



# PLANNING FOR RESILIENCE IN EAST AFRICA THROUGH POLICY, ADAPTATION, RESEARCH, AND ECONOMIC DEVELOPMENT (PREPARED)

## WASH ASSESSMENT PHASE II: APPRAISAL AND BASELINE STUDY FOR JINJA AND ENTEBBE WASH SITES IN THE REPUBLIC OF UGANDA



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COVER PHOTO: A map showing the improved water supply in the provinces of the Republic of Uganda.

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SITES IN THE REPUBLIC OF UGANDA

SEPTEMBER 10, 2014

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# ACRONYMS AND ABBREVIATIONS

AC	Asbestos Cement
BOD <sub>5</sub>	Biochemical Oxygen Demand
CIESIN	Columbia University's Center for International Earth Science Information Network
DFCU	Deseret First Credit Union
DI	Ductile Iron
DMAs	District Metering Areas
DN	Diameter Nominal
DWD	Directorate of Water Development
EAC	East African Community
FABRI	Further Advancing the Blue Revolution Initiative
GCAP	Global Climate Adaptation Partnership
GIS	Geographical Information System
GS	Galvanized Steel
HDPE	High-Density Polyethylene
ICPAC	Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Center
ICT	Information and Communication Technologies
IDAMCs	Internally Delegated Area Management Contracts
IWA	International Water Association
KCB	Kenya Commercial Bank
LVB	Lake Victoria Basin

LVBC	Lake Victoria Basin Commission
MIS	Management of Information Systems
MWE	Ministry of Water and Environment
NDP	National Development Plan
NGOs	Non-Governmental Organization
NRW	Non-Revenue Water
NWSC	National Water and Sewerage Cooperation
PIP	Performance Improvement Program
PREPARED	Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development
PVC	Polyvinyl Chloride
QSIP	Quality Service Improvement Program
RCMRD	Regional Centre for Mapping of Resources for Development
RWASHTF	Regional WASH Task Force
SEREP	Service and Revenue Enhancement Project
TSS	Total Suspended Solids
UBA	United Bank for Africa
USAID	United States Agency for International Development
WASH	Water Sanitation and Hygiene
WEMA	Water and Environmental Management
WHO	World Health Organization
WSP	Water Safety Plan
WSSP	Water Supply and Sanitation Service Provider
WTP	Water Treatment Plant

# EXECUTIVE SUMMARY

## INTRODUCTION

During WASH Assessment Phase I (Regional WASH Outlook) in the East Africa partner states, it was noted that a detailed study is needed at the lower levels, where water utilities could be assessed in terms of their capacity to deliver quality water and sanitation services. Better understanding of water utilities would enable formulating interventions that are more specific, thus addressing utilities' real needs.

With understanding on the aforementioned situation, the Regional WASH Task Force (RWASHTF) met in Bujumbura, Burundi, February 11–13, 2014. Regional WASH site selection criteria was formulated and adopted for water utilities to be supported under the Planning for Resilience in East Africa through Policy, Adaptation, Research, and Economic Development (PREPARED) Project. This selection criteria looked at the following areas:

- Its location is within the Lake Victoria Basin (LVB).
- Population size (8,000 to 300,000 people in service area), including clusters
- Limited investments and access to water sanitation and hygiene (WASH) services;
- Area of high incidences of waterborne diseases and poverty
- Vulnerability to climate change
- Institutional and operational modalities [presence of water supply and sanitation service provider (WSSP) utility] in place and can be built upon
- The town is either significantly impacted by or significantly impacts Lake Victoria.
- Potential exists for quick win-win solutions

Based on the set criteria, Regional WASH Task Force members from Uganda selected three water utilities (Jinja, Bugiri, and Masaka) to be considered for PREPARED Project interventions. Later, the Government of Uganda replaced Bugiri with Entebbe. As an initial prioritized WASH sites assessment Phase II, the PREPARED Project undertook the exercise in two of the three priority WASH sites by the use of a sub-contractor, Water and Environmental Management (WEMA) Consult team accompanied by the WASH Task Force member from Burundi and the PREPARED Project WASH technical advisor. The exercise was undertaken June 2–9, 2014.

