **Table 3.4** above, for storage and distribution for consumption. **Figure 3.5** also shows examples of Eda Ranu water storage and distribution network in the NCD.

Each reservoir has SCADA systems[20] installed to monitor the inflows and outflows of treated water and water pressure in real–time on-line hooked to control centre located in the Eda Ranu office. The inflows and outflows and the water pressures for each reservoir are standardised. A variation in water pressure, inflows and outflows, indicates some problems such as overflow of reservoirs, water valve malfunction, blockage of water pipes or leakage.

Also an IWON system[21]is installed in the distribution network to record and transmit real time data from the reservoir to the control centre remotely. The same system is used to detect leakage in the water distribution network.

Furthermore, Eda Ranu has acquired an *Inductive Coupled Plasma* (ICP) machine (chemical analysis equipment) to test treated water for the presence of bacteria and contaminants in drinking-water. The testing equipment is used to monitor and test water in the distribution systems, extraction points and the treatment plant.

AGO is of the view that the technology used by Eda Ranu in its water supply operations is adequate and appropriate.

Eda Ranu informed the AGO during audit that the Company is continuing to upgrade and develop its technology and structure with a new financial software, water testing laboratory and equipment, and sewerage treatment system under the Port Moresby Sewerage System Upgrade Project.

[20] A computerised system used by Eda Ranu to gather and analyse real time data for monitoring water pump stations, reservoirs and the treatment plant

[21] A system used by Eda Ranu to monitor Non-Revenue Water in the distribution system and used as the water leakage detection device to assist in work done to convert non-revenue water into revenue water.

Figure 3.5 Eda Ranu Water Storage and Distribution Network in NCD

Sufficiency and Technical Competency of Human Resources

Audit Criteria

Each agency responsible for providing/facilitating access to safe drinking-water to the population should have sufficient and technically qualified staff to ensure effective implementation of the set plans/strategies. (Pacific RAP, Key Thematic Area 4 – Technology.)

Audit Findings

Water Supplier

AGO noted in audit that Eda Ranu has in place a strategic objective to develop and implement structured training and development plan in line with business needs in the *Corporate Strategic Plan 2008–012*. The company had planned to achieve the set objective by conducting training needs analysis to develop training plans, provide funds for staff training, identify and coordinate integrated development roll-out program for management trainees and apprentice trainees as wells as skills development for engineers, managers and senior officers. These strategies were then translated into *Annual Managements plans for 2008, 2009 and 2010*.

In line with its strategies, the water supplier has developed a *Training Program 2008–2012* to facilitate the implementation and is supported with a *Training Needs Analysis and Skills Audit Report 2008 – 2012.*

Further the organisational structure indicated to AGO that the water supplier has positions filled with qualified managers and competent technical staff to manage the water supply operations and to undertake regular maintenance of the water supply infrastructure and facilities respectively.

Eda Ranu informed the AGO during audit that the Company will continue to upgrade and develop its human resources, recruit the best qualified people to add value to the Company and recruit young graduates and put them through the graduate development program.

National Department of Health

AGO observed that there was insufficient allocation of human resources, particularly in the Water and Sanitation Section within the NDOH for effective implementation of its mandated responsibilities. The Section has three officers to coordinate the monitoring and surveillance activities to ensure drinking-water consumed by the public is in compliance to the Drinking-Water Quality Standards.

On the other hand, AGO noted that the Department has qualified technicians in the Central Public Health Laboratory to test and analyse water samples forwarded by water suppliers.

Insufficient human resources in the Water and Sanitation Section may have resulted from the Department's lack of priority to the area of monitoring and surveillance of the quality of drinking-water. This could result in the population having access to questionable quality of water and this could contribute to a future health burden for the country.

Audit Recommendation

Recommendation No. 11

The AGO recommends that the NDOH reviews and allocates sufficient financial resources and manpower to the Water and Sanitation Section to facilitate and ensure effective coordination of control and monitoring of water quality supplied by water suppliers.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparation this Report in March 2012.

3.6 Financing

Adequacy of Financial Resources and Financial Viability of Water Supplier

Audit Criteria

The water supplier should have sufficient financial resources and be a financially viable enterprise by developing appropriate financial and cost recovery policies, tariff, billing and collection systems and operating systems to ensure effective implementation of the set plans/strategies to improve access to safe drinking-water to residents of the NCD. (Pacific RAP, Key Thematic Area 6 –Finance.)

Audit Findings

To sustain its operations through cost–recoveries, *Part IV Section 22 (1)* of the enabling *Act* empowers the company to *"fix water rates...annually, subject to the approval of the Minister, …"Section 31* – Tariff, rates, fees and charges further amplifies that *"subject to any determination under Section 21 of the Prices Regulation Act 1949, the company may fix and set a tariff, rates, fees and charges*

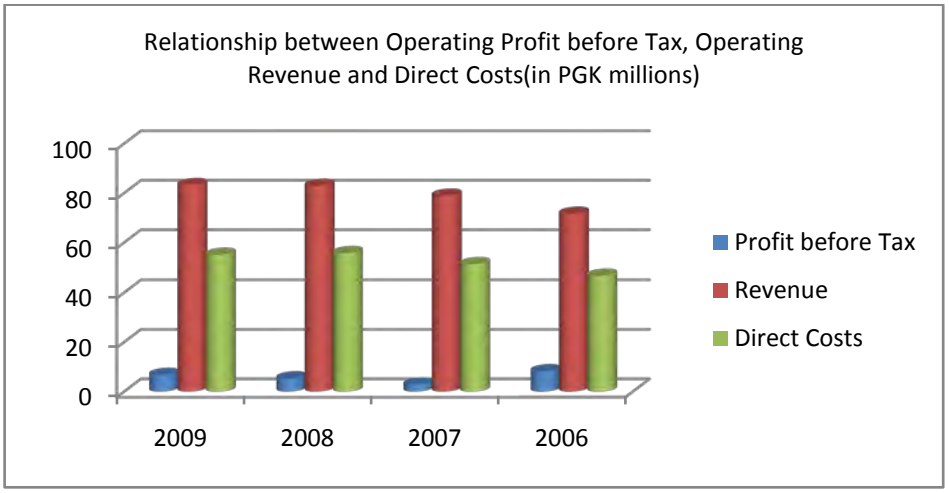
to be made for water and services supplied by the company...and may be varied from time to time by notice in the National Gazette and otherwise as the company shall determine."

The above provisions are expanded through Policy Statements on Focus Areas under their Financial Management Strategies. This requires application of financial discipline in all its operation to ensure sufficient revenue is generated, costs are controlled and there is a fair return on the capital employed for asset replacements, new investments and expansion in its *Corporate Strategic Plan*.

Eda Ranu began operation on 1st November 1996 with loan of K6.0 million borrowed from the National Provident Fund [now the National Superannuation Fund (NasFund)]. From 1996 to 2004 the company was operating without making profits and in 2005 the first profit was posted. In the following year, the loan of K6.0 million from NasFund was paid off and the first dividends were declared and paid to its shareholder, which is the State through the *Independent Public Business Corporation (IPBC).*

Since the posting of profits in 2005 up to 2009, the company's financial performance has been good and it has paid dividends to its shareholder. The operating profits before tax for the last four years are present in **Figure 3.6** below.

