

# The Water Herald



Volume 5, Issue 4, October–December 2014

*First Lady graces  
NWSC's end-of-year  
thanksgiving party*



*NWSC wins  
other awards*





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## Managing Director's Foreword

### Practicable Mechanisms for Tackling Non-Revenue Water; What works for Utilities in Developing Countries?

It first and foremost gives me great pleasure to welcome you once again to this edition of the water Herald for the period October to December 2014. As we come to the end of the year, we continue reflecting upon the conscious efforts the Corporation has taken to avert some of its teething challenges such as the predicament of Non-Revenue Water.

To begin with, one of the major issues affecting water utilities in the developing world is the considerable difference between the amount of water put into the distribution system and the amount of water billed to consumers (also called "non-revenue water" [NRW]) a consequence of which affects the financial viability of water utilities through lost revenues and increased operational costs. The waste of resources resulting from high NRW levels in developing

countries is considerable. According to the **World Bank Discussion Paper No 8 of 2006**, the total cost to water utilities caused by NRW worldwide can be conservatively estimated at USD \$14 billion per year.

This therefore calls for pragmatic steps if utilities are to effectively counter and mitigate this adverse vice. Indeed a multifaceted approach needs to be used in order to tackle this challenge. The following are some of the practical mechanisms that the Corporation has implemented over the years in order to address the NRW predicament.

- i) **Universal metering** of customer premises, and bulk metering of water production facilities. This improved measurement and accountability of water in the system.





- ii) The **replacement of old meters** so as to ensure accurate billing.
- iii) The establishment of a **24 hour Call Centre** in Kampala aimed at addressing customer complaints with speed and accuracy.
- iv) **IT innovations** and development of modern billing system that restored the confidence of the customers and thus high willingness to pay that resulted in high billing and collection efficiencies.
- v) Limited water distribution **network rehabilitation/replacement** particularly in the towns of Kampala, Jinja, Mbarara, Masaka, Kabale, and Entebbe.

These have resulted into a reduction of NRW from a high of about 50 % in the later part of the 90's to about 33 % in 2014.

However, these achievements notwithstanding, typical challenges that continue to impede the speedy reduction in NRW include; the lack of adequate funding to restructure and replace the aging infrastructure (50–70 years old) especially in Kampala, inability to carry out a comprehensive asset replacement, inadequate technology – GIS modelling and leak detection, difficulties in water supply system balancing which results

in high pressures in some lower areas and very low pressures in high elevation areas, and continued meter vandalism.

As a futuristic strategy, and in line with the **Corporation's 5 Year Strategic Direction (2013–2018)** NWSC intends to implement a combination of hardware and software techniques for which some are already underway. These include; the installation of **prepaid meters** (commencing with the Government Institutions), installation of a **modern GIS system** which will improve the monitoring of the water distribution system, the creation of hydraulic zones and **District Meter Areas**, and the institution of a water prevention unit which encompasses increased **stakeholder participation** involving the **communities, police and civil society** in the fight against the water losses.

As a Corporation, we are certain that the steps we are undertaking will bring about a reduction in water losses and a positive change to the people we serve. I therefore take this opportunity to wish you a good reading and in the same latitude, wish you a merry Christmas and a happy and prosperous new year.

Thank you.

*Dr Eng Silver Mugisha*  
**MANAGING DIRECTOR**





## Editor's Note



**Dr Martin Kalibbala**

**Chief Editor–Water Herald**

### *Precious Readers,*

Non-revenue water (NRW) management in water utilities is the main conversation of this issue of the Water Herald (October–December 2014). No doubt, many water utilities in low and middle income countries (LAMIC) are grappling with addressing the challenges and issues of proper management of NRW.

In addition, NRW is considered the biggest problem facing the water supply industry in Africa and beyond. The World Bank estimates that the total cost of NRW to utilities worldwide is US \$ 14 billion per annum. With the availability of suitable water supplies being depleted and rising costs in treating and transporting water, NRW adds a severe burden to water management for urban water supplies.

This has resulted into billions of potential revenue wasted in terms of both running and capital expenditure costs – NRW is detrimental to the financial viability of any water utility company. But what exactly are the underlying hurdles that are hindering utilities to tackle this? Is it lack of adequate financing? Or is it lack of technical know-how? What about forging meaningful partnerships for mutual benefit, especially among experts that might add value?

Probably, the answers to these valid and interesting questions could not be instantly gotten off-the-shelf. Thus, robust solutions might require serious utilities like National Water and Sewerage Corporation (NWSC) to hammer out well thought through, sound and cost effective home grown solutions.

In many African utilities, more than 40 % of their water produced does not earn them any revenue. It is either lost before reaching the customer or is not being

billed, or both. NRW losses increase: (i) operating costs, (ii) contribute to poor service quality and coverage, (iii) make investments in capacity augmentation larger, and (iv) reduce cash generation.

Part of the problem is that utilities have failed to manage their networks in line with international best practices. Many networks are old and hydraulically unstructured, are expanded in an unstructured way, are devoid of reliable network information systems.

Numerous African water utilities – if put to serious task – might not intelligibly articulate the extent of NRW losses in their water networks, and the underlying derivatives. Without taking control of their water networks, utilities cannot implement systematic and sustainable actions to control NRW losses. Some utilities have therefore resorted to erratic and irregular technical exercises involving only repair of reported leaks or bursts.

Within the pages of this issue of the Water Herald, there could be a lot to learn about how NWSC is handling this vice. There is always room for improvement. Please give us your thoughts and experiences on this key subject. Believe me, they are, and shall be highly valued.

On top of the NRW conversation, numerous nice things took place with the operational jurisdiction of NWSC. For instance, our end of year thanksgiving staff party was done, and the chief guest was the First Lady, Honourable, Janet K Museveni. Also, Professor Ephraim Kamuntu – honourable minister of water and environment – graced the occasion.

So much more to highlight here! Please flip through the pages of this issue, to get a feeling of what transpired during the annual quarter.



## First Lady Graces NWSC's End-of-Year Thanksgiving Party

First Lady, Honourable Janet Museveni applauded the National Water and Sewerage Corporation (NWSC) for its 'dedicated' service and urged other public entities to learn from the water utility company.

In her remarks as guest of honour at a thanksgiving prayers held on 19<sup>th</sup> December 2014, at the NWSC International Resource Center (IREC), Bugolobi, the First Lady commended NWSC for expanding its geographical network coverage, infrastructure growth, improved customer care and steady water supply in Kampala, among others.

"On behalf of government, I want to thank and congratulate you on the seriousness and dedication you have exhibited so far in the programme as you move steadily throughout the country, giving communities the greatest commodity they need, clean and safe water," the First Lady said. She singled out NWSC for winning the 'Best Performing Utility Procurement and Disposal of Public Assets Award' this year.

"For this (award), you are particularly commended, considering the disappointing performance of some of our other public utilities in recent times," she said, describing NWSC staff as a group of dedicated Ugandan professionals. In the last one year, NWSC has extended its service coverage from 23 to 66 towns, added 1,000 kilometres of water pipes to its network countrywide, grown its customer base by 400,000 new connections and built new sewerage facilities such as the Lubigi treatment plant in Kampala.

The utility also switched on its call centre, consisting of more than 25 agents to handle customer complaints at once. Accordingly, NWSC won six different major awards at both local and international levels in recognition of the aforementioned innovations.

"It is my hope and prayer, therefore, that the whole nation will take note of these achievements and that all public servants will be challenged to do likewise," said the First Lady, who is also MP for Ruhaama and minister for Karamoja.

She added that it was a worthwhile occasion for NWSC to celebrate and thank God for such progress made in the year. She challenged NWSC to extend its services to semi-arid Karamoja, one of the most water stressed spots in the country. Dr Eng Silver Mugisha, the NWSC managing director, assured the First Lady that Karamoja has been included on their service expansion agenda for next year.

Water and Environment Minister, Prof Ephraim Kamuntu, State Minister for Environment, Ms Flavia Munaba, Rtd Anglican Archbishop Luke Orombi, and Kampala Catholic Archbishop, Dr. Cyprian Kizito Lwanga, as well as several MPs, were among the guests.

Meanwhile, NWSC recognized the First Lady with a plaque for her outstanding commitment to fight for women and children's rights. It also awarded House committees on finance and statutory agencies and state enterprises, and ministers Kamuntu and Munaba, for their prudent oversight roles.



First Lady, Hon Janet K Museveni at the NWSC function

# Paying Your Water Bills Contributes to Service for All Ugandans

by Dr Eng Silver Mugisha

A multifaceted discourse has been raging on various media platforms regarding water tariffing and how it impacts the socio-economic life of citizens, especially the low-income segment.

I have observed strong commendations but also some areas of distortion that need ideological discussion. This opinion is aimed at contributing to knowledge about water tariffing as a concept and the status of water tariffs charged by National Water and Sewerage Corporation (NWSC).

Water Tariffing: the traditional thinking has, invariably, alluded to water being a basic social good, God-given and a lifeline of mankind that should, if possible, be supplied free of charge to citizens. Increasingly, this hypothesis has mutated, and rightly so, to regarding water as a socio-economic good that needs some configuration of inputs in order to be delivered as a potable product to citizens, at a convenient location.

Yes, water is a social good but also requires some level of funding to treat it (using chemicals, pumped systems and unit operations), transmit it (through pumping and transmission pipes) and distribute it to customers.

Therefore, bringing potable water close to a homestead requires a combination of operating expenditure (OPEX) and capital expenditure (CAPEX) where the latter is predominantly a one-off sunk investment.

The question is: can this entire cost requirement be met by consumers in countries with citizenry of significant low income status? The answer

is no; some cost has to be met by government (assisted by development partners, sometimes). This is because, tariffing benchmarks suggest that water prices must be conserving, affordable, fair, enforceable and serviceable (CAFES).

In order to comply with this criterion, water tariff must fit within the willingness to pay (WTP) and ability to pay (ATP) limits of citizens. The quantitative benchmarks (universally accepted) of WTP and ATP are three per cent and five percent of homestead income respectively.

This empirical generalisation can be practically verified through a contingency survey; by asking people of various categories, how much they would be willing to pay if they got water services (of good quality) in their vicinity and save on time lost in walking long distances to fetch water.

**“Yes, water is a social good but also requires some level of funding to treat it (using chemicals, pumped systems and unit operations)”**

Status of NWSC tariffs: save for annual indexation to cater for inflation and other exogenous economic factors, NWSC tariffs have never been increased since 1994. Accordingly, the prices of water per 20-litre jerrycan (including VAT) for the various customer categories are



as follows: public stand post for low-income communities (UShs 32); domestic consumers (UShs 50); Institutions/government (UShs 60); large industrial users (UShs 58). That means for a milk factory that sells a litre of milk at, say UShs 1,500 will have used about UShs 2 per litre of water (0.13 %).