## BASELINE INFORMATION

The National Water and Sewerage Cooperation (NWSC)-Entebbe abstracts raw water from Lake Victoria at a rate of 14,590 cubic meters per day. The water treatment plant (WTP) has a capacity of treating 20,000 cubic meters per day. The system is designed to serve 216,750 people, although it's currently serving slightly more than its designed capacity (233,637 people). The total length of the distribution network is about 72 km for the trunk mains and 252 km for distribution lines, including consumer connections. Water supply coverage currently stands at 90%. NWSC-Entebbe also runs a centralized sewerage system for collecting, treating, and disposing wastewater generated from domestic, commercial, institutional, and industrial centers. The service coverage is 0.1% of the population served with water supply, while the sewer network covers an area of 7.5 square kilometers, which is equivalent to 7% of the whole utility service area. The remaining population (99.9%) uses on-site sanitation, mostly septic tank systems and pit latrines.

NWSC-Jinja's water supply is also abstracted from Lake Victoria, where the raw water is abstracted via a common diameter nominal (DN) 600 underground pipe to the WTP. The total average abstraction rate is estimated at 22,000 cubic meters per day. The treatment plant has a capacity of treating 30,610 cubic meters of raw water and producing an average of 20,000 cubic meters of treated water per day. The total length of the distribution network is about 520 km for the trunk mains and 511 km for distribution lines, including consumer connections. The challenges facing the two water utilities include low water production; low water supply coverage; poor urban planning, which limits network expansion; meter tampering; illegal connections; inadequate pressure management; and high non-revenue water.

NWSC-Jinja also operates the sewerage service. Current sewerage service coverage is estimated at 25%. The sewer network covers an area of 10 square kilometers. Those who are not connected to the sewerage system use on-site sanitation, such as septic tank systems (25%) and pit latrines (50%). The low sewerage service coverage is due to the high cost involved in sewer connection and high sewer tariffs, which are 75% of water tariffs.

In Uganda currently, there is no independent authority responsible for regulating water and sewerage service. Instead, the Ministry of Water and Environment (MWE), through its Directorate of Water Development (DWD), is responsible for providing overall technical oversight for planning, implementing, and supervising the delivery of urban and rural water and sanitation services across the country. DWD is also responsible for regulating the provision of water supply and sanitation and thus acts as "a player and referee" at the same time. Efforts to establish an independent regulatory authority are recommended.

Non-revenue water (NRW) is defined as water that is processed and supplied by a water utility that cannot be accounted for (i.e., water that is lost and cannot be paid for). NRW results from physical and commercial losses. In Jinja and Entebbe, factors that contribute to physical losses include leakages due to an aging pipe network; illegal connections; and unrecorded users. Factors responsible for NRW through commercial losses include meter reading errors; slow running meters; meter tampering; faulty meters; illegal connections; billing errors, and inefficient revenue collection.

During the past three years, NRW for Entebbe has increased from 11% in 2010–2011 to 23% in 2012–2013. For Jinja, NRW decreased from 25% in 2010–2011 to 23% in 2011–2012. Yet it increased to 42.7% in 2012–2013. The NWSC, in its Five-Year Strategic Direction (2013–2018), highlights an NRW-reduction action plan, which includes replacing bulk meters, faulty meters, and aging meters (7 years and older); close monitoring of big consumers and of accounts with declining or zero consumption; disconnections of suppressed accounts; and routine follow-up meetings to track progress on implementing area non-revenue reduction action plans.

As of December 31, 2013, NWSC had 341,511 connections, of which 303,019 (89%) were active accounts. Jinja's and Entebbe's total connections are 18,305 and 24,474, respectively. There are 17,010 active accounts in Jinja; inactive accounts were estimated to be 2,893, which is equivalent to 15% of all accounts. In Entebbe, there are 22,870 total active accounts, while there are 1,604 inactive accounts, which is equivalent to 6.6% of the total number of accounts. All accounts in Jinja and Entebbe are metered (100%).

With regard to customer billing, NWSC has adopted an on-the-spot billing system, in which meter readers produce a bill to the customer on the spot after entering the meter readings into the meter-reading recorder. This has the advantage of saving time in producing and delivering bills to customers. With the use of on-the-spot billing, meter reading errors are reduced as the system requires the reading to be entered three times before the bill is printed. The average volume of water billed monthly in Jinja is estimated at 277,302 cubic meters, while in Entebbe it is 312,767 cubic meters. The monthly water billing in Entebbe is US\$919,530,059, which is equivalent to US\$367,812; while in Jinja, monthly water billing is US\$832,000,000, equivalent to US\$332,800.