Figure 3.6 Eda Ranu Operating Profit before Tax for last Four Year



Source: Eda Ranu Financial Statements 2006-2009

The relationship between the operating revenue, direct costs and the operating profit before tax in Figure 3.6 indicate that Eda Ranu is financially viable and has sufficient financial resources to sustain its operations in the long run and enable it to improve access to safe drinking-water in the NCD.[22] Eda Ranu informed the AGO during audit that the Company is self-sustaining, with prudent management, efficient operations and with minimum cost. It continues to improve its bottom line with good returns to shareholders, improve and extend services in and around the

[22]It is important to note Eda Ranu does not receive funding from the National Government through the budgetary process to sustain its operation. It is a self–sustaining public enterprise.

NCD, and align itself with the Medium Term Development Plan (MTDP 2010 – 2015) and Vision 2050.

Pricing and Tariff Policies and Structure

Audit Criteria

Pricing and tariff policies and structure should be developed by Eda Ranu to ensure sufficient generation of revenue is raised to recover costs and to sustain its operations. (Pacific RAP, Key Thematic Area 6 –Finance.)

Audit Findings

AGO noted that, in accordance with the provisions *Section 31* of the *NCD WS&S Act 1996*, Eda Ranu had fixed and established the tariff, rates, fees and charges subject to the approval of ICCC (which is the administering agency of the *Prices Regulation Act)*. The new water and sewerage tariff for 2010 was approved by ICCC and was published in *Gazettal Notice No. G2 dated 23rd December 2009* and is applicable from year 2010 to 2014.

Further, the water rates were set into five categories by consumer classification as shown in ***Appendix 8***.

AGO is of the view that the tariff structure set by the Company is reasonable to recover costs of providing water services. The structure has appropriately classified the consumers based on the projected rate of water usage by consumers and takes into account the affordability of the population to the rates.

Eda Ranu informed the AGO during audit that the company is regulated by ICCC; and the tariff is set to improve services sustain its operations and make a return for its shareholder. In 2011, Eda Ranu applied to ICCC for nil increase in rates and was approved.

3.7 Conclusion

The roles and responsibilities of each government agency concerned with access to safe drinking-water are clearly defined. Even though a central agency has yet to be identified for overall coordination across key government agencies, there is effective coordination between the water supplier and regulatory agencies in the NCD for ensuring that the population has access to safe drinking-water.

In the NCD, Eda Ranu has appropriate technology, structure and facilities in place to support it to extract raw water, treat and distribute it to the population. Risks associated with access to and the quality of drinking-water are adequately identified and incorporated in the company's Operational Contingency Plan developed to ensure quality and the sustainability of the quantity of drinking-water.

The company also has an adequate pricing policy and structure to recover service supply costs. In the last four years of performance, profits were made by the water supplier and thus, the company is financially viable to sustain its operations in the long-term.

Furthermore, Eda Ranu has developed strategies in its *Strategic Corporate Plan* to raise public awareness on operational matters and water-related issues for internal and external stakeholders; however, there was inadequate implementation of the strategies.

Risks associated with drinking-water quality are adequately identified by the NDOH and set out in the National Drinking-Water Quality Standards to ensure safety of drinking-water supplied by the water supplier to the population. However, insufficient resources, such as staff and finance have been allocated to the Water and Sanitation Section within the NDOH for the process of implementation.

This has led to inadequate dissemination of information related to drinking-water quality to the public.

4 MONITORING OF IMPLEMENTATION & DEMONSTRATION OF IMPROVEMENTS

4.1 Introduction

Under this Section, the effectiveness of actions taken by the government agencies assigned the responsibilities to monitor the effectiveness of implementation of the legal and policy framework and the strategic plans to provide access to safe drinking-water to the population are examined. This was achieved through assessment of the reporting arrangements of the agencies involved, the effectiveness of compliance to the National Drinking-Water Quality Standards, the assessment and analysis of drinking-water quality, and actions taken to protect and conserve water catchment areas

Further, the actions taken by the water suppliers and regulators to improve access to water, its safety and protection for the` population are also assessed by looking at the key performance indicators and demonstration of improvements made.

4.2 Effectiveness of Monitoring Compliance

Reporting Arrangements

Audit Criteria

Agencies concerned with access to safe drinking-water should report on the effectiveness of their actions to Government and stakeholders. (PNG AGO 2012)

Audit Findings

Section 32 (1) (a) of the *Public Services (Management) Act 1995 (as amended in 2003)* requires each Departmental Head to prepare and forward to the Chief Secretary's[23] Office a report on the attainment of the planned activities of his/her Department for the year 31st December preceding by 31st March each year.

Similarly, public enterprises such as Water PNG and Eda Ranu, are required to report on their attainment of planned activities to *the Independent Public Business Corporation* by 31st March each year.

Accordingly, Eda Ranu has prepared annual reports on the effectiveness of its actions for the years, 2007, 2008 and 2009 and submitted these to the Minister responsible for Public Enterprises. The Annual Report for 2010 was in progress at the time of this audit.

[23] In PNG, the Chief Secretary is the Head of the Department of Prime Minister and National Executive Council. All Heads of Departments and Statutory Bodies administratively report to the Chief Secretary.

The AGO was informed during the audit by the NDOH that the Department prepares and submits its reports to the Minister responsible for Health and the Chief Secretary. The reporting arrangements cover the overall operations of the agency but do not have arrangements for the reporting of actions taken with regard to water supply and sanitation services. This was because a central agency has not been identified by the existing legal and policy framework for overall coordination and control of activities related to water supply and sanitation.

As a result specific reports relating to water supply activities were not prepared and reported by government agencies concerned with access to safe drinking-water.

Eda Ranu further explained to the AGO that the ICCC regulates the company's industry, both economically and in meeting customer satisfaction with improved services, on a monthly and quarterly basis. The monthly reports are provided to the Minister's Office and quarterly reports are provided to IPBC.

4.3 Monitoring Compliance to National Drinking-Water Quality Standards

Audit Criteria

"Water supplied by water suppliers to the public should meet the National Drinking-Water Quality Standards and WHO Drinking-Water Quality Standards" (Section 5, Public Health (Drinking-Water) Regulation 1984.)

Audit Findings

Compliance by Water Supplier in the NCD

The AGO noted that Eda Ranu carries out one of the most comprehensive and efficient quality control programs in the NCD to ensure the quality of water supplied to consumers is safe at all times. This is achieved by testing and monitoring of water quality at raw water extraction points, treatment plants and the distribution network with support of chemical analysis (which tests and recognises traces of toxic chemical elements).

The testing and monitoring of the distribution system takes place on a daily to an hourly basis from over 60 testing locations.

Water samples are collected from different testing locations using aseptic techniques and sent for further analysis to accredited laboratories such as the National Agricultural Research Laboratory at Kilakila. The samples are also forwarded to the NDOH through the Central Public Health Laboratory at Port Moresby General Hospital to undertake bacteriological and microbial analysis.

AGO was informed further that in the assessment of the quality of water, the consumer relies principally upon his/her senses. Water constituents may affect the appearance, odour or taste of the water on the basis of these criteria and if it is also highly turbid, is highly coloured or has an objectionable taste or odour it may be regarded by consumers as unsafe and rejected for drinking.

Due to the effective monitoring and testing of water established by Eda Ranu, water is safe to drink from on-plot taps directly.

Eda Ranu informed the AGO during audit that under their *Annual Business Plan*, one of the key performance indicators is to have a nil tolerance of water contamination. The water (testing) laboratory is currently being upgraded to meet NATA and International standards for registration and certification.

Monitoring by Water Quality Surveillance Agency

Section 13 of the *Public Health (Drinking-Water) Regulation 1984* provides that the NDOH Departmental Head or a person authorised by him/her in writing may enter any premises for the purposes of inspecting any treatment plant or any water distribution system to ensure compliance of the *Regulation.*

However, the AGO observed that the NDOH has not inspected the water facilities of Eda Ranu to conduct independent testing of the water supplied to consumers.