A beer factory that sells beer at say UShs 2,000 per half-litre will have used UShs 1.0 per half-litre of water to produce it. A low-income person that takes a bottle of soda at UShs 1,000 foregoes about 30 jerrycans of water.

A child that takes a chewing gum of UShs 100 foregoes three jerrycans of water. Clearly, from this comparative analysis, one cannot say that NWSC tariffs are not affordable. The problem, really, relates to vendors that buy water from NWSC at a public stand post rate of UShs 32 per jerrycan and sell it at UShs 200-500 per jerrycan – exploitative behaviour.

Paying for water helps to serve all the people: some elements of society have been advocating for a public policy that gives free water services to people. This theory is problematic in a number of ways.

First, our country has taken strides to balance its national budget through an efficient taxation system. Asking for free water services and also pursuing a balanced national budget means that other taxes will have to increase to cater for implicit water tariff subsidies.

This setup is further complicated by the fact that the urban water service coverage for a population of about 4.6 million people is about 77 per cent. It should be noted that Uganda's population is largely rural and without piped water (albeit having other safe water point sources).

Clearly, advocating for free piped water services, which means increased taxation on other services, implies that the rural poor are indirectly paying for the urban people. This is not compatible with sound and efficient economic

policies. The correct strategy – which NWSC is implementing – is to differentiate the tariff so that people pay affordable prices according to their income levels.

**“A beer factory that sells beer at say Shs 2,000 per half-litre will have used Shs 1.0 per half-litre of water to produce it. A low-income person that takes a bottle of soda at Shs 1,000 foregoes about 30 jerry cans of water.”**

In so doing, services get extended to more people through increased number of PSPs so that the profit-maximisation behaviour of the water vendors is curtailed through the law of supply and demand. Paying affordable and fair water prices also helps to promote efficient allocation of homestead resources, based on smart priorities.

Practical steps by NWSC to reach a wider population: The NWSC tariff system, which is heavily based on an internal cross-subsidy arrangement, has enabled the corporation to extend its operational coverage from 23 towns as at June 2011 to a current 84 towns of Uganda.

The number of connections per annum has also increased from 25,000 to 35,000 while the total connections have increased from 270,000 to 380,000. The corporation currently constructs over 1,000 km of network per annum compared the previous rate of 80 km per annum. At this rate, we are committed to 100 % service coverage by 2018.



## CAPACITY REQUIREMENTS FOR EFFECTIVE NRW MANAGEMENT

by Eng. Timothy Mubbala

NRW is the difference between volume of water delivered to the distribution system and the volume of water sold expressed as a % of water delivered. It is composed of Commercial losses, physical losses and unbilled Authorized consumption

In African Cities NRW stands at 60% on average, the lowest being 20% and the highest being 70%. The biggest challenge is the **limited knowledge on NRW** and the absence of resources to invest in NRW reduction.

The global volume of non-revenue water (NRW) is staggering. In many low-income countries – (50 % – 70 %). Each year billions m3 of treated water are lost through leakages and additional billions m3 per are delivered to customers but not invoiced because of theft, poor metering, or corruption. A conservative estimate of the total annual cost to water utilities worldwide is USD \$ martin14 billion. Saving just half of this amount would supply water to an additional 100 million people without further investment

This paper addresses the aspect of limited knowledge specifically by decision makers at the strategic level of management.

In my ten year career operation in management and provision of consultancy services in regard to urban piped water management, I have noted that most CEOs and decision makers seem not to appreciate the fact that NRW management requires specialized skills and tools.

The paper presents the required technical skills for effective NRW management in regard to;

1. Selection of performance indicators and target setting
2. Action Plan Preparation
3. System input Volume Determination (flow measurements, installation and calibration of production)
4. Management of Physical Losses
5. Consumer meter selection, installation, operation and maintenance
6. Management of Water theft

7. Capacity and awareness of the technical staff
8. Mapping
9. Water Auditing and balancing

**The expected output is the appreciation of the need for specialized skills for NRW management and therefor an increased demand for NRW focused technical services.**

The participants will certainly benefit from my 10 years exposure and insight in the field of NRW management and consultancy service provision through NWSC's External Services Unit.

### 1.0 Selection of performance indicators and target setting

#### Challenge at hand

Most often the performance targets for utility operators is based on previous performance or in comparison to the performance of utilities considered to be good performers in a region. Without any effort to ascertain the correctness or authenticity of the reference / basis for target setting, worse still, the NRW% target often used by utilities is more sensitive to the commercial oriented performance other than the technical aspects.

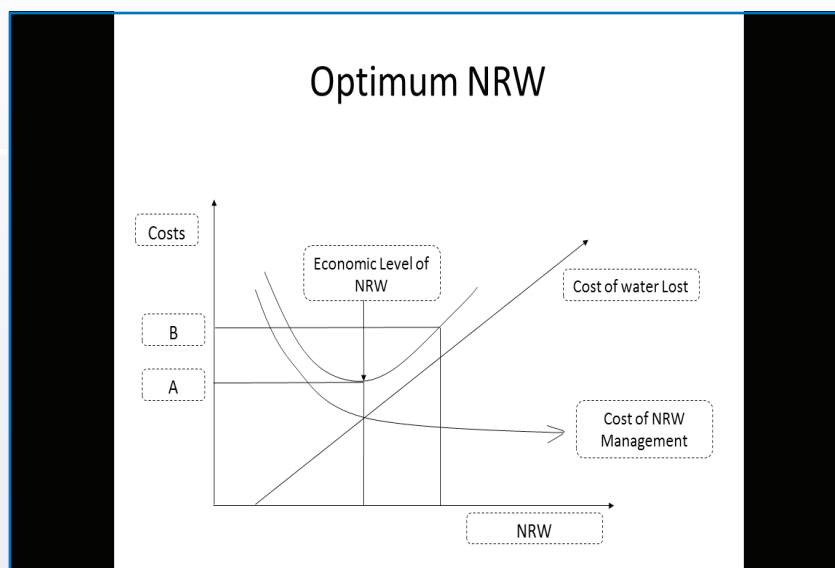
For that reason, the regulators or governments that set targets are seldom able to technically defend the targets set.

#### Baseline Figures and other relevant data

Ideally before setting targets, correct baseline data/ figures should be established. i.e. NRW%, Physical losses / connection per day, commercial losses, Length of pipe network e.t.c establishment of correct baseline figures requires staff that highly skilled in NRW management.

According to the NRW manual, The optimum NRW for a system occurs when the curve of water lost meets the curve of the cost of NRW management – see illustration below.





### Performance Indicators

According to the AfWA, in addition to NRW% as a performance indicator, the other recommended performance indicators include; physical and commercial loss performance indicators. i.e. Physical loss target matrix and commercial/monetary losses.

**Determining authentic baseline performance coupled with the nature of target setting is better done with a thorough understanding of NRW management (See Appendix II)**

## 2.0 Action Plan Preparation

An Action Plan is a sequence of steps that must be taken or activities that must be performed well, in order to achieve a given goal.

Action Planning involves

1. Identifying objectives
2. Setting objectives which are achievable and measurable
3. Prioritizing tasks
4. Identifying the steps needed to achieve specific goals
5. Setting milestones / Time horizon
6. Specific tasks
7. Assigning Responsibilities and Resource allocation

**With the exception of first and last activities, the rest all require NRW skilled manpower.** To improve on the effectiveness of the plan, the skilled persons use the 5 step action planning model illustrated below;

1. Step 1: Where am I now? – review achievements & under take self-assessment (Appendix I)
2. Step 1: Where do I want to be? – Decide your goals
3. Step 1: How do I get there? – Define Strategy and break down goal to smaller discrete steps to be taken in order to achieve target
4. Step 1: Taking Action - Nitty gritty where you implement your plan
5. Step 1: Where am I now ? – the cycle begins again

## 3.0 System input Volume

### Challenge at Hand

From my experience, majority of the small and medium water utilities struggle with the measurement of system input volume, Some of which have 100% unmetered

or partly unmetered consumption. Some cannot even differentiate between system input volume and production.

System input volume is the first important figure upon which NRW is computed, and SIV implies wrong NRW management.

The installation of production meters is still a challenge. The meters are installed poorly even by renowned contractors.

In some utilities where production is not metered at all, production is estimated based on pump hours, a practice that is very misleading.

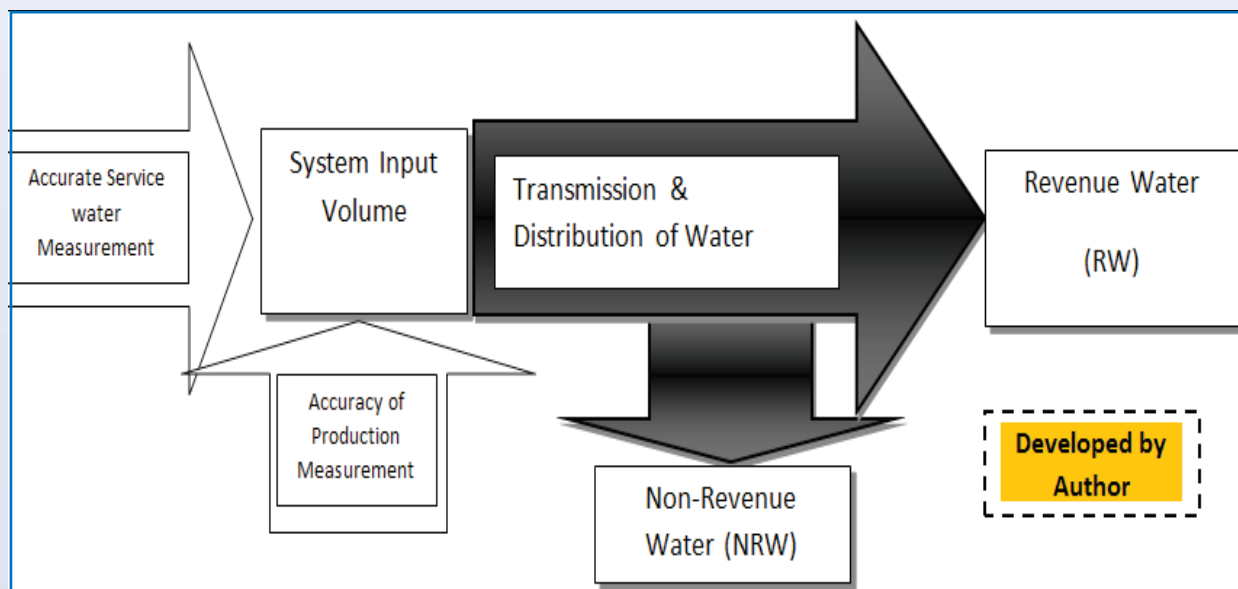
Installed water meters should as well be calibrated regularly to ensure that the performance is within the accuracy curve (See appendix IV)

The production meters should be sized according to a meter sizing catalogue (See example –Appendix V)

### Recommended Technical Practice

Meters can only perform as expected if installed according to the manufacturer's instructions and should therefore be installed well (See appendix III)

If the production is not metered at all, flow meters should be used to estimate the production for different pump combinations on a regular basis.