In revenue collection, NWSC has introduced innovative ways whereby its staffs are not involved with cash collection. Instead, NWSC has made a strategic decision by introducing an "e-water" payment system by entering into an agreement with financial institutions. This has enabled the corporation to free up

human and financial resources that had been engaged in cash collection to tackle core NWSC business functions, such as customer service and reduction of NRW and illegal connections. Because of technology advancement at NWSC, revenue collection at corporate level has been increasing each year. Revenue collection efficiency was 96% in 2010–2011, 95% in 2011–2012, and 98% in 2012–2013. However, government departments are not paying their water bills; thus, they owe NWSC more than US\$63 billion. To settle the matter, NWSC has launched the use of prepaid water meters, which will control bill arrears.

The corporate customer service charter clearly indicates the need for improving service delivery to satisfy its customers. According to the Corporate Strategic Plan and the Five-Year Strategic Direction (2013–2018), the customer satisfaction index is targeted to be increased from 81% in 2012 to 90% in 2015. In order to meet customer expectations, utilities have put in place various means through which customers can report their complaints. Currently, the common means used include in-person discussion, short-message service (SMS), letters, and phone calls to a toll-free number.

## **PROPOSED INTERVENTIONS**

Based on the findings obtained during this assessment, the following interventions are proposed for the Uganda utilities and the PREPARED Project:

1. Reduction of non-revenue water: The entry point for this intervention is to undertake a detailed diagnostic study so as to determine the contributing factors to physical and commercial losses. This is due to the fact that NRW is currently calculated by subtracting sold water from supplied water.
2. Customer and zone mapping: Mapping the network system as well as customers will enhance system monitoring, thus enabling the institution of specific measures when needs arise.
3. Improving information management system: This is important to enhance efficiency in billing, revenue collection, accounting, and decision making.
4. Introduce quality service improvement program (QSIP) to complement the existing performance improvement programs
5. Protection of water catchment areas to enhance continuous availability of water resources
6. Skill development in areas related to using information management system and service delivery for NWSC and other actors, such as non-governmental organizations (NGOs) and community groups

Because NWSC has an institutional framework that is effective in service delivery, it is suggested that the existing framework and structure be used in implementing the proposed interventions. NWSC-Jinja and NWSC-Entebbe should therefore be the lead agencies during implementation of the interventions. However, due to a high level of NRW in Jinja, it is recommended that Jinja be the first to roll out the PREPARED Project interventions.

# I.0 BACKGROUND INFORMATION

## I.1 INTRODUCTION

Planning for Resilience in East Africa through Policy, Adaptation, Research, and Economic Development (PREPARED)—which is funded by the United States Agency for International Development (USAID)/East Africa office—is a comprehensive five-year multi-organization program aimed at mainstreaming climate-resilient development planning and program implementation into the East Africa Community (EAC) and its partner states’ development agendas.

Therefore, the overall goal of the PREPARED Project is to strengthen the resiliency and sustainability of East African economies, transboundary freshwater ecosystems, and communities. The PREPARED Project targets three key development challenges of the EAC region, which are transboundary freshwater biodiversity conservation; improved access to drinking water supply and sanitation services; and increased resiliency to climate change. Based on the aforesaid, the PREPARED project comprises five components, which include three technical components and two components that focus on cross-cutting program coordination and management.

PREPARED’s key institutional partners include the East African Community (EAC), the Lake Victoria Basin Commission (LVBC); the Intergovernmental Authority on Development Climate Prediction and Applications Center (ICPAC); the Regional Centre for Mapping of Resources for Development (RCMRD); and EAC partner states. Tetra Tech ARD is the prime institutional contractor implementing the PREPARED Project, and is supported by a team comprising SSG Advisors, a leader in the field of developing public-private partnerships; LTS Africa, with extensive experience in transboundary biodiversity conservation in East Africa; Water and Environmental Management Consultants [WEMA Consult (I) Ltd], with relevant regional experience in WASH activities in East Africa countries and in the Lake Victoria Basin; Columbia University’s Center for International Earth Science Information Network (CIESIN), which specializes in data and information management and state-of-the-art decision support tools; and the Global Climate Adaptation Partnership (GCAP), a leading climate change adaptation consulting firm whose staff includes some of the world’s leading climate adaptation experts and trainers.

During Phase I of assessing the WASH situation in East Africa partner states, it was noted that there is a need to have detailed study at the lower levels, where water utilities would be assessed in terms of their capacity to deliver quality water and sanitation services. Better understanding of the water utilities would enable formulating interventions that are more specific, thus addressing the real utilities’ real needs.