This was due to inadequate allocation of manpower and insufficient allocation of resources to the *Water and Sanitation Section* with the Department which is assigned with the responsibility to perform this task. The Section has only three staff to cover the entire country.

Further, the AGO was made aware by the NDOH that the health inspectors at provincial levels were delegated the task to inspect and monitor water supply facilities; however, they also are limited by resources necessary to effectively discharge this responsibility.

The consequences of the NDOH's ineffective monitoring of the compliance of safe drinking-water provided by water suppliers could result in the public having access to unsafe drinking-water and contracting water–borne diseases.

Audit Recommendation

Recommendation No. 12

AGO recommends that NDOH:

(i) plans and carries out independent testing of drinking-water supplied by a Water Supplier to ensure the safety of water consumed by the population; and

(ii) liaise with relevant Provincial Governments (such as Central Provincial Government and National Capital District Commission) and public health authorities to ensure that sufficient financial resources and logistic support is provided to Provincial Health Inspectors to carry out independent testing of water supplies.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparation this Report in March 2012

Scientific Assessment and Analysis of Safety of Drinking-Water

Audit Criteria

Drinking-water quality and its safety should be scientifically assessed and analysed to ensure that the water supplied by a water supplier meets the established Drinking-Water Quality Standards. (Public Health (Drinking-water) Regulation 1984.)

Audit Findings

The NDOH has a Central Public Health Laboratory at Port Moresby General Hospital which is adequately equipped with appropriate equipment and trained staff. The laboratory undertakes bacteriological and microbial assessment and analysis of water samples forwarded by water suppliers to ensure water supplied to consumers is safe to drink. The analysis of water is in accordance with the methods set out in the *National Technical Standards 1025-82* under *National Institute of Standards and Technology Act 1993*.

In addition, water samples collected by Eda Ranu from its distribution network are sent to other accredited laboratories such as National Agriculture Research Laboratory at Kilakila for further testing and analysis.

The water samples are analysed and forwarded to the company for appropriate remedial actions where necessary.

Protection and Conservation of Water Catchment Areas

Audit Criteria

Water Catchment areas should be protected and conserved for now and future generations of the country. (Environment Act 2000)

Audit Findings

In the NCD, the Laloki River catchment located in Central Province serves as the main source for water supply and electricity. The structure providing for these utilities is Sirinumu dam which is located in the headwaters of the catchment.

Water supply is piped from Sirinumu Dam to Rouna1 hydro-electric plant for generating electricity before being piped to Rouna 1/3 head pond and Rouna booster pump station for extraction. The other raw extraction point is Bomana Pump Station located downstream of the Laloki River where water is extracted directly from the river.

Compliance by Water Supplier

Public access to Rouna 1/3 head pond and Rouna 4 booster pump station is restricted and well secured with fencing. The water is transmitted through pipes from the dam through the turbines at the PNG Power hydro-plant to these extraction points. This process adequately protects the quality and quantity raw water.

Moreover, wastewater or sludge from the clarifiers at Mt Eriama treatment plant is piped to a pond at Pacific Adventist University where it used to irrigate crops on the school farm.

However, the downstream raw water extraction point at Bomana Pump station is not adequately protected. The quality and quantity of the raw water extracted at this point is exposed to serious pollution threats from settlements, farms, factories, hotels, educational institutions and recreational activities upstream of the Laloki River. Eda Ranu informed the AGO during audit that there is no monitoring and control of waste discharge into the Laloki River catchment and river source by DEC, the only source of our water supply to the city. The Laloki River Integrated Catchment Management Demonstration Project has never been implemented due to lack of coordination at the respective government agency.

Actions taken by the Monitoring Agency

According to *PNG IWRM* [24]*– Demonstration Project Proposal* in 2007 by the DEC; villages, settlements, educational, church and research institutions, commercial farms, a cannery and the NCD's prison institution are all located near and around Sirinumu Dam, or along and down the Laloki River catchment. The main concerns identified in the project proposal for the river catchment included water quality monitoring due to increase point and diffuse waste management, land use impact on catchment yield and water quality, deterioration of river water from agricultural and non-source pollution, and absence of a catchment management plan to safeguard all water uses.

To address the main concerns identified for the water catchment area, the Department has developed a proposal called *Laloki River Integrated Catchment Management Demonstration Project*. The proposal was consistent with one of the key objectives of *Strategic Action Plan (SAP)* for *Pacific International Water* which aims for effective water allocation and pollution regulation through a water use and waste disposal policy and planning.

However, due to non-cooperation from the DEC, the AGO has not undertaken an audit of the Department. As such, the AGO was unable to ascertain whether the proposed project was implemented by the Department and has taken the steps necessary to monitor the protection and conservation of the water catchment area.

4.4 Demonstration of Improvements

Performance Indicators

Audit Criteria

Performance indicators should be in place which can measure access to safe drinking-water, its safety and protection as well as population health. (PNGAGO, 2012.)

[24] Integrated Water Resource Management

Audit Findings

Performance Indicators of the Water Supplier

AGO noted that Eda Ranu has in place a *Corporate Strategic Plan 2008–2012* and key performance indicators are established for each of the strategies under focus areas. Key performance indicators were in place to measure the performance of the company in areas of access to water, and to ensure compliance to drinking-water standards, safety and protection of water resources.

The key performance indicators and the related strategies under each of the core areas are shown in ***Appendix 4***.

Eda Ranu informed the AGO that the company will continue to monitor, review and improve its performance indicators by benchmarking with other similar industries in Asia and Australia.

National Department of Health (NDOH)

AGO noted that the NDOH has in place *a National Department of Health Corporate Plan 2009–2013* '*Our Way Forward*' with the objectives of ensuring healthier communities, improved support service delivery and better management. In the plan, key performance indicators were established; however, strategies and the corresponding performance indictors relating to monitoring and surveillance of water quality were not included.

AGO noted further that the Department has not prioritised the monitoring and surveillance of drinking-water quality standards in its corporate strategies. This may be due to lack of adequate manpower to effectively discharge the responsibilities as observed under **Section 3.4** (*Sufficiency and Competency of Human Resources*.)

The implication of not establishing performance indicators to measure actions taken to improve monitoring and surveillance tasks could result in the population having access to questionable quality of drinking-water, which in turn could affect the public health.

Audit Recommendation

Recommendation No. 13

The AGO recommends that the NDOH revisits its strategies in the corporate plan and prioritise the monitoring and surveillance responsibility and provide the relevant KPIs, backed up with plans of action to fully discharge its mandated responsibilities.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparation of this Report in March 2012

Department of Environment and Conservation (DEC)

AGO had planned to undertake an audit to assess the actions taken by the DEC as the agency responsible for the allocation and protection of water, however, the Department did not respond favourably to our correspondences. As such, AGO has not performed the assessment of the actions taken by the Department to ensure safety and protection of water.

AGO is yet to ascertain whether the DEC has in place key performance indicators to measure the effectiveness of actions taken to improve protection of water.

Demonstration of Improvements

Audit Criteria

Responsible agencies should demonstrate improvements to access to safe drinking-water in the effectiveness of their actions, over time. (PNG AGO, 2012.)

Audit Findings

Demonstration of Improvements by Eda Ranu

In assessing the effective of actions taken by Eda Ranu, AGO noted Eda Ranu has accomplished the expected outcomes in its corporate plans. Improvements made were noted in areas of facilitating access to safe drinking-water to consumers, water quality and sustainability of drinking-water sources. The focus areas, established performance areas and actions taken to demonstrate improvements in these areas are presented in ***Appendix 9***.