**The two main activities regarding SIV are the accurate measurement of both the production and the service water.**

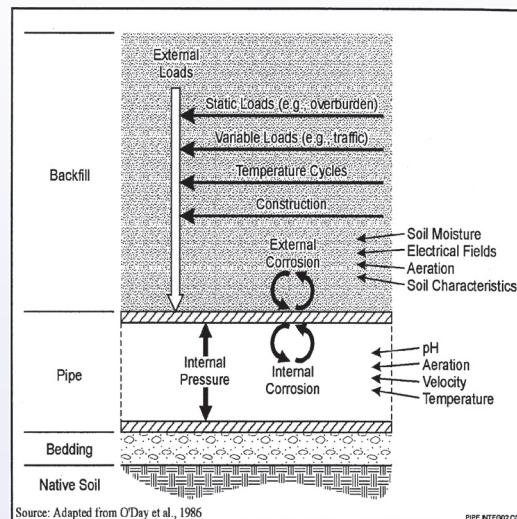
$$\text{SIV} = \text{Accurate production figures} - \text{Accurate service Water}$$



## 4.0 Management of Physical Losses

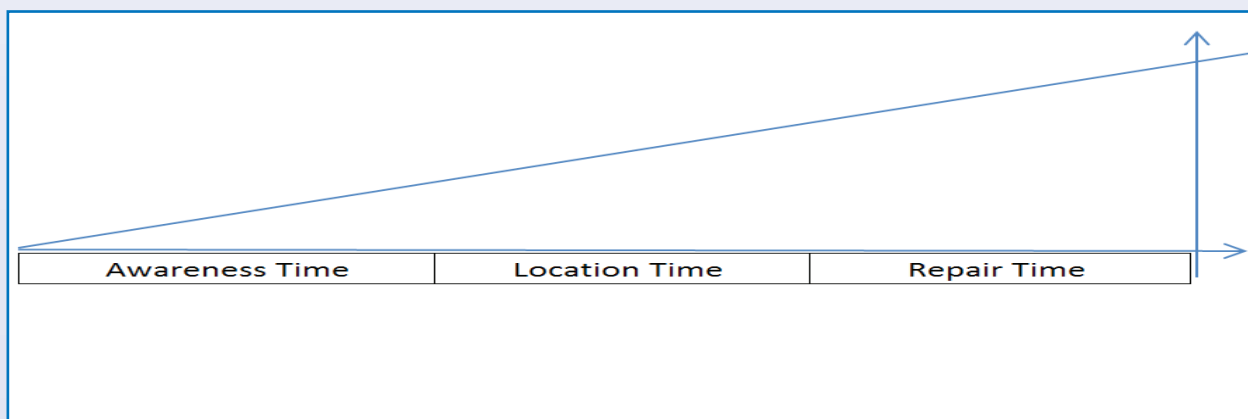
### Causes of Physical Losses

Summarized below are the causes of leakages.



In addition to the aspects above are poor workmanship and quality materials.

### Volume of Water Lost



### Issues at hand

Most small and medium water utilities have a limited understanding and capacity to manage physical losses.

- Have no dedicated teams to address the awareness time – the awareness time is unknown.
- The location and repair times are unknown
- Use poor quality materials – the use of electrical conduits for consumer connections is a common site.
- Absence of sound new connection policies
- Poor materials – no knowledge of pipe pressure ratings

- Unknown water supply / network pressure pressures
- No asset management policies / practices

### Recommended Technical Practice

For effective management of leakages, the four pillars of management should be applied simultaneously. **All the pillars require a reasonable technical background.**

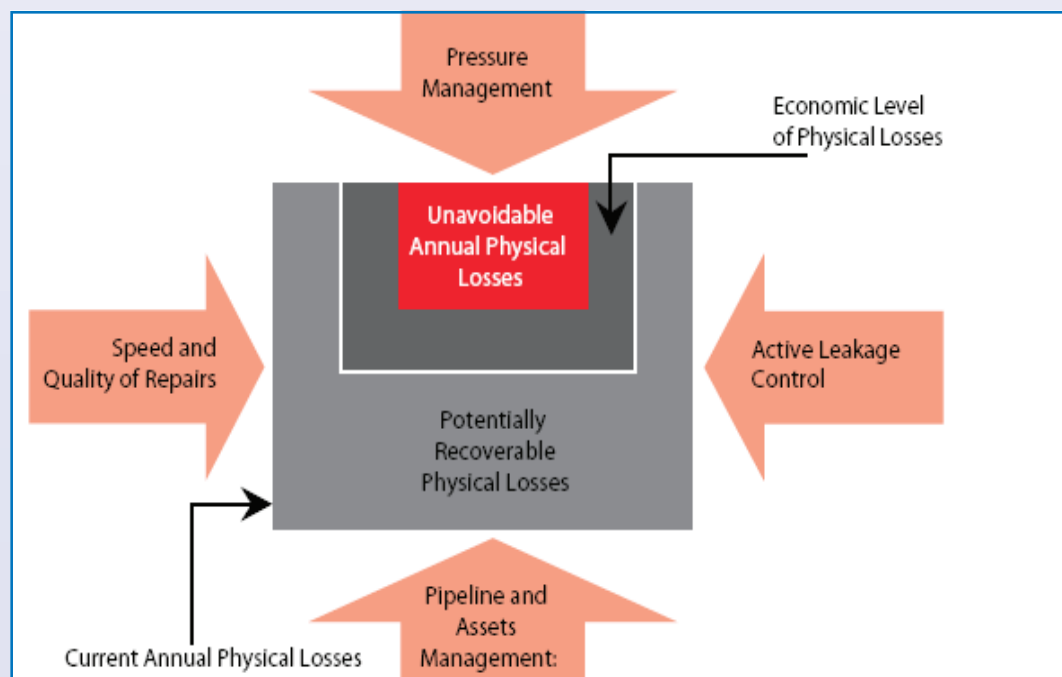
1. Asset Quality of repairs
2. Leak Detection
  - a. Zoning and network evaluation and prioritization (**Night flow measurements**, Hydrostatic testing, Zero consumption measurements or water audits)
  - b. Actual leak detection (Acoustic with correlator, Infrared thermography,

Tracer Chemical, Mechanical or ground microphone)

3. Pressure management (Pressure measurement / logging, The use of Pressure reducing valves, Pressure break tanks, the use of fittings - L/D Ratios e.t.c)

4. Quality of repair – (Materials selection, workmanship, Stock levels e.t.c)

The Leak related data records should also be linked to GIS maps.





## 5.0 Consumer meter selection, installation, operation and maintenance

### Issue at hand

The absence of specific literature about water meters is quite striking, yet they have been in use for over 100 years. Metering of consumption is the heart of any water utility. Integrated Water Meter Management by Francisco Arregui, Enrique Cabrera Jr and Ricardo Cobacho

The apparent lack of knowledge as per the matter of meter management (Technical & managerial) does not match the needs and expectations of technical and managerial staff responsible for water service management on a world wide scale.

The required knowledge to support decision making is lacking for most utilities. As a result most decisions are inclined to the 'tradition' i.e. Cheapest option, a certain model, a technology or a manufacturer who has delivered what is considered to be a good performance, or simply by the very limited information available.

This subject is critical because meters; Are the single instrument available to provide fair and documented billing; Provide data that may be fundamental for the technical management of a utility; Allow for rigorous water balancing and management of losses; Used to characterize demand; Used to Identify anomalous behavior and failures in systems; Used to reflect the real cost of abstracting, treating and distribution of drinking water

### Recommended Technical Practice

Water meters require significant technical expertise at all levels i.e.

1. Water meter Model Selection (Detailed economic analysis, Initial field testing & Economic selection)
2. Quality Control Tests (Quality control at reception, Quality Control in the field & General recommendations for installations of meters)
3. Database development management
4. Utilities Water Meter Audit (Check for Vulnerability

to fraud, Quality of Meter Readings and Performance of water meters)

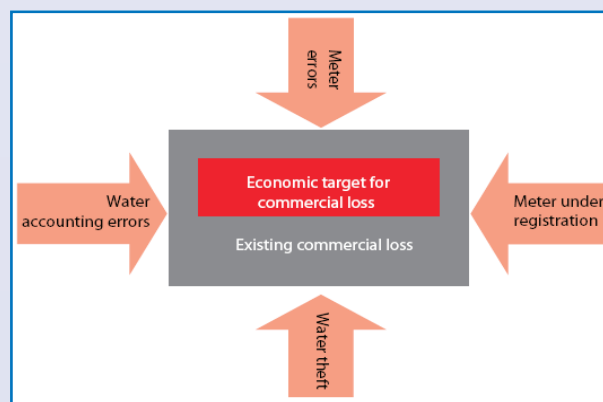
5. Water meter maintenance (Service of meters, Repair Meters, Re-calibrate meters and Replacement of metering Module (Component)
6. Meter replacement program (Replacement of domestic meters and Replacement of Large Consumer meters)
7. Meter sizing (Consumption profile Database, Catalogues for Consumption by Meter type and size, consumption by consumer category & characteristics e.t.c)
8. Estimation of Commercial losses by meter under registration
9. Meter Management Strategy (See appendix VI)

**All the issue mentioned above are seldom taught in school, are not learned out of mere experience by require technical expertise.**

## 6.0 Management of Water theft

### Issue at hand

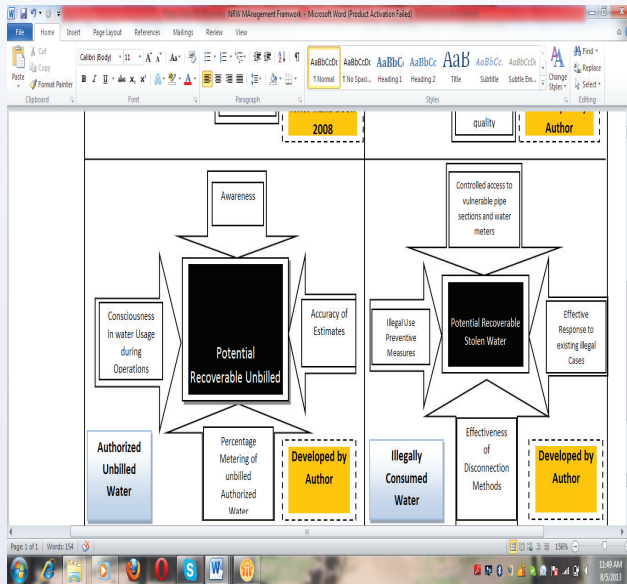
Unlike electricity and other services, the water service industry is more vulnerable – plumbing does not require specialized knowledge. Most problems and subsequent solutions are first appreciated and then addressed by the western world. This is not the case for water theft as it is largely unique to Africa. This is evidenced in the illegal NRW manual - which only mentions water theft without a detailed breakdown.