With that understanding, the regional WASH Task Force met in Bujumbura, Burundi, February 11–13, 2014, and formulated selection criteria for water utilities to be supported under the PREPARED Project. The criteria were as follows:

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- Institutional and operational modalities [presence of water supply and sanitation service provider (WSSP) utility] in place and can be built upon
- The town is either significantly impacted by or significantly impacts Lake Victoria.
- Potential exists for quick win-win solutions

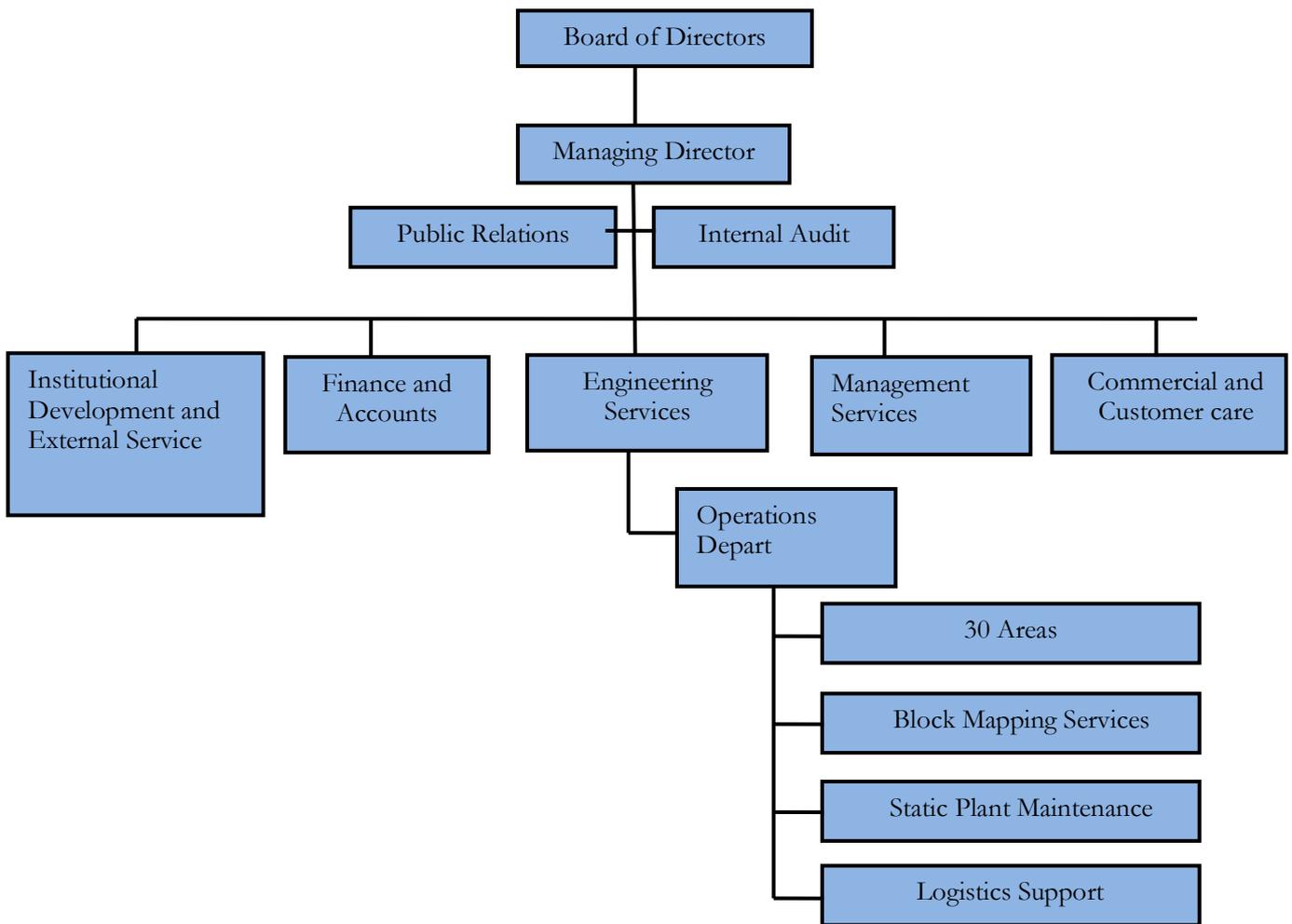
Based on the set criteria, Regional WASH Task Force members from Uganda selected three water utilities (Jinja, Bugiri, and Masaka) to be considered for PREPARED Project interventions. However, after consultation with the Government of Uganda and the National Water and Sewerage Corporation, it was agreed that Entebbe should come in instead of Bugiri, as Entebbe and Jinja are already under the African Water Association program that aims to reduce NRW; thus, this would have a synergistic effect. Further, it was agreed that a detailed baseline study should first consider two towns—i.e., Jinja and Entebbe. WASH sites assessment Phase II was therefore undertaken by a WEMA Consult team, accompanied by one WASH Task Force member from Uganda and the PREPARED WASH technical advisor from April 28<sup>th</sup>-May 6, 2014.