AGO is of the view that the actions taken by Eda Ranu to demonstrate the improvements of access to safe drinking-water in the NCD are adequate.

Demonstration of Improvements in the NCD

AGO noted that settlements within the NCD which do have access to a water supply are provided with on-tap water supply through funding from National Politicians representing NCD Electorates. According to media reports, the NCD Governor has funded a water supply project for Moitaka Ridge settlers at Nine Mile at the cost of K40,000.00 which was officially opened on 26th March 2011. A total of 15 taps were installed for the settlement. ("*The National" Newspaper, Thursday 31st March 2011*).

Prediction of Future Water Demands

Audit Criteria

Agencies should predict future demands through climate forecasting and population projections, and this information should be used in planning. (PNG AGO, 2012)

Audit Findings

AGO noted that Eda Ranu has predicted the water demand in 2020 to be 184 MLD in the NCD. Based on this prediction, the water supplier is taking steps necessary to

improve and upgrade raw water intakes, water treatment plants and the distribution network to meet the future water demand.

However, the predicted water demand for 2020 was not adequately supported with weather pattern forecasts from NWS and population projections from NSO.

This may have been caused from a lack of coordination between Eda Ranu and the concerned agencies which could lead to inaccurate prediction of water demand in the NCD.

Audit Recommendation

Recommendation No. 14

The AGO recommends that Eda Ranu coordinates with the NWS and NSO to obtain reliable data on weather pattern forecasts and population projections to assist it to accurately predict the future water demands for the NCD.

Management's Comment

Eda Ranu response: Agreed with qualification.

Eda Ranu responded that NWS has no relevance to the Company as they only predict weather and most of the information from them has not always been reliable. The NSO is the key agency to coordinate with but due to out of date data kept there, it is again not accurate; however, Eda Ranu has relied on the growth rate of 3% per annum for the last 10 years from the last national census, and infrastructure was designed to meet the projected demand to approximately 2015.

The Company also retaliated that the capacity at the WTP is adequate to meet the growth for the next ten years and the next census (conducted in 2011) will assist it to project future water demand.

4.5 Conclusion

Eda Ranu has effectively prepared and submitted *Annual Management Reports from years 2007–20011* on its effectiveness of actions to the Minister responsible for Public Enterprise.

Effective water quality testing, analysis and monitoring are also established by the Company to ensure water supplied to the population complies with the *National Drinking-Water Quality Standards*. Also, water samples are collected from raw water sources, water treatment plants and the distribution network and sent to an accredited laboratory for further analysis.

Further, Key Performance Indicators are established to measure performance for a given period of time against set strategies. Over a four year period, Eda Ranu has demonstrated improvements in network efficiency, non-revenue water (NRW), water treatment plant (WTP), total capacity of water, water assets and facilities, testing and monitoring of water and customer billing system.

The company has predicted water demand for 2020 to be 184 mega-litres per day (MLD); however, the predictions were not supported with relevant data such as climate forecasts and population projections.

The NDOH has in place a laboratory equipped with appropriate equipment and trained staff to undertake bacteriological and microbial analysis. Hence, samples of water forwarded to the Department from a water supplier are analysed and examined in the laboratory.

However, the Department has not undertaken independent testing of water in the water supplier's WTP and distribution network to ensure safety of water supplied to consumers and thus, the monitoring and surveillance of drinking-water quality standards were not consistent.

PHILIP NAUGA
Auditor-General
Port Moresby, NCD

21st February, 2013

APPENDICES

Appendix 1: Audit Recommendations and Formal Management Responses

Formal comments on the proposed audit recommendations by the Department of Environment & Conservation, the Department of Health, the Water PNG, and Eda Ranu are reproduced in full.

Chapter 2

Recommendation No. 1

To support the existing legislation on the protection of water, in particular drinking-water, AGO recommends the DEC gives priority with the formulation of the environmental policy on water in close consultation and coordination with relevant government agencies concerned.

Management's Comment

The management responses/comments were yet to be received from DEC at the time of preparing this Report in March, 2012.

Recommendation No. 2

The AGO recommends that Water PNG and Eda Ranu:

(i) review the regulatory roles assigned to them to exercise control over private water supply and sanitation services for the possibility of separating the functions; and

(ii) in close consultation with the NDOH, DEC and other government agencies, donor agencies and NGOs, identify and establish a central agency to assume the role of regulating and coordinating all water supply and sewerage activities in the country.

Management's Comment

Water PNG response: Agreed with qualification.

Refer to Fig 1.1 of the report. This is a regulatory function by the Government (either DEC or NDOH). Regulatory function performed by the service providers (such as Water PNG) can be seen as a conflict of interest as they can be seen as a referee and a player. A Central Agency must take lead to be supported by service providers such as Water PNG. An Apex Body (such as a National Water Authority) will address this situation.

Eda Ranu response: Agreed.

Eda Ranu agreed that an entity should be set up to coordinate, monitor and control all activities of water supply and sanitation at the national level.

Recommendation No. 3

AGO recommends that Water PNG and NDOH take the lead to coordinate and consult with government agencies such as DEC, Eda Ranu, donor agencies and NGOs concerned with access to safe drinking-water in the country to formulate:

(i) A National Drinking-Water Policy to support the legal framework to ensure integrated implementation throughout the country, and

(ii) National Drinking-Water Plans to support the legal and policy framework to map out the focus areas of improvement in access to safe drinking-water.

Management's Comment

(i) Water PNG response: Agreed with qualification.

The NEC has directed Water PNG to develop a National Policy for Water Supply and Sanitation services under NEC Decision 72/2005. Water PNG finalised the Draft National Water Policy and submitted to IPBC in 2007.

The Draft National Water Policy recommended an Apex Body (such as National Water Authority) to undertake the leadership of the Water Sector and address many conflicting functions and duplications of roles. The Apex Body would oversee commercial service providers (Eda Ranu & Water PNG), establish non-commercial water operations (WS to rural areas and urban fringes), undertake national WS planning, undertake regulatory functions and formulate policies such as funding Community Service Obligations (CSO).

Eda Ranu response: Agreed.

Eda Ranu agreed and endorses the setting up of the National Drinking-water Policy

(ii) Water PNG response: Agreed with qualification.

It is not the lack of plan but lack of funding. In 2006, Water PNG prepared a 15-year three-prolong Water Supply and Sanitation Development Plan: for Provincial Towns, District Towns and Rural Communities launched by the Government. Unfortunately, lack of funding support resulted in little progress to date. Water PNG also pointed out that their 2006 - 2015 Development Plan is being updated to align with Government MTDS and Vision 2050.

Further, Water PNG agreed that under its legislative function, it has a "promotional" role in terms of extending safe drinking-water access in rural areas. Again, a National Water Policy setting up an Apex Body will address this situation.

Recommendation No. 4

The AGO recommends that the NODH considers reviewing its corporate plans to ensure the Department prioritises the monitoring and control of drinking-water quality activities in its plans.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Recommendation No. 5

The AGO recommends that Water PNG, Eda Ranu and the NDOH consult with each other and identify agencies at national, provincial and local government levels and coordinate with these agencies to facilitate access to safe drinking-water to the rural communities, squatter settlements and urban fringe areas in the country.

Management's Comment

Water PNG response: No comments.

Eda Ranu response: Qualification with comments.