## Framework for commercial loss management – NRW Manual

### Recommended Technical Practice

In my 10 year career, I have noted that water theft often occurs through meter tampering, illegal reconnections, meter by passing and illegal connection / tapping. The aspects below should be addressed for better management of water theft.



### Framework for management of illegal water use

The illegal water use can be minimised by the use of specialized knowledge coupled with specialized tools e.g. Pipe locators, “tamper proof” meters, metallic clamps, Security chambers, position sensitive meters, AMR systems coupled with a well maintained database e.t.c.

## 7.0 Water Auditing and balancing

Most small and medium utilities do not conduct water auditing and balancing at all.

- The production / SIV figures are acquired from the production team.
- The water sales for the given period are on the other hand acquired from the billing team
- NRW is then computed
- There are no efforts made to verify the accuracy of the production and consumer meters and to break down or quantify the NRW contributors.

### Recommended Technical Practice

Technically, a thorough water audit should be conducted to a 95% confidence interval. This implies that the SIV will be accurate, the NRW accurate and the components of NRW also Broken down.

Water auditing and balancing is very important because;

- a. Framework for assessing a utility's water loss situation
- b. Calculating the water balance
  - i. Reveals availability/ reliability of data and level of understanding
  - ii. Creates awareness of problems/issues
  - iii. Gives direction for improvements
- c. Tool for communication and benchmarking
- d. Understanding Water balance is a must for prioritizing attention and investments.

There are also tools developed to ease the water auditing process – the IWA water audit process.



System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water (NRW)
			Unbilled Unmetered Consumption	
	Water Losses	Commercial Losses	Unauthorized Consumption	
			Customer Metering Inaccuracies and Data Handling Errors	
		Physical Losses	Leakage on Transmission and/or Distribution Mains	
			Leakage and Overflows at Utility's Storage Tanks	
			Leakage on Service Connections up to Point of Customer Use	

## 8.0 Mapping

In most small and medium utilities, GIS maps are unheard of. Customer's locations are tagged to particular long serving field staff / artisans. This practice greatly undermines the independence of the utility & the technical management of the water supply systems.

### Recommended Technical Practice

A utility should have updated maps linked to with the relevant NRW related data / information e.g. sizes of pipes, location of leaks, pipe diameter, material and type, spatial location of no water cases e.t.c.

The usage of GIS maps has enormous benefits, these include

Among other benefits mapping water networks eases the Location of customers, is a powerful decision support tool, facilitates asset management, and eases PPM and also depending of the mapping system it can be used in the design of the system.

**These services all require specialized labor**

## 9.0 Capacity and awareness of the technical staff

Hiring experts for each service can be quite cumbersome and is not sustainable. The best is to identify and equip staff to manage Non Revenue Water.

The staff should undergo sufficient training and be equipped with relevant equipment to effectively - Select of performance indicators and set meaningful target, produce action plans, determine accurate system input figures, manage physical losses, Manage commercial losses, develop and or maintain procured NRW related databases and conduct water audits.



## APPENDIX I

	Level	1	2	3	4	5
	Issues questions	Basic				High
1	Water Balance, Flow and Pressure Monitoring, Mapping					
1.1	Water Balance	We do not establish a water balance	We have tried to establish a water balance but gave up since we don't know the split in physical and commercial losses	We establish a water balance following our own format	We establish an annual water balance in accordance with the international form	We establish an annual water balance in accordance with the international form and also use 95% confidence limits to indicate accuracy bands.
1.2	System Input Metering	Most of our system input is not metered	Not all, but > 50% of our system input is metered	Our system input is metered but we are not sure about the accuracy of these (partly old) meters	Our system input is metered with mechanical and/or magnetic flow meters that are rarely calibrated	Our system input is metered with magnetic flow meters that are regularly calibrated
1.3	Pressure Monitoring	We do not have any pressure recorders installed	We have a few pressure recorders at pumping stations and treatment plants installed	We have a few pressure recorders at pumping stations and treatment plants installed and sporadically measure pressure in the distribution network with pressure gauges	We have a few pressure recorders at pumping station and treatment plants and sporadically measure pressure in the distribution network with pressure loggers	We have permanently installed pressure loggers and continuously monitor pressure in the distribution network
1.4	Maps/GIS	We do not have maps at all	The maps we have are not updated	We have started to update our maps	Our maps are updated but do not include GIS	We use GIS based on updated maps
2	Leak Repair Records					
2.1	Leak Repair Records	We have no records of leak repairs	The only way to know the number of leaks repaired is to look into the customer complaints book	We keep basic leak repair records that only tell us whether the leak was on a main pipe or a service connection	We keep detailed records that indicate location, pipe diameter, material and type of leak as well date of detection and duration of repair	We keep detailed records that indicate location, pipe diameter, material and type of leak as well date of detection and date and duration of repair and have linked this to our GIS
3	Performance Indicators					
3.1	Performance Indicators	The only PI used is % NRW	We have tried to calculate water loss performance indicators	We regularly calculate physical loss performance indicators	We regularly calculate physical and commercial loss performance indicators	We regularly calculate physical and commercial loss performance indicators and publish them in our annual report
4	Active leakage control					



Level		1	2	3	4	5
Issues	questions	Basic				High
4.1	Active leakage control	We only repair visible leaks.	We have leak detection equipment but we do not use it.	We do leak detection occasionally if there is a specific problem in an area.	We have started to do regular leak surveys.	We cover the network by leakage survey at least once a year.
4.2	District Meter Areas (DMAs)	We have no DMAs and have no plans to establish DMAs	We have started to establish the first DMAs	The first DMAs are established and we have already the first results	We have several DMAs and check and analyse inflow data sporadically	We have several DMAs and monitor flow and pressure on a regular basis
4.3	Leak Repair - Distribution Pipes (Repair Time)	We have no records and therefore don't know how fast our leaks repaired	Our average repair time is more than 7 days	Our average repair time is between 7 and 3 days	Our average repair time is between 3 and 1.5 days	Our average repair time is less than 1.5 days
4.4	Leak Repair - House Connections	We have no records and therefore don't know how fast our leaks repaired	Our average repair time is more than 14 days	Our average repair time is between 14 and 7 days	Our average repair time is between 7 and 2 days	Our average repair time is less than 2 days
5	Customer Metering					
5.1	Customer Metering	We have no customer metering	Only large customers are metered	We have started with universal customer meters but at present not all customers have meters installed	Nearly all of our customers are metered, except public fountains, stand pies and similar.	100% of our customers are metered
5.2	Customer Meter Replacement and Age	We have no reliable information on the age of our customer meters	Many of our customer meters are older than 10 years, we have not yet introduced a regular replacement policy	We only change meters if they are obviously not functioning anymore	We have a meter replacement policy but have not been able to change all meters so some of our customer meters are still older than 10 years	We strictly follow our customer meter replacement policy and replace ALL meters every 5 - 7 years
5.3	Customer Meter Class	All customer meters are class B	All customer meters are Class B and C	All customer meters are class C	All customer meters are Class C and D	All customer meters are class D
5.4	Customer Database	Our customer database has not been updated for a long time	We sporadically update our customer database	We are in the process of updating our customer database	We regularly update our customer database by house to house surveys and checks	We have an updated customer data base that is linked to the GIS.
5.5	Customer Meter Reading	We have no special system of controlling meter readers	We only rotate meter readers if we are suspicious of inaccuracies	We regularly rotate meter readers	We regularly rotate meter readers and make often spot checks	Our meter readers use handheld meter reading devices
5.6	Illegal Connections, meter tampering, bypasses	We have not made any assessment and have no program to deal with water theft	We occasionally detect illegal connections	We occasionally detect illegal connections and other forms of fraud	We have a thorough illegal connection detection program	We have a thorough illegal connection detection program and also try to identify bypasses

## APPENDIX II

Physical Loss Target Matrix (use with either ILI or l/conn./day & average pressure)						
Technical Performance Category	ILI	Physical Losses [Litres/connection/day] (when the system is pressurised) at an average pressure of:				
		10 m	20 m	30 m	40 m	50 m
Developed Countries	A	1 - 2	< 50	< 75	< 100	< 125
	B	2 - 4	50-100	75-150	100-200	125-250
	C	4 - 8	100-200	150-300	200-400	250-500
	D	> 8	> 200	> 300	> 400	> 500
Developing Countries	A	1 - 4	< 50	< 100	< 150	< 200
	B	4 - 8	50-100	100-200	150-300	200-400
	C	8 - 16	100-200	200-400	300-600	400-800
	D	> 16	> 200	> 400	> 600	> 800

## Physical Loss Performance Categories; Guide to Further Action

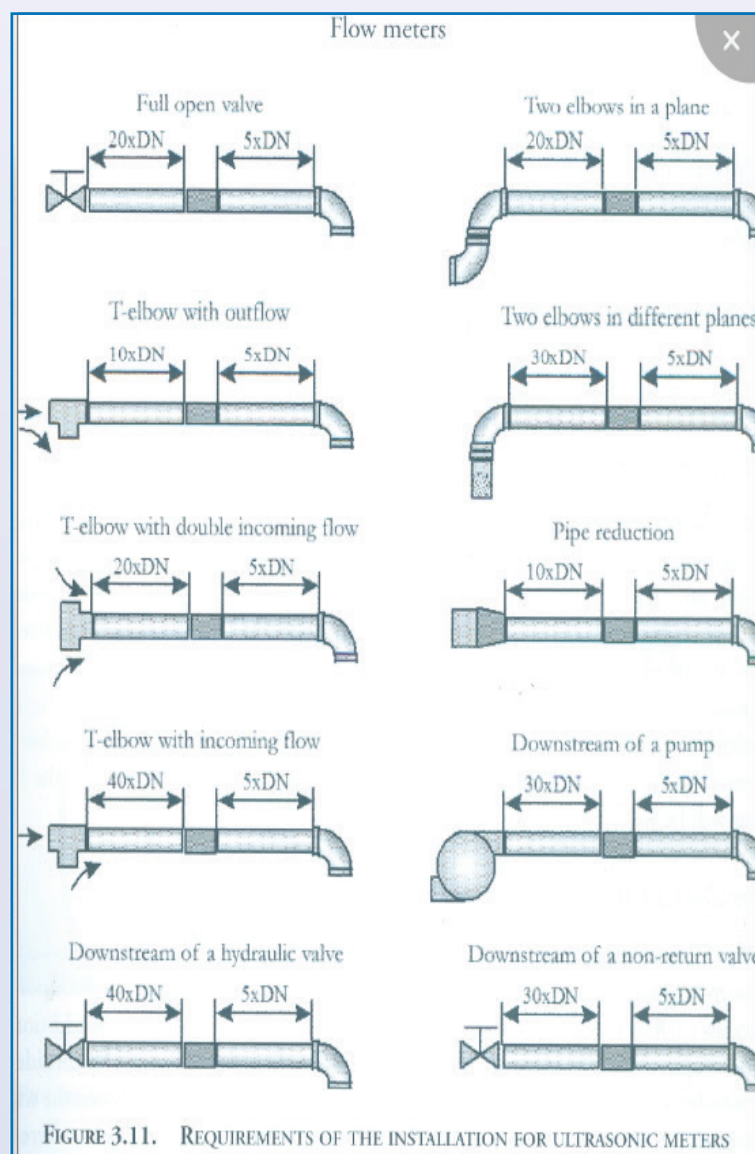
- Category A:**
  - Good; further loss reduction may be uneconomic; careful analysis needed to identify cost effective improvements
- Category B:**
  - Potential for marked improvements: consider pressure management, better active leakage control practices, and better maintenance
- Category C:**
  - Poor: tolerable only if water is plentiful and cheap; even then intensify NRW reduction efforts
- Category D:**
  - Terrible: inefficient use of resources; NRW reduction programs imperative and priority