## **I.2 OVERVIEW OF THE NATIONAL WATER AND SEWERAGE CORPORATION**

The NWSC is a public corporation wholly owned by the Government of Uganda that operates and provides water and sewerage services to large urban centers across the country. The corporation was initially established by Decree No. 34 of 1972 following an earlier study on the need for improving water and sanitation services in the large urban areas of Uganda (NWSC, 2012). In 1995, the corporation was re-established by the National Water and Sewerage Corporation Act, with the primary aim of revising the objectives, powers, and structure of the corporation and enabling it to operate on a commercial and viable basis.

The NWSC currently operates in 30 large towns known as areas under the new corporation setup. As of Dec. 31, 2013, NWSC had the practical production capacity of 343,196 cubic meters per day. Total water produced is 46,681,842 cubic meters with an average water production of 253,706 cubic meters per day. The total number of connections is 341,511, of which 303,019 (89%) are active accounts.

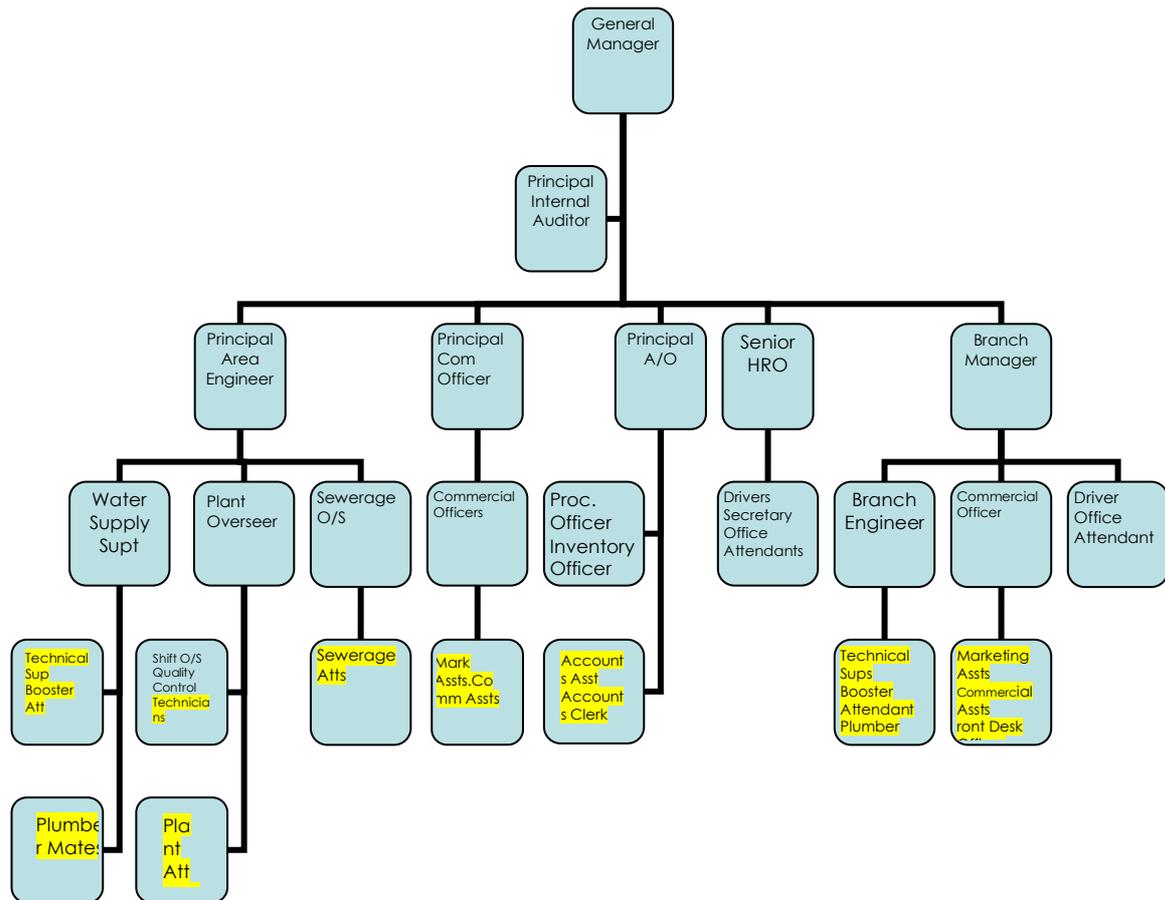
The corporation performs its duties under the supervision of the board of directors. The board is chaired by the chairman; the managing director of the corporation is the secretary to the board. The day-to-day activities are manned by the managing director, who is assisted by chief managers. According to the current organizational structure, the chief managers include institutional development and external services; engineering services; management services; finance and accounts; commercial and customer services; planning capital development and internal auditor (Figure 1.1: NSWC Organogram).