Eda Ranu does not support the collaboration with Water PNG and NDOH, as it is a local challenge which Eda Ranu has tried to address with politicians, NCDC and the community but without success due to political interest and free handout mentality of receiving a free service. CSO is recommended to be developed and implemented. No service should continue to be given free unless someone pays for it.

Recommendation No. 6

The AGO recommends that Eda Ranu and Water PNG take steps necessary to ensure that informal settlements in the urban and the urban fringe areas have access to safe drinking-water facilities. The steps may include: community participation, Provincial Governments, Local Level Government and political will, commitment and involvement.

Management's Comment

Water PNG response: Agreed with qualifications.

As mentioned in Recommendation 3, under NEC Directive 72/2005. Water PNG prepared a Draft National Water Policy in 2007 and submitted to IPBC. Water PNG has been advised that the formulation of a National Policy is the function of Central Agency not a Sectoral Agency such as Water PNG.

Water PNG concurs that a National Water Policy is necessary supported by a legislation clearly demarcating roles and responsibilities are prerequisites to holistic and equitable development of safe water supply for the Nation.

They also concur with the AGO that political will and commitment to providing sufficient funding in the next 15-20 years is necessary to make an impact. Otherwise, policies and plans will come to nothing.

Eda Ranu response: Qualification.

Community participation, NCDC and political will is a failure, and unless there is a Community Service Obligation (CSO) assistance or funding is provided for infrastructure and sustainability, there will be no further services. However, small improvements are being made now for private vendoring service in each community.

Recommendation No. 7

The AGO recommends that the NDOH adopts and incorporates the Samoa Commitments into its National Health Policy and ensure that the recommendations are implemented in the country.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Chapter 3

Recommendation No. 8

The AGO recommends Eda Ranu ensure that:

(i) the Public Affairs Section coordinates effectively with departments in the company to identify the vital information that is necessary to be disseminated to the public to appreciate the efforts and initiatives put in by the company to improve access to and protection of safe drinking-water in the NCD; and

(ii) information on operational matters such as costs related to extraction of raw water, treatment, storing and distribution and costs of non–revenue water is incorporate in the awareness programs and made available to the public for information.

Management's Comment

Eda Ranu response: Agreed.

The management agreed that further improvements are required.

Recommendation No. 9

The AGO recommends that Eda Ranu:

(i) reviews the staffing level in the Public Affairs Section and the job descriptions to assign adequate and competent staff to align with the assigned responsibilities; and

(ii) fills the vacant positions in the Public Affairs Section immediately with qualified persons.

Management's Comment

Eda Ranu response: Agreed.

The management agreed and pointed out that remedial action has been taken to recruit additional manpower.

Recommendation No. 10

The AGO recommends that Eda Ranu:

(i) maintains adequate filing systems and files all communication materials developed to map out the awareness activities on a yearly basis to ensure consistency in information made available cross sections of the population on its operational matters and water related issues; and

(ii) updates its website regularly to ensure effective communication and updated information is made available to the public.

Management's Comment

Eda Ranu response: Agreed.

The management agreed with the audit recommendations and is currently taking necessary steps.

Recommendation No. 11

The AGO recommends that the NDOH reviews and allocates sufficient financial resources and manpower to the Water and Sanitation Section to facilitate and ensure effective coordination of control and monitoring of water quality supplied by water suppliers.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Chapter 4

Recommendation No. 12

The AGO recommends that the NDOH:

(i) plans and carries out independent testing of drinking-water supplied by a water supplier to ensure safety of water consumed by the population; and

(ii) liaise with relevant Provincial Governments and public health authorities and ensure that sufficient financial resources and logistic support is provided to Provincial Health Inspectors to carry out independent testing of water supplies.

Management's Comment

The management responses/comments were yet to be received from NDOH at the time of preparing this Report in March 2012.

Recommendation No. 13

The AGO recommends that the NDOH revisits its strategies in its Corporate Plan and prioritise monitoring and surveillance responsibility and have in place KPIs, backed up with plans of action, to fully discharge its mandated responsibilities.

Management's Comment

The management responses/comments were yet to be received from DEC at the time of preparing this Report in March 2012.

Recommendation No. 14

The AGO recommends that Eda Ranu coordinates with the National Weather Service (NWS) and National Statistics Organisation (NSO) to obtain reliable data on weather pattern forecasts and population projections to assist it to accurately predict the future water demands for the NCD.

Management's Comment

Eda Ranu response: Agreed with qualification.

Eda Ranu responded that NWS has no relevance to the Company as they only predict weather and most of the information from them has not always been reliable. The NSO is the key agency to coordinate with but due to out of date data kept there, it is again not accurate; however, Eda Ranu has relied on the growth rate of 3% per annum for the last 10 years from the last national census, and infrastructure was designed to meet the projected demand to approximately 2015.

The Company also stated that the capacity at the WTP is adequate to meet the growth for the next ten years and the next census (conducted in 2011) will assist it to project future water demand.

Appendix 2: Water Quality Standards for Raw and Drinking-Water

SCHEDULE 1.

Reg. Sec. 4

STANDARDS FOR RAW WATER.

The standards for raw water shall be:

			Maximum Allowable
1.	**Micro-Biological Standards:**		
	Coliform Bacteria		20,000 per 100 mil
2.	**Toxic Contaminants Standards:**		
	Substances		
	(a)	Arsenic (as As)	0.05 mg/L
	(b)	Cadmium (as Cd)	0.01 mg/L
	(c)	Cyanide (as Cn)	0.05 mg/L
	(d)	Lead (as Pb)	0.10 mg/L
	(e)	Mercury (total as Hg)	0.001 mg/L
	(f)	Selenium (as Se)	0.01 mg/L
	(g)	Nitrate	45.0 mg/L
	(h)	Silver	0.05 mg/L
	(i)	Fluorides (as F)	1.5 mg/L
3.	**Aesthetic Quality Standards:**		
	Substance or Characteristics		
	(a)	Colour	50 units
	(b)	Odour	Unobjectionable
	(c)	Taste	Unobjectionable
	(d)	Iron	1 mg/L
	(e)	Manganese	0.5 mg/L
	(f)	Sulphate	400 mg/L

	(g)	Total dissolved solids	1, 500 mg/L
	(h)	Chemical oxygen demand (COD)	10 mg/L
	(i)	Bio-chemical oxygen demand (BOD)	6 mg/L
	(j)	Mineral oil	1 mg/L

SCHEDULE 2.

Reg. Sec. 5.

STANDARDS FOR DRINKING-WATER.

Note: The standards in this Schedule have been adopted from the WHO International Standards for Drinking-Water, 1971, and unless stated otherwise, shall comply with these standards.

1. Micro-biological Standards:
   (a) Chlorinated or otherwise disinfected water supplies-
      (i) For water entering the distribution system, the coli form count shall be zero in any 100 ml sample;
      (ii) For water in the distribution system-
         A. Throughout any year, 90% of the sample shall not contain any coli form organisms in any sample of 100 ml;
         B. There shall be no E. Coli in any sample of 100 ml;
         C. No sample shall contain more than 10 coli form organisms per 100 ml;
         D. Coli form organisms shall not be detectable in both of any of two consecutive 100 ml samples;
   (b) Non-disinfected water supplies-
      (Individual or Small Community Supplies)
      (i) There shall be no E. Coli in any sample of 100 ml;
      (ii) If E. Coli is absent, no sample shall contain more than three coli form organisms per 100 ml.

2. Toxic Contaminants Standards:
   No drinking-water shall contain the following substances in amounts exceeding the stated upper limit of concentration.