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NRW - Performance Indicators

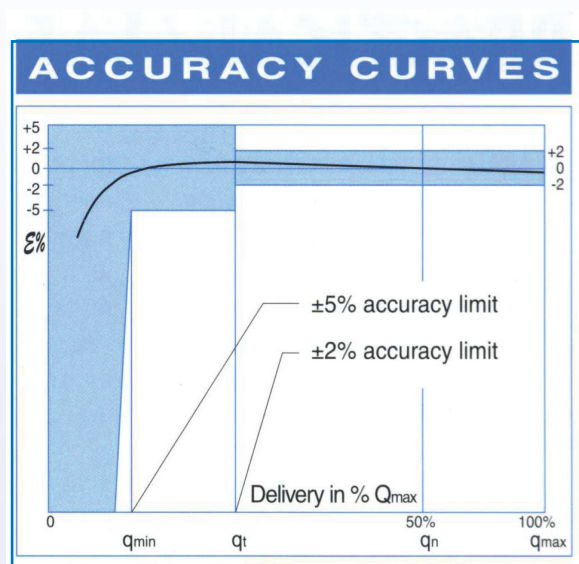
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## APPENDIX III





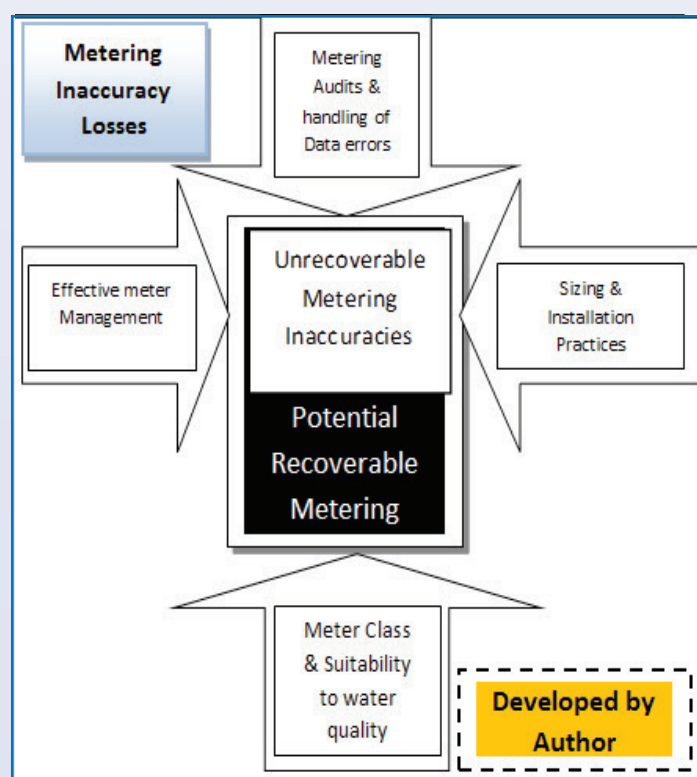
## APPENDIX IV

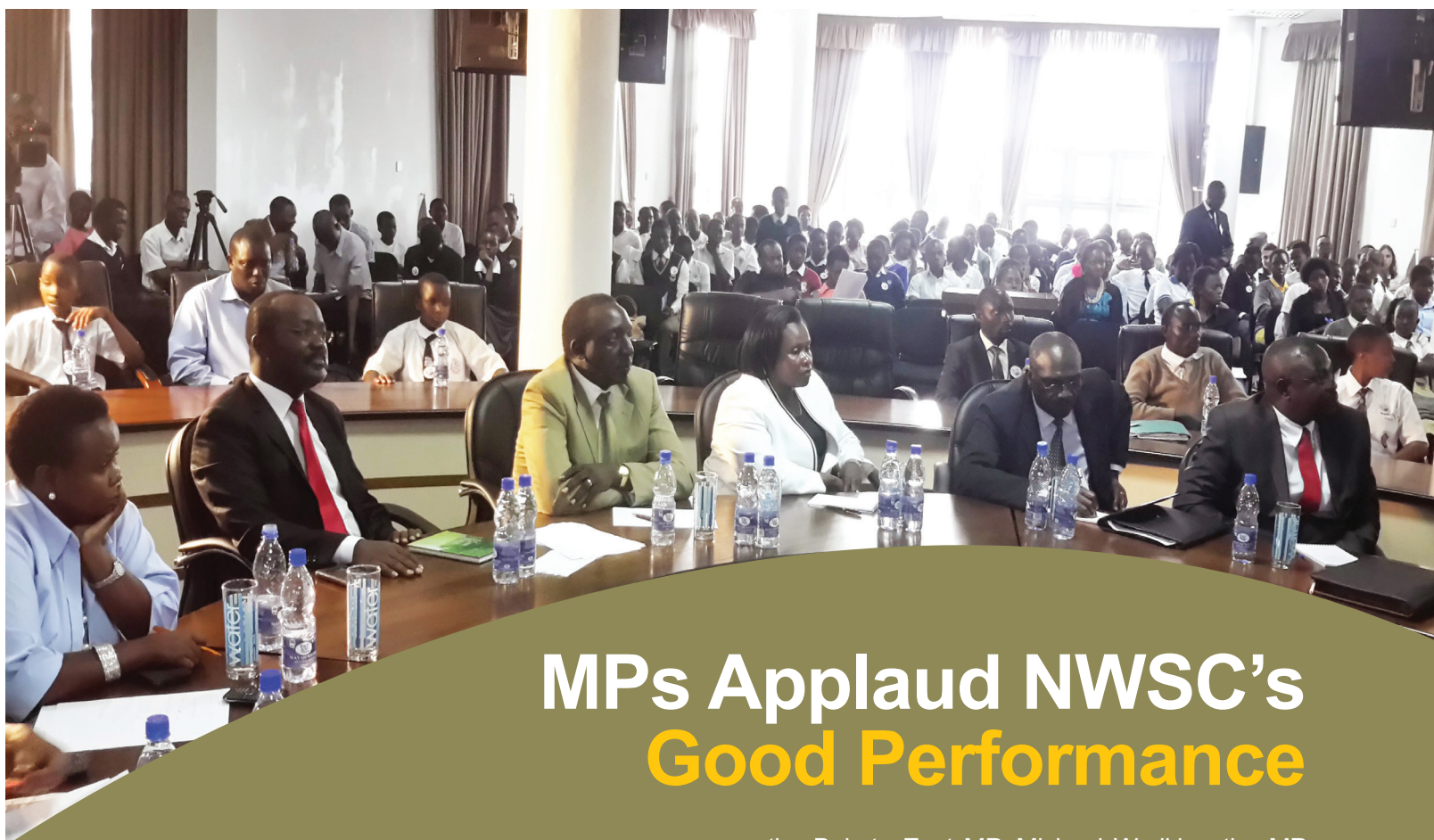


## APPENDIX V

40*	$Q_{max}$	12
	$Q_n$	6
	$Q_t$	1
	$Q_{min}$	0.35
	Approval	Class B/-0.1 bar
50	$Q_{max}$	30
	$Q_n$	15
	$Q_t$	3
	$Q_{min}$	0.45
	Approval	Class B/- 0.1 bar
80	$Q_{max}$	80
	$Q_n$	40
	$Q_t$	8
	$Q_{min}$	1.2
	Approval	Class B/ 0.1 bar
100	$Q_{max}$	120
	$Q_n$	60
	$Q_t$	12
	$Q_{min}$	1.8
	Approval	Class B/ 0.1 bar
150	$Q_{max}$	300
	$Q_n$	150
	$Q_t$	30
	$Q_{min}$	4.5
	Approval	Class B/ 0.1 bar
200	$Q_{max}$	500
	$Q_n$	250
	$Q_t$	50
	$Q_{min}$	7.5
	Approval	Class B/ 0.1 bar

## APPENDIX VI





## MPs Applaud NWSC's Good Performance

A group of Members of Parliament from two committees in Parliament; Natural Resources and that of accountability commended the good job being done by National Water and Sewerage Corporation of supplying water and managing sewerage in the country. The MPs made these comments after a visit of the Corporation's facilities in Lubigi and Ggaba on 16-17 December 2015.

The group also visited NWSC Bugolobi where construction of a new sewerage plant is currently underway. The Bugolobi plant will be the biggest in East and Central Africa and will not only treat sewerage but also generate power. This electricity will be used to power Ggaba Water Works. "From what we have seen so far, National Water is doing a good job," said Florence Namayanja,

the Bukoto East MP. Michael Werikhe, the MP for Bungokho South constituency said, MPs are interested in value for money. "From what we saw we can say that tax payers' money is being well utilized," Werikhe said.

Beatrice Atim Anywar, the woman Member of Parliament for Kitgum District said they [MPs] are ready to partner with the water body to manage the challenges faced by NWSC, so that it meets its objectives. Dr Eng Silver Mugisha, the Managing Director NWSC, said they were happy to host the MPs. "I urge all of you to help us on our journey to serving all Ugandans," he said. The water body is eyeing 100 % service coverage of all Ugandans in years to come. NWSC's customer base has grown from 50, 826 accounts in 1998 to 366, 097 accounts in 2014.