Substances		***Upper Limit of Concentration***
(a)	Arsenic (as As)	0.05 mg L
(b)	Cadmium (as Cd)	0.01 mg/L
(c)	Cyanide (as Cn)	0.05 mg/L
(d)	Lead (as Pb)	0.1 mg/L
(e)	Mercury (as Hg)	0.001 mg/L
(f)	Selenium (as Se)	0.01 mg/L
(g)	Nitrate*	45.00 mg/L

(h)	Silver*	0.05 mg/L

Note: Standards for substances marked thus * are Papua New Guinea requirements as distinct from WHO.

3. Aesthetic and other Qualities Standards:

Note: These standards for substances and characteristics affecting the acceptability of water for domestic use, follow the WHO International Standards for Drinking-water, 1971, except for those standards marked thus *, which indicate that these have been modified to allow for the great variation of physical and chemical qualities for the various sources throughout Papua New Guinea:

Substances or Characteristics		***Highest Desirable Level***	***Maximum Permissible Level***
(a)	*Colour*	*5 units*	*50 units***
(b)	*Odour*	*Unobjectionable*	*Unobjectionable*
(c)	*Taste*	*Unobjectionable*	*Unobjectionable*
(d)	*Suspended matter (turbidity)*	*5 units*	*25 units****
(e)	*Total solids*	*500 mg/L*	*1,500 mg/L*
(f)	*pH range*	*7.0—8.5*	*6.5—9.2*
(g)	*Mineral oil*	*0.01 mg/L*	*0.30 mg/L*
(h)	*Total hardness**	*200 mg/L ($CaCo^3$)*	*600 mg/L ($CaCo^3$)*
(i)	*Calcium (as Ca)*	*75 mg/L*	*200 mg/L*
(j)	*Chloride**	*200 mg/L*	*1, 000 mg/L*
(k)	*Copper (as Cu)*	*0.05 mg/L*	*1.5 mg/L*
(l)	*Iron (Total as Fe)*	*0.1 mg/L*	*1.0 mg/L*
(m)	*Magnesium (as Mg)*	*Not more than 30 mg/L if there are more than 250 mg/L of sulphate*	*150 mg/L*
(n)	*Manganese (as Mn)*	*0.05 mg/L*	*0.5 mg/L*
(o)	*Sulphate*	*200 mg/L*	*400 mg/L*
(p)	*Zinc (as Zn)*	*2.0 mg/L*	*15 mg/L*
(q)	*Fluoride*	*1.0 mg/L*	*1.5 mg/L*

Note. ** On the platinum-cobalt scale

*** Jacksons Turbidity Units (J.T.U.)

Appendix 3: Water Sampling Requirements for Community Water Supply Systems

SCHEDULE 3.

Reg. Sec. 8(2).

	Column 1	*Column 2*	*Column 3*
	Population Served	Minimum number of samples per month	Frequency
(a)	*Individual or Small Community Water Supplies:*		
	1,001 to 2,000	3	Once a month
(b)	*Community Water Supplies for Urban Centres:*		
	2,001 to 4,000	4	Twice per month
	4,001 to 5,000	6	"
	5,001 to 8,000	8	"
	8,001 to 10,000	10	"
	10,001 to 15,000	17	Once a week
	15,001 to 20,000	15	"
	20,001 to 30,000	18	"
	30,001 to 50,000	20	"
	50,001 to 75,000	25	"
	75,001 to 100,000	30	"
	100,001 to 150,000	40	"
	150,001 and above	40 plus 1 sample per 10,000 population	Once a day.

Appendix 4: Key Strategies, Action Plans and Performance Indicators for Eda Ranu

Strategic Objectives	Key Action Plans	Key Performance Indicators (KPI)
OPERATIONAL DIVISION		
Water Assets Maintain best practice water asset management in water supply network system	• identify asset maintenance and develop plan, budget and schedule implementation program	• 100% reliable high performance water supply system; and, • Improve water assets life cycle
Service Efficiency Establish a system to maintain and monitor all routine maintenance work to increase productivity	• utilize appropriate IT application to record all service repairs and respective costs	• improve response to service call in accordance to ICCC requirements yearly • improved work performances and reduced costs annually
Water Quality Ensure water supplied to consumers is in compliance with quality standards at all times	• improve and expand on current on-field and in-house testing methods and analysis of water samples • improve and upgrade staff managerial, supervisory and technical skills • upgrade and improve lab facilities to PNGLAS and NATA Standards	• maintain 100% compliance to WHO and PNG Drinking-Water Quality Guidelines yearly • acquire ICP machine to handle chemical analysis in-house in 2008 and also generate revenue for Eda Ranu
TECHNICAL DIVISION		
Service delivery Ensure planning and efficient delivery of annual Capex Programs	• Capex works program delivery	• 90 - 100% annually
Network Efficiency Ensure efficient management of water and sewerage network	• Improve network data collection thru maintenance and upgrading of telemetry, IWON and data collection systems • Improve Network Management through network distribution models • Assets management through data collection and transfer to MapInfo/GIS systems • Upgrade and mapping of sewerage network drawings	• Distribute network operation to 75-90% efficiency • Wider coverage of network distribution network • Completion of one-trunk-one-model (100%) • Completion of all models • 80 - 100% • Complete set of drawing 100%)s
NRW Reduction Ensure continuous reduction of Non-Revenue Water (NRW)	• Change NRW areas into revenue water • Maintain pressure reduction programs • Improve leak repair programs • Upgrade quality of materials and facilities	• Reduction from current 60% NRW to 30% by 2012

Strategic Objectives	Key Action Plans	Key Performance Indicators (KPI)
Planning Undertake business plan for water and sewerage network development to meet demand now and in the future	• Identify current and future development trends and water demands • Develop and establish water plans	• **100% by 2012** • **85 - 100%**
Future Demand Establish alternate raw water source to achieve reliable long term supply of water	• Plan and develop alternate raw water sources through coordination and integrated assessment programs • Alternate sources (a) Brown River (b) Laloki Basin Area Bore Water	• Feasibility Study Report : 100% by 2012
Business Development Continually improve and increase our customer base annually (Business Development)	• Increase the number of new customers • Awareness and prevention of illegal connections • Convert current NRW areas into revenue water and metering	• Sound financial returns • Dividend payment over K1.0 million • Customer satisfaction 70-100% • Reduction from current 60% NRW to 30% by 2012
Ensure continuous awareness and prevention of illegal water connection and sewerage discharge	• Benchmark, develop and establish new innovative engineering options • Reduce disconnection from mains	• Save disconnection time and costs by over 85% • Improve revenue earnings
Customer Services Ensure good customer relationships and communication	• Continuously provide water that meets the drinking-water quality standards • Record, report and respond to customer complains efficiently	• Over 85% efficient customer services • Improve corporate image
Continually improve on customer billing system and update connection fees to improve revenue collection	• Implement prepaid water metering • Meter all consumers	• 80 - 100% collection rate annually • Improve revenue collection • 100% completion by 2012
Business Support Establish village and settlement water supply policy to enable further reduction in NRW	• Plan and develop research surveys and assessment through coordination and integrated assessment programs and data collection • Conduct research documentation	• 100% by 2012

Strategic Objectives	Key Action Plans	Key Performance Indicators (KPI)
CORPORATE AFFAIRS		
Administration Development and implementation of structured training and development plan in line with business needs	• Solicit funding support for staff training • Develop trade skill base training programs • Secure funding for senior managers to attend international conferences, seminar and workshops • Develop integrated program for skill development for engineers, managers and senior officers	• Secure scholarships and other external funding to support training • Increase by 100% the certified trade personnel and improved competency in all fields by end of 2012 • Increase adoption of international best practice and technology annually • Enhance commercial orientation of engineers and management team
Business and Marketing Ensure all stakeholders are well informed on water and sewerage operation matters and on general water issues	• Produce regular newsletter to communicate and inform stakeholders about Eda Ranu operations • Develop and implement water related awareness programs for community, schools and general public • Review and develop communication materials • Provide support for developing websites-internet and intranet websites	• 100% well informed internal and external stakeholders on operational matters • Increased awareness on water related issues amongst the customers and stakeholders annually • 100% improved stock of communication resource materials • Improved communication through internet website and improved internal interactions and communication through intranet website by end of 2012
EXECUTIVE MANAGEMENT		
Shareholders Expectations Ensure government's development goals and priorities are also implemented by Eda Ranu through integrated approach	• Meet government's MTDS on water and sanitation targets 2000-2015 • Play a part to achieve the MDG relating to water	• Support the Government's effort to meet the target of water supply to 90% of the population, particularly in NCD by 2012
Ensure effective management and administration of the company	• Provide clear policy directions and guidelines to achieve the company's overall vision, mission, goals and targets	• A well managed Water and Sewerage Company in the country meeting all its shareholder, community service and landowner obligations
Establish compliance system and license all private operators of water supply and sewerage systems in the NCD	• Identify, plan and develop a comprehensive Compliance and Licensing System and issue licenses to all private operators of water supply and sewerage system in NCD	• Improve revenue base by 2012 • Full implementation of Eda Ranu's mandated functions in NCD

Appendix 5: Roles and Responsibilities of Government Agencies - NCD

DEC	NDOH	Eda Ranu
Reviews, approves and issues Environmental Permits(Water Permits) to Water Suppliers	Establishment of National Drinking-water Quality Standards	Extraction, treatment, storage and distribution of drinking-water within the NCD
Collection and storage of data related to water resources	Monitor Drinking-water Quality of water supplies provided by water suppliers	Management of water supply and sanitation facilities
Set-up and monitoring of hydrological stations throughout the country to monitor levels of water	Scientific testing and analysis of samples of water from water supplier's raw water sources, treatment plant and distribution systems	Billing and collection of water rates and tariff Conduct awareness on water operations and water related issues
Conducts awareness on protection of water resources	Formulation of Plan of Action to monitor compliance of drinking-water quality standards	Engage in research related to water supply and sanitation Prepare disaster preparedness and adaptability Plans
Prepare disaster preparedness and adaptability Plans	Conduct awareness on water quality issues	Comply with the conditions of the water permit to supply water
	Facilitate, coordinate and provide water supply in rural areas of the country	Comply with the National Drinking-water Quality Standards
		Exercise control over private water supply and sanitation service providers

Source: PNG AGO (2012)

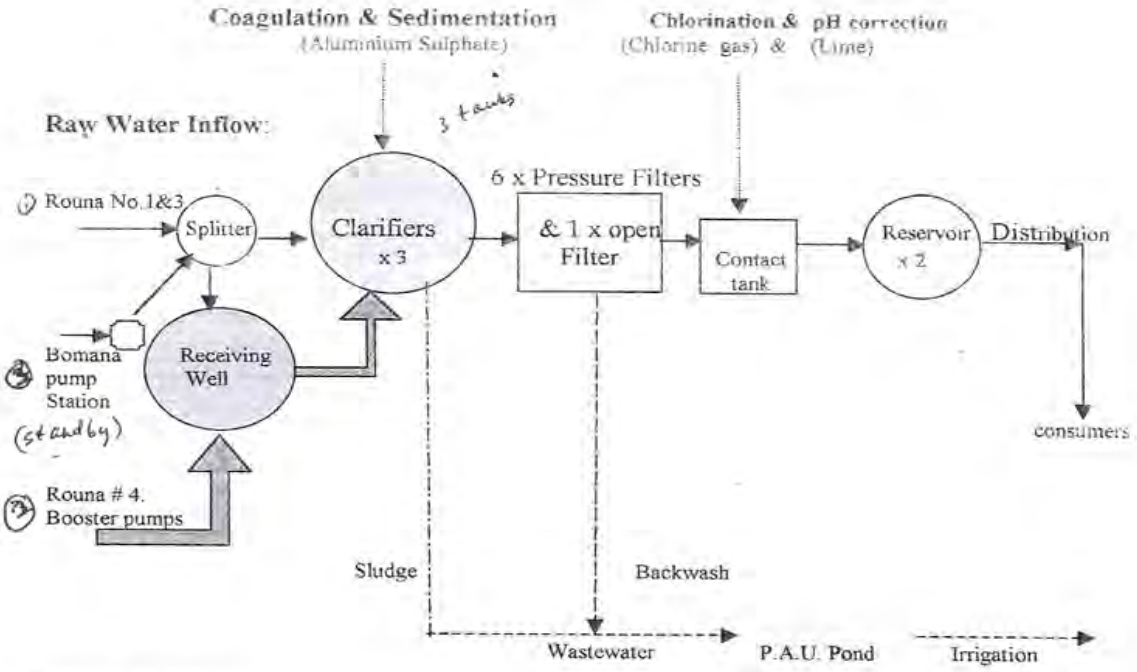
Appendix 6: Risks associated with Water Supply and Monitoring Processes

	Possible Risks	Monitoring Process	Remedial Actions
1	**Disruption to raw water sources**		
	No water supply at all	Eda Ran and PNG Water to coordinate with National Coordination Centre (NCC) to help minimize the effects of this problem	• Shutdown service reservoirs to retain water • Launch of public information through TV, radio, newspapers and loudhailers • Hire of private water carts to supply water from private tanks, borehole supplies and nearby rivers
	Treatment plant malfunction	Monitor close link with Mt Eriama WTP 24 hrs a day during crisis situation in consultation with PNG Water Coordinate with NDES	• Close down WTP or • Supply partially or non-treated water to the city's residents • Manual chlorination at WTP • Issue of boil-water public notice • Extra sampling across City
	Major Pollutant Incident	Liaise with all appropriate bodies and issue clear decisions to employees and public	• Close intakes at Bomana and/or Rouna 1/3 and Rouna 4 and allow the pollution to pass • Monitor water quality at raw water source, WTP and throughout the distribution network • Liaise with testing laboratory to provide fast, reliable results of samples tested for pollutants • Issue boil-water public notice • Close-off major trunk mains that may be contaminated • Instigate comprehensive mains-flushing exercise once treated water is restored
	Rouna 1/3 raw water supply failure	Control water pressure and capacity by turning on and off water supply mains through rationing scheme	• Introduce major water supply rationing scheme by closing a number of truck mains in return • Issue Rationing schedule to public by way of map • Use of water carts • Water use restriction notice to public such hosepipes ban and pre-planned closure of non-essential large-scale consumption
2	**Disruption to power supply**		
	Water and sewerage pumping station inoperable	Liaise with NCDD to prioritize the allocation of water pump generators according to national interest	• Rotation of back-up generators at water-pumping stations • Use of private water carts • Public awareness campaign
3	**Shutdown of major trunk mains**		
	Upstream on Nine Mile Valve Complex	Closing and opening of valves	• Identified trunk mains valves to close
	Downstream of Nine Mile Valve Complex	Closing and opening of valves	• Identified trunk mains valves to close • Water rationing

Appendix 7: Systematic Diagram of Mt. Eriama Water Treatment Plant

Mt. Eriama Water Treatment Plant

Schematic Diagram 1



Raw Water Inflow:

Rouna 1 & 3 Source – about 99-103 MLD (flow by gravity)
Rouna 4 Source (Headpond) New Pump Station - 50 -100 MLD
Bomana Pumping Station (Standby booster pumps) - 58 MLD

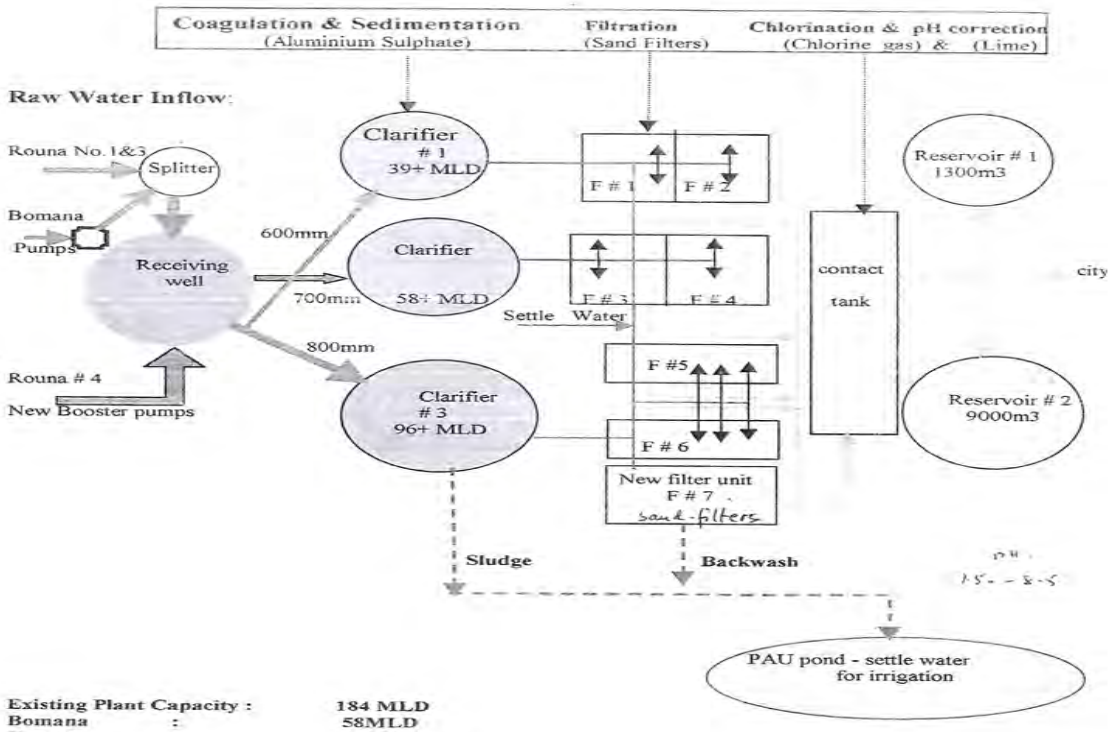
Existing Plant Capacity : Upgraded from 136 MLD to184 MLD

- Installed tube settlers in 3 x clarifiers
- Refurbished pressure filters
- Additional filters (50 MLD capacity)
- New chemical dosing system
- New mixing chamber
- New Raw water pump station - Booster pump station

7 July, 2009

Mt. Eriama Water Treatment Plant

Schematic Diagram 2



Existing Plant Capacity : **184 MLD**
Bomana : **58MLD**
Booster : **50 MLD**
Rouna 1/3 : **99-103 MLD**

8-Jul-09

150 MLD per day -

Appendix 8: Eda Ranu Water Tariff with Customer Classifications

Customer Classification	Water Prices in PGK per kilolitres (kl)						
	Access Charge (p.a.)	**Monthly Consumption 0.1 -15 kl**	**15.1 – 35 kl**	**35.1 –50 kl**	**50.1 –75 kl**	**75.1 –100 kl**	**100.1 –150 kl**
Class 1: Statutory Authorities/ Government	60.00	1.00	1.00	4.00			
Class 2: Commercial /Industrial /High Users	60.00	1.00	1.00	4.00			
Class 3: Approved Schools	60.00	1.80					
Class 4: Approved Charities /Religious Organisations	60.00	1.00	1.00	1.15	1.80	3.00	4.00
Class 5.1: High Covenant Residential	60.00	1.00	1.00	1.15	1.80	3.00	4.00
Class 5.2: Low Covenant Residential	60.00	1.00	1.00	1.15	4.00		
Other Regulated Services							
Public/Community Bulk Meters	*Water Prices*	*Metered Stand-Pipes*	*Monthly Charges*				
• All registered Volume per kl	K1.50	Up to 15 kl Up to 50 kl	K7.50 K25.00				
• Eda Ranu Filling Station Coupon Sale per kl	K5.00	Up to 75 kl	K42.50				

Source: "The National" newspaper, 8th January 2010–Eda Ranu Press Statement

Appendix 9: Eda Ranu's Actions to Demonstrate Improvements to Drinking-Water

Target Areas	Set Performance Indicators	Demonstration of Improvements
Water Assets	100% reliable high performance water supply system Improved water asset life cycle	Undertaken regular water supply upgrades on raw water intake facilities, service reservoirs around the city, transmission mains and distribution network
Network efficiency	Distribution network operation to 75% –90% efficiency; and, Wider coverage of distribution network	Upgraded and installed telemetry, IWON and SCADA systems for data collection, monitoring and controlling of water pressure, water flow and leakage on real-time.
Non-Revenue Water (NRW) Reduction	Reduction from current 60% NRW to 30% by 2012	Phase 1 &2 of NRW was completed and Phase 3 was in progress in 2010 by: • utilising telemetry technology to manage water supply network systems, and • Signing of Memorandum of Understanding (MOU) with settlements and villages for Eda Ranu Ltd to provide water supply service and to recover of costs from settlements and villages.
Planning	100% by 2010	Increased capacity of raw water source by completion of Rouna Booster Pump Station in 2007 from 170 MLD to 184 MLD which is the projected water demand of 2020 in the NCD; Also upgrade Mt Eriama Water Treatment to cater for increased capacity of water.
MDG	Support the government's effort to meet the target of water supply to 90% of the population, particularly in the NCD by 2015	Upgrade of water distribution network in the NCD; Signing of MOUs with settlements and villages to extend water supply services to this population.
Customer billing systems	80–100% collection rate annually; and, Improve revenue collection	Pre-paid Water Meter Project completed in 2010 and awaits approval from IPBC through the responsible Minister; Notices are issued for payments of arrears in Newspapers; Signing of MOUs with settlements and villages.
Awareness	100% well informed internal and external stakeholders on operational matters Increased awareness on water related issues amongst the customers and stakeholders Increase communication through internet websites	Publication of quarterly newsletters; Publication of promotional materials on introduction of Prepaid Water Meters; Preparation and submission of Annual Management Reports.
Water Quality	Maintain 100% compliance to WHO and PNG Drinking-water Quality Standards yearly Acquire ICP machine to handle analysis in-house in 2008 and also to generate revenue for Eda Ranu Limited	Acquired K500,000 worth of Inductive Coupled Plasma (ICP);a chemical analysis machine to test and recognise traces of toxic chemical elements in water to test water at the raw water in-take locations, treatment plant and distribution network; Upgrade and installation of two bobby filters at Mt Eriama Treatment Plant; Accreditation of in-house testing Laboratory

Source: Eda Ranu Five-Year Strategic Corporate Plans 2009 -2012

OFFICE OF THE AUDITOR-GENERAL OF PAPUA NEW GUINEA
PERFORMANCE AUDIT REPORT NO. 01/2012