# NWSC Receives Golden European Award

Board and Management of NWSC today received The Golden Europe Award for Quality and Commercial Prestige at The InterContinental Hotel in Geneva. The award given by Otherways Management and Consulting of Paris officially accredited and awarded NWSC to receive the Total Quality Management Aptitude Seal for high quality performance and best customer service.

NWSC was represented at the Award by Board Chair, Dr Eng Christopher Ebal, Managing Director Dr Eng Silver Mugisha, and the Corporation Secretary, Ms Edith Kateete. The award ceremony was attended by industry players and business executives from over 40 countries according to the event organisers.



Holding the award is Board Chairman, Dr. Eng. Christopher Ebal, MD-NWSC, Dr. Eng Silver Mugisha, and Corporation Secretary, Ms. Edith Kateete at the award ceremony in Geneva.





## End-of-Year Thanksgiving









# How Should Utilities Tackle the NRW Problem?

by Editorial Team

## Background

More than 40 % of water produced in many African utilities, does not earn any revenue. It is either lost before reaching the customer or is not being billed or both. Water losses increase: (i) operating costs, (ii) contribute to poor service quality and coverage, (iii) make investments in capacity augmentation larger, and (iv) reduce cash generation.

For instance in 2010, conservative estimates suggested that National Water and Sewerage Corporation (NWSC) was losing close to US\$ 30 billion or more, annually. This was partly attributed to parts of the network being old, and commercial losses. This compounded the great need to redress the problem of non-revenue water (NRW).

Part of the problem is that many utilities failed to intelligibly manage their networks in line with international best practices. Some parts of their networks are old and hydraulically unstructured, they continue to expand them in an unstructured way. Neither do they have a reliable network information system, nor do they know the extent of water losses in the network, do not know the pressure variations in the network, do not know the type of meters in the network, do not know how much water is entering or leaving the reservoirs, because their bulk meters do not work, do not fully know who is connected to the network. The list of unknowns is baffling, to say the least.

Without taking control of utility networks, it is not possible to implement systematic and sustainable actions to control losses. We have therefore resigned ourselves to erratic and irregular technical exercises involving only repair of reported leaks or bursts.

It is against this background that utilities need to conduct pilot studies (action research) in at least two (2) discreet zones – district metered areas (DMAs) – to demonstrate the impact of applying best practice network management on NRW reduction. The results of the pilot study could be subjected to peer review, to enable reviewers assess the business relevance and proposed research approaches, so that guidance can be provided to the research team and go or no-go decision can be made.

Management of water distribution systems is becoming more and more sophisticated with increasing demands for not only keeping the system in good condition, but to do so in an optimal manner. Any water distribution system ought to be used to its full economic potential, not just its technical lifetime. Therefore, every utility needs to have a sound and robust strategy to manage its water distribution network.

NRW is considered the biggest problem facing the water supply industry in Africa and beyond. The World Bank estimates that the total cost of NRW to utilities worldwide is USD \$ 14 billion per annum. With the availability of suitable water supplies being depleted and rising costs in treating and transporting water, NRW adds a severe burden to water management for urban water supplies.

Also, NRW results in billions of dollars wasted in terms of both running and capital expenditure costs – NRW is detrimental to the financial viability of any

water utility company.

## Why is Struggle with NRW Reduction?

- Complex problem – not analysed and not fully understood. Difficult to make a convincing case for investment in NRW reduction activities.
- Failure to make use of the already existing hydraulic zones, in order to analyze the NRW problem better.
- Unclear accountability – too much bundling.
- Perceived lack of comprehension for the long term effect of water losses. Reluctance to allocate sufficient resources to NRW reduction activities.
- Failure to realise that NRW reduction is: (i) not just an isolated technical problem; (ii) tied to overall asset management and operation; (iii) not a one-off activity, but one requiring long term commitment.
- Poor O&M practices.
- Use of inappropriate indicators for NRW.
- Lack of a sound policy and strategy for water loss management.

## What is about Network Management?

Network management refers to the activities, methods, procedures, and tools that pertain to the operation, administration, and maintenance, of a networked system.

Operation – deals with keeping the network up and running smoothly. It includes monitoring the network to spot problems as soon as possible, ideally before users are affected.

Administration – deals with keeping track of resources in the network and how they are assigned.

Maintenance – is concerned with performing repairs and upgrades. Maintenance also involves corrective

and preventive measures to make the managed network run “better.”

## Records

- System maps of various scales and detail – need to know your network.
- Documents detailing the location of individual service taps, valves, mains, hydrants, pumps, wells, washouts, etc.
- Periodic fixtures condition survey records.
- Transactions against these assets such as failures, maintenance repairs, etc.
- Customer information which carries billing history.

## Problems in Distribution Networks?

- Intermittent supply and poor pressure due to low carrying capacity of facilities, equipment failure, power outages, etc.
- Burst on mains/service pipes due to pressure surges, corrosion, inferior materials, ground movement, exposed pipes, etc.
- Buried or un-locatable valves.
- Colored water due to inadequate treatment, pipe ageing characteristics, external contamination.
- Poor plumbing works at customers' premises.

## Corrective Maintenance

Maintenance activities undertaken to detect, isolate, and rectify a fault/failure so that the failed system can be restored to its normal operable state.

## Preventive maintenance

Maintenance activities that involve systematic inspection, detection, correction, and prevention of incipient (beginning to come into being) failures,



before they become actual or major failures – a form of Planned Preventive Maintenance (PPM)

Proper operation and maintenance (O&M) is a key remedy to addressing network problems

The O&M of the water distribution system includes upkeep of:

- Pipes such as ductile iron (DI), high density poly-ethylene (HDPE), un-plasticized polyvinyl chloride (uPVC), asbestos cement (AC), galvanized iron (GI), etc
- Storage tanks
- Valves and appurtenances
- Booster pumps

## O&M Activities

- Water pipe flushing
- Water mains repair and replacement
- Valve service, repair, maintenance
- Storage tank maintenance
- Pump maintenance

## Water Pipe Flushing

- Performed to remove any accumulated sediments or other impurities which have been deposited in pipes.
- Improves the quality and flow of water through the distribution system, allowing it to work at capacity
- Performed by isolating sections of the distribution system and opening washout (flushing) valves or more commonly fire hydrants to cause a 'large' volume of flow to pass through the isolated pipeline and so suspend and flushed out the settled sediment
- Water mains may also be mechanically cleaned through the use of swabs or pigs which are devices that are pulled through a section of line

that scrap the accumulated debris off the inside of the pipe

- o 'Not to be overdone' – need to control NRW

## Water Mains Repair and Replacement

- Done to replace, repair, or resize broken, corroded, or leaking sections of pipe
- A broken pipe section is either replaced or a repair sleeve is placed around the outside of the broken pipe section and clamped into place
- Newly replaced and constructed mains are pressure tested to ascertain resilience
- Following the repair of the pipe, the line is typically flushed and then disinfected with a chlorine solution – procedures are key!
- The chlorine solution is usually mixed on site with powdered calcium hypochlorite or sodium hypochlorite

## Valves Service, Repair and Replacement

- Done to replace, repair, or service leaking or damaged valves
- Ensures valves are easily locatable; markers, chambers, etc
- Planned preventive maintenance (PPM) program for valves should be put in place
- Documentation!

## Storage Maintenance

- Storage facilities have to be washed regularly to ensure good water quality
- Requires frequent inspection and may require occasional repairs
- Most frequent types of repairs are; repainting tanks and replacing screens over vents and other points of access for insects, birds, and



rodents

- Steel tanks are subject to corrosion – should be repainted regularly
- Storage facilities should be well maintained and out of bounds to unauthorized personnel

## Booster Pump Maintenance

- Pump maintenance done to ensure booster and other distribution system pumps stay in good working condition
- Maintenance of the pumps involves; checking the pumps regularly for excessive vibration or noise, greasing and lubricating (servicing) regularly, and checking pump bearings and packing glands
- PPM program should be in place
- Booster stations should also be well maintained and out of bounds to unauthorized personnel

## Other Solutions

- Proper choice of pipe materials for use in the transmission and distribution networks
- Establishment of leakage detection and control mechanisms (an active leakage handling policy)
- Maintain system records for effective network management and for future planning – design criteria
- Proper Analysis of the nature of failure so as to recommend appropriate solutions
- Remedial action will depend upon the nature of problems and the availability of financial resources, both short and long term
- Adoption of a comprehensive asset management and renewal policy
- Network planning – social economic land mapping

## Viable Objectives of the Pilot

- The overall objective of any viable pilot study should demonstrate (through at least two discreet DMAs) how best practice network management can have an impact on NRW

reduction. This helps to lay the ground work for future technical and administrative unbundling of the entire network to make individual administrative zones accountable for the water entering their DMAs and territorial zones.

- The network management approach should encompass both technical aspects (i.e. improved network operating practices and maintenance, active leakage control, network zoning, hydraulic modelling, pressure management, enforcing best practice technical standards and quality management systems, etc) and institutional issues (i.e. internal organizational structure and reform, change management, staff capacities and accountability).
- The pilot study must serve to provide a demonstration and justification for the adoption and extension of best practice network management techniques and procedure to the entire supply system in order to reduce NRW levels and release access to additional self-generated revenue.
- The scope of the work ought to involve (i) diagnostic work to gain a better understanding of the reasons for NRW in the selected network zones, and the factors which influence its components; (ii) investigating the wider institutional issues and bottlenecks affecting NRW management; and (iii) developing and piloting techniques and procedures tailored to the specific characteristics of the network zone and the influencing factors, to tackle each of the components in order of priority.

## Methodological Approach

- The pilot study could be conducted in two phases: the investigative phase and the action phase.
- Investigative Phase: This could start by selecting at least two DMAs – under the existing utility administrative and technical set-up. The selection criteria is envisaged



to include: (i) branched and looped DMA systems – so the inflow to the zone and hence also the achieved reduction of losses can easily be monitored, (ii) reasonable hydraulic pressures not less than 5 m, (iii) considered to have significant NRW losses, and (iv) size of the DMAs ought to be approximately 1500 connections, and above.

- Proper computations of water balances for the selected DMAs must be done in order to determine how much (and where) water is being lost. This usually involves measuring the different components of water losses using best practice estimation/measurement techniques, meter calibration and meter checks and customer investigations.
- Next, pilot research team ought to conduct comprehensive reviews of the network operating practices to understand the reasons for NRW in the pilot DMAs, review current practice and methodologies used for operating and managing the network, including: (i) the facilities for monitoring flows, pressures and reservoirs, (ii) the level of technology available for monitoring and detecting leakage, and (iii) staff skills and capabilities. At this stage, there is need to interview senior and junior operational staff on current management practices, perceptions, financial and organisational constraints and influences. Discussion of water system features and current practice is necessary, including physical data, drawings and records, flow measurements or estimate, techniques and equipment.
- Following the above interventions/scope and investigations, the pilot team must develop a strategy, fully costed action plans (short-term and long-term plans, and a defensible cost-benefit analysis), and standard operating procedures for

combating NRW in the pilots DMAs. They should also assess investment needs in network upgrading, effective metering, network information systems (including GIS), active leakage control and monitoring, and pressure management. The strategy and action plans ought to also include recommendations for policy and institutional changes and the timeframes for implementation of these changes.

- **Action Phase:** During this phase, the pilot project teams could work with utility management in the selected pilot DMAs to implement the developed strategies and action plans, so as to scientifically measure the impacts of the various interventions.

#### 1. Expected Results

- Any sound NRW reduction pilot study must serve to provide a demonstration and justification for the adoption and extension of best practice network management techniques and procedures to the entire utility network in order to reduce NRW levels and release access to additional self-generated revenue.
- These proposals herein could probably provide some sound rationale, and first steps for technical (hydraulic) and administrative unbundling of any unstructured utility network to increase water loss accountability.





Dr Ebal (centre) receives the award.

## NWSC Board CHAIRPERSON AWARDED LIFE TIME ACHIEVEMENT AWARD

The National Water and Sewerage Corporation Board Chairperson Dr Eng Christopher Ebal was awarded a life time achievement award in Corporate Management for the great works he is doing in his current position as Head of Infrastructure of the Uganda Judiciary (1998–todate), and for the fundamental changes he has spearheaded as Chairman, NWSC Board of Directors 2013–todate.

The Award was handed over to Eng. Ebal during the St. Marys College Kisubi Old Boys Association annual re-union Gala held at City Royale Hotel, Kampala. Some notable achievements Dr Eng Ebal has championed in his tenure as chairman NWSC Board include:

- Expansion of NWSC geographical coverage from 28 towns as of June 2013 to 66 towns as of June 2014.
- Restructuring of NWSC operations (infrastructure development plan 2013/2014; roll out of restructuring action plan 2014/2015).
- He has over seen the NWSC service expansion drive from less than 200 km of water extensions p/a to 900 km – 1000 km per annum.
- Towards ensuring abolishing of dry zones within the Kampala Metropolitan Service Area, there is ongoing expansion of the NWSC Gaba Water Works intended to increase water supply to areas within Kampala currently suffering cases of low pressures and no water.

The team at NWSC congratulates the Board Chairperson for this great achievement.



## NWSC–MD Elected on IWA Board



The International Water Association (IWA) organizes high-profile World Water Congress and Exhibition every two years. This year's Congress was the 9<sup>th</sup> IWA World Water Congress and Exhibition. It was held in Lisbon, Portugal and attracted over 5,000 high profile participants. Many were IWA members.

These individuals and companies represent every aspect of the water cycle, from research to practice. They work in all facets of water, from big-picture issues such as conservation of water resources, through to the science and management of practicalities such as drinking water, wastewater and storm water.

During this high profile event, the MD, Dr Eng Silver Mugisha was elected to the Board of IWA. This monumental election to the board is in recognition of National Water and Sewerage Corporation's efforts in fuelling the increase in service delivery and expansion to more areas in Uganda.

Congratulations to the MD, and thanks for keeping the Uganda flag high.

## NWSC WACOCO meets central division councilors

National Water and Sewerage Corporation met with Kampala Central division councilors under its WACOCO program, at Mt Zion Hotel. This is part of NWSC's commitment to stakeholder engagement. During the meeting, NWSC emphasized more cooperation between them and KCCA.

Present at the function was the Kampala central division Town Clerk, Catherine Musingiirwe, Kampala Central Division Mayor, Mr. Godfrey Nyakana and Mr. Salim Uhuru, among others.

The meeting was aimed at bringing communities closer to NWSC and its operations. NWSC thus decided to involve councilors, so that they in turn could go on and sensitize their people about NWSC programs like the Water Committee Communication Clubs (WACOCO), and Water Loss and Prevention Unit (WALOPU), ongoing projects like extensions and challenges being faced by the Corporation. Feedback was also a major driver behind the dialogue.

During the Q&A which usually characterizes these meetings, councilors and other stake holders asked NWSC staff present at the meeting a number of questions mainly regarding sewer services.

The town Clerk, Catherine .B. Musingiirwe asked what was being done to subsidize sewerage service systems especially in places like Kisenyi. To this, Gerald Ahabwe, Manager pro poor said that NWSC has a number of pro poor initiatives going on. "As long as you are within 50 metres of an existing connection, NWSC will connect you for free," he said. "Public water points have also been set up and subsidized to allow genuine low income customers access services as 3000 prepaid meters are being rolled out," he added.

Councilor Peter Azo, also present during the dialogue noted that NWSC earns money from the sewerage and queried whether there was a way the community could benefit from some of







A cross section of councillors during the dialogue.

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these earnings. “What are the collections made by NWSC spent on so that communities can be sensitized,” he asked. “It may motivate the community not to cheat NWSC,” he added. To this, Angello Kwitonda, the Principal Engineer Sewerage Services, said that NWSC abstracts its water from Gaba. “If one were to transport their water personally from Gaba, the cost would be much higher than the current. We provide you with 1,000 litres (50 jerrycans) of treated water at about US\$ 2000,” he said. “The money collected thus goes into treating water from Gaba, and is delivered through pipes, all the way to your taps,” he added.



KW Staff respond to questions from councillors.





# NWSC Wins Procurement Award

NWSC was recognized as one of the best performing entities in public procurement and disposal of public assets in the Country for the Financial Year FY 2013–2014.

The official recognition and award giving ceremony took place during the 7<sup>th</sup> East African Procurement Forum (EAPF) in Nairobi Kenya on 19<sup>th</sup> November 2014. The EAPF is an annual event hosted by the Public Procurement Regulatory Authorities for all the East African Community countries.

Congratulations go out to all the teams that made this award possible. Special thanks go to the Board of Directors, Managing Director, and Management for the continued strategic guidance.



## Pictorial...





## *Pictorial...*

### Kampala Water (KW) takes part in Corporate Social Responsibility (CSR) with Daily Monitor and Police





## *KW CSR in Pictures, Cont'd...*





## KW CSR in Pictures, Cont'd...





## *KW CSR in Pictures, Cont'd...*





## Pictorial...

### Nakawa Vocational Training Institute (VTI) staff hold a collaborative visit at the NWSC Vocational Skills Development Facility (VSDF), Gaba.



Exchange in the VSDF workshop



A walk to the Gaba II water works, and laboratory



Discussion and illustration of the VSD practical aspects

The Nakawa VTI five-man team, led by the deputy principal, Mr David Mubiru, was given a guided tour of the NWSC-VSDF by Dr Martin Kalibbala (Manager-Training and Capacity Development, M-TCD), who explained to them the vocational skills development (VSD) initiative of the Corporation.

They jointly discussed possible and future portals of combining synergies for mutual benefit. Herein is a pictorial of the visit.



M-TCD explains the NWSC-VSD training model to the VTI team



## Pictorial, Cont'd...



Discussions in the Nakawa VTI workshops (electrical and mechanical)



Discussions in the Gaba II pump houses



M-TCD exchanging ideas on VSD initiatives with the Principal, Nakawa VTI



Joint discussions at IREC, Bugolobi





## NWSC – FIELD MANAGERS' PHONE LIST

Switch Board / Reception NWSC Location: Plot 39 Jinja road Box No: 7053 Kila	100	0414-315000 0414-315100
Switch Board / Reception Kampala Water Location: 6 <sup>th</sup> Street industrial area Box No: 70255 Kila	500 501	0414-315500 0414-315501
Call Center toll free lines		0800100977 0800200977 0800300977
E-mail: <a href="mailto:info@nWSC.co.ug">info@nWSC.co.ug</a> Website: <a href="http://www.nWSC.co.ug">www.nWSC.co.ug</a>		
eTAX TIN 1000023440 for Kampala Water		

### BRANCH 1 - CITY CENTRE (601,602,605,604)

Name	Designation	CUG	Mobile
Josephine Oryem	Branch Manager ( 0414-315601 )	0717-316650	
Joseph Micheal Okoth	Branch Engineer	0714019342	

### BRANCH 2 - NSAMBYA (613, 610)

Name	Designation	CUG	Mobile
Deogratius Serumaga	Branch Manager ( 0414- 269478 )	0717-316655	
Gilbert	Engineer	0714-019347	0700647442/ 0774538392

### BRANCH 3 - NAJJANANKUMBI (630,631)

Name	Designation	CUG	Mobile
Margaret Apoto	Branch Manager (0414-266318)	0717-316181	0772-365699
Tom Mbaziira	Branch Engineer	0717-314118	

### BRANCH 4 - BWAISE (640,642,646)

Name	Designation	CUG	Mobile
Zamh Musoke	Branch Manager (0414-566863 )	0717-316685	
Pamela Besigye	Branch Engineer ( 0414-289100 )	0717-316631	
Peter Ariho	Engineer	0715-114405	

### BRANCH D – KYALIWAJJALA (594)

Name	Designation	CUG	Mobile
Agnes Aketch	Sub Branch Manager (0414-597981)	0717-316846	0714-677074
Joseph Lubega	Engineer	0715-114469	

### BRANCH E - KASANGATI (518)

Name	Designation	CUG	Mobile
Freda Bugenyi	Branch Manager ( 0414-597562 )	0717-316661	
Huzaira Nalwoga	Engineer	0714-648509	

### BRANCH F – KANYANYA (657)

Name	Designation	CUG	Mobile
Ataro Joyce	Branch Manager (0414-568833)	0717-316680	0772-437416
Emmanuel Okello	Engineer	0714-019340	

### BRANCH G - MATUGGA (584)

Name	Designation	CUG	Mobile
Byansi Robert	Branch Manager (414-662200 )	0717-316645	0772-587252
John Speke Oryem	Engineer	0717316838	

### BRANCH H - SALAMA

Name	Designation	CUG	Mobile
Adam Nabusagu	Sub Branch Manager (0414-597982)	0717-316620	
Raymond Can Ogura	Engineer	0715114474	

### BRANCH J – KYENGERA (583)

Name	Designation	CUG	Mobile
Moses Akanyijuka	Branch Manager (0414-597964)	0717-316682	0712-801785
Akello Edith	Engineer	0715114366	

### BRANCH L - NDEJJE

Name	Designation	CUG	Mobile
Danstan Peko	Branch Manager	0717-315434	

### BRANCH 5 - NTINDA (650,652)

Name	Designation	CUG	Mobile
Omoding Apollo	Branch Manager ( 0414-285174 )	0717-316647	0772-561123
Charles Odeke	Engineer	0715-114465	

### BRANCH 6 - NAKAWA

Name	Designation	CUG	Mobile
Sharon Karungi	Branch Manager ( 0414-223087 )	0717-316630	0772-478462
Vitalis Wangoda	Branch Engineer	0714-648506	0773-142536

### BRANCH 7 - NAKULABYE (670, 671, 648)

Name	Designation	CUG	Mobile
Nelly	Branch Manager ( 0414-255065 )	0717-316542	0782-433044
George Alunga	Engineer	0715-114452	

### BRANCH 8 - NATETE (680,682)

Name	Designation	CUG	Mobile
Annet Kukunda	Branch Manager ( 0414- 271704 )	0717-316690	0772-588555
Sam Kigunddu	Branch Engineer	0715-114406	

### BRANCH 9 - NANSANA (690, 692)

Name	Designation	CUG	Mobile
Ronald Odhiambo	Branch Manager ( 0414-535701 )	0717-316612 0714-612863	0752-612863
Steven Walakira	Engineer	0714-019303	0702-070257

### BRANCH A - BUNGA (538)

Name	Designation	CUG	Mobile
Gloria Bashemera	Sub branch Manager	0717-316662	0772-657389
Collin Bosa	Engineer	0714648502	0792238873

### BRANCH B – MUKONO (696)

Name	Designation	CUG	Mobile
Process Ahabwe	Branch Manager (0414-290860)	0717-316516	0772-437416
Brian Agaba	Mukono Engineer	0717-316713	

### BRANCH C - KIREKA (669)

Name	Designation	CUG	Mobile
Helen Ejang	Branch Manager	0717316873	

### BRANCH M – LUZIRA (660,662, 585)

Name	Designation	CUG	Mobile
Ampumuza Joy	Branch Manager	0717-316602	0776-518462

### BRANCH N - SEETA

Name	Designation	CUG	Mobile
Christine Awino	Branch Manager	0717-316553	

### BRANCH P – BULENGA

Name	Designation	CUG	Mobile
Joselyn Kobusingye	Branch Manager	0717-316589	

### BRANCH R - MASANAFU

Name	Designation	CUG	Mobile
Ruth Bitaroh	Branch Manager	0717-316635	

### URBAN POOR - 693

Name	Designation	CUG	Mobile
Gerald Ahabwa	Manager (0414-373515)	0717 -316757	
Ronald Bitwire	Engineer	0717314113	

### AREAS

Area	Name	Direct No.& CUG	Mobile
Apac			
Apac Manager	Andrew Manson	0717-316549	0774-125067
Arua		0392-672979/ 39-701672	
Manager	Badru	0717-315850	
Senior Engineer	Lambert Tabu	0715-114372	
Budadili			
Budadili Manager	Charles Maseye	0717-315143	
Bombo			
Bombo Manager	Musana Stephen	0717-316886	0712-841506 /0704-741506



## NWSC – FIELD MANAGERS' PHONE LIST

Bombo Engineer			
<b>Bugembe</b>			
Manager			
Engineer			
<b>Bushenyi</b>		<b>0485-42339</b>	
Manager	Kateeba Francis	0717-316887	0772-603499
Engineer	Geofrey Dwoka	0715-114466	0700-802174
<b>Entebbe</b>		<b>0414-320706, 321692</b>	
Entebbe Manager	Jackson Turyahurira	0717-315361	0772-466473
Entebbe Engineer	Ojok Anthony	0717-315470	
<b>Fortportal</b>		<b>0483-427793, 0392-548331</b>	
Fortportal Manager	Tibenda John	0717-315261	
Fortportal Engineer	Paul Semakula	0714019298	0782-070257
<b>Gulu</b>		<b>0471-32381</b>	
Gulu Manager	Paul Rachkara	0717-315343	
Gulu Engineer	Nyeko David	0717-315462	
<b>Hoima</b>		<b>0465-44686</b>	
Area Manager	Moses Nandigobe	0717-316830	0713-410211
Hoima Engineer	Julius	0717314275	
	Judith	0717-315277	
<b>Ibanda</b>			
Ibanda Manager	Didas	0717-316367	0777-666466
Ibanda Engineer	Andrew Bwenje	0714-971877	
<b>Iganga</b>		<b>043-120531, 120285</b>	
Iganga Manager	Isagala Paul	0717-315378	
Iganga Engineer	Kyalibona	0717-315487	
	Mbowa James	0717316856	
<b>Jinja Area</b>		<b>043-121150, 122052</b>	
Jinja GM	Nicholas Mwebaze	0717-316696	0772-387654
Manager	Peter Mark Opedun	0717-315966	
Engineer	Kitakuffe Ronald	0717-316698	
Engineer	Jacqueline Bagonza	0715-114367	
<b>Kiryandongo</b>			
Area Manager	Wilson Nyegirire	0717-316064	
Engineer			
<b>Kisoro</b>			
Area Manager	Allan Kakwezi	0717-315445	0702224111
Area Engineer	Robert Mukasa	0717-316145	
<b>Kitgum</b>			
Area Manager	Stephen Gang	0717-315282	
Area Engineer	Samson	0717-316921	
<b>Lira</b>		<b>0473-20111, 203111</b>	
Lira Manager	Walusimbi Mpanza	0717-315862	
Lira Engineer	Lawrence Mutawe	0717-315585	
<b>Lugazi</b>			
Lugazi Manager	Lydia Kibasomi	0717-315403	
Lugazi Engineer	Mushabe Charles	0717-315474	
<b>Luwero</b>			
Area Manager	Ronald Kisakye	0717-315332	
Engineer			
<b>Lyantonde</b>			
Lyantonde Manager	Abbey Serunkuma	0717-316771	0751-618732
Engineer			
<b>Masaka</b>		<b>0481-20561</b>	
Masaka Manager	Joseph Mugenyi	0717-315395	
Branch Engineer	Kikoyo Joseph	0717-315951	
<b>Masindi</b>		<b>0465-20607</b>	
Masindi Manager	Nelson Okwi	0717-315270	0772-494236
Masindi Engineer	Norbert Busobozi		0782-802823
<b>Mbale</b>		<b>045-4433709, 4433742</b>	
Mbale Manager	Emanuel Ekanya	0717-315425	
Mbale Engineer	Omara Francis	0717-316118	
<b>Mbarara</b>		<b>0485-421547</b>	
Mbarara Manager	David Opoka	0717-315391	0772-468828
Mbarara Senior Engineer	Emmanuel Mujuni	0717-316066	0702-611132
Engineer	Viola Aine Amwine	0715-114461	

## NWSC – FIELD MANAGERS' PHONE LIST

<b>Kabale</b>		<b>0486-315380/ 381</b>	
Kabala Manager	Nelson Otai	0717-316673	
Kabale Engineer	Bugembe Hajab	0717-316986	
<b>Kabwohe</b>			
Area Manager	Deus Akoromwiguru	0717-315468	
Engineer			
<b>Kajjansi</b>		<b>0414-200351</b>	
Manager	Fred Busingye	0717-315747	
Engineer	Slyvia Takali	0717-317172	
<b>Kaliro</b>			
Area Manager	Paul Isagala	0717-315378	
Engineer	Kayeyera Bernard	0714-839171	
<b>Kalisizo</b>			
Manager	Clare Namatovu	0717-316556	
Engineer			
<b>Kamwenge</b>			
Kamwenge Manager	Innocent Kansiime	0717-316802	0703-089784 /0782-895020
Engineer			
<b>Kanungu</b>			
Area Manager	Bernard Kabangira	0717-315304	
Eng	Rwanyarare William	0715-114402	
<b>Kasese</b>		<b>0392-548282</b>	
Kasese Manager	Brian Ampeire	0717-316377	
Kasese Engineer			
<b>Kawuku</b>		<b>0414669550</b>	
Manager	Prossy	0717-317065	
Engineer			
<b>Kigumba</b>			
Area Manager	Patrick Otim	0717-315954	
Engineer			
Engineer	Jimmy Mwebaze	0717-315464	
<b>Mityana</b>			
Mitiyana Manager	Charles Sseku	0717-316621	0787-717148
TS	Wamala Paul	0717-315386	
CA	Awor Benna	0717-315708	
CA	Lillian	0714-019242	
<b>Mubende</b>		<b>046-44986</b>	
Mubende	John Opolot	0717-315839	0772-527255
Mubende Eng	Agaba Andrew	0715-114417	0702-790481
<b>Nebbi</b>			
Area Manager	Denis Etonu	0717-315681	
Area Engineer	Gerazio Tukahirwa	0717-316067	
<b>Pader</b>			
Area Manager	Max Ommut	071-315274	
Eng	Peter Edyau	0717-314137	
<b>Paidha</b>			
Area Manager	Gerazio Tukahirwa	0717-316067	
Engineer			
<b>Rukungiri</b>			
Area Manager	Joseph Nyimalema	0717-315842	
Engineer	Samuel Akol	0715-114444	
<b>Sironko</b>			
Area Manager	Sam Barigye	0717-315682	
Engineer			
<b>Soroti</b>		<b>045-61968, 61306</b>	
Soroti Manager	Connie Nagimesi	0717-315440	
Soroti Engineer	James Tumwesigye	0715-114409	
<b>Tororo</b>		<b>045-4445105, 4445172,</b>	
Tororo Manager	Charles Okuonzi	0717-315522	
Tororo Engineer	Fred Etednal	0717-315348	
<b>Wakiso</b>			
Manager	Peter Oburu	0717-316669	
Engineer	Charles Echoku	0717-315488	
<b>Wobulenzi</b>			
Manager	Benon Niyoyita	0717-315275	



## NWSC-INTERNATIONAL RESOURCE CENTRE (NWSC-IREC)

a newly constructed state-of-the-art facility. Plot M11, Old Portbell Road, Bugolobi Kampala

### Services Offered at the NWSC-IREC Facility Include:

- \* Hosting of Conferences (local and international)
- \* Hire of facilities to corporate companies (for workshops, trainings, local exhibitions, meetings, professional debates, among others)
- \* Practical advisory services (performance improvement initiatives, vocational skills development, process benchmarking, etc)
- \* Hire and usage of state-of-the-art video conference facilities, and Business centre, knowledge management and library services
- \* Technical assistance
- \* Capacity building initiatives.



NWSC-IREC Facility Reservations and Enquiries: Do you want to make reservations and/or hire the facility? Please use the following contacts. Office phone(s): +256-414-315 100 (extns 111, 700, 720, 729) Mobile(s): +256-717-315 111, +256-782-489 304, +256-717-315 138, +256-712-270 019  
Email(s): [rose.kaggwa@nwsc.co.ug](mailto:rose.kaggwa@nwsc.co.ug), [betty.aliba@nwsc.co.ug](mailto:betty.aliba@nwsc.co.ug), [martin.kalibbala@nwsc.co.ug](mailto:martin.kalibbala@nwsc.co.ug)



"the customer is the reason we exist"

NATIONAL WATER AND SEWERAGE CORPORATION

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