**Figure 1.1: NWSC organization structure**

The NWSC board of directors uses a committee system in its governance. This implies that management issues are submitted to the board through four committees. The Committees are finance; administration; technical; and audit. The chief manager is responsible for managing the NWSC areas.

NWSC-Jinja is located about 80 km east of Kampala and is the third-largest NWSC area after Kampala and Entebbe. However, Jinja not only is the second-largest city in the country but also is the second-busiest town after Kampala. The town of Jinja, which is on the shores of Lake Victoria near the source of the Nile River, was established in 1907. NWSC-Jinja is one of the three town founders of the NWSC, which was established in 1972.



The area is headed by the general manager, who is assisted by five section heads. The sections they lead are engineering; human resource and administration; commercial; accounts; and branches. The engineering section is headed by the principal area engineer (currently a vacant position), who is responsible for the water treatment plant, water distribution, sewer services, and water losses. The senior customer officer leads the commercial section and is responsible for billing and revenue collection. The human resource and administration section is headed by the senior human resource officer, who is responsible for general office administration, transportation, and security matters. The principal account officer is the head of accounts section and is in charge of information and technology; finance management; procurement; and inventory. The branch managers are the heads of the branches, which are Centre, Njeru, and Bugembe. These branches are further subdivided into four territories. The subdivision of the area into branches and territories allows efficient management of the area. This is due to the fact that in each territory, there is a territory leader, a marketing assistant responsible for billing and other customer matters, and a plumber who is responsible for network repair and maintenance. Figure 1.2 shows the organogram for NWSC areas (Entebbe and Jinja). NWSC Jinja has a potential customer base of around 300,000 people. Currently, the utility serves 254,532 people with a water supply coverage of 90%.

**Figure 1.2: NWSC Uganda Organization Chart**

NWSC-Entebbe is located in the north along Entebbe Kampala road. The NWSC-Entebbe water network extends up to Kajjansi Township, while in the west it goes up to the areas of Nakiwogo, Kiwafu, and Kitooro. In the northwest, it covers the areas of Namate, Katabi and Busambaga; in the southwest, the utility serves areas beyond Entebbe International Airport, like Kigungu and Misooli. The utility operates through its three branches: Entebbe Amin, Kawuku, and Kajjansi. Its area of jurisdiction has a total population of 271,670 people, while the current served area has a population of 233,637 persons. The present service coverage is 86%. NWSC-Entebbe Branch management structure is the same as NWSC-Jinja's.

NWSC's vision is to be "the leading water utility in the world." The mission of NWSC is to "provide efficient and cost-effective water and sewerage, applying innovative managerial solutions to the delight of our customers." In addition, the areas have their own visions and missions, which are adapted from the NWSC's vision and mission. For instance, the vision for Jinja Area is "to be among the leading water and sewerage service providers in the world," while its mission is "to provide water and sewerage services in a commercially viable, socially acceptable, environmentally friendly, and sustainable manner." On the other hand, Entebbe Area has its vision of being "the supreme provider of water and sewerage services that meet international standards," and its mission is "to provide safe and pure water and sewerage services of international standards at affordable charges to all residents in a customer[-friendly] and environmentally friendly manner."

The NWSC planning framework is based on the Corporate Plan, which is a three-year planning cycle document. The current Corporate Plan covers a period from 2012-2015. Furthermore, since 2000, the NWSC has operated within the framework of a Performance Contract with the Government of Uganda. Within the overall framework of the Corporate Plan and the performance contract with the government, the NWSC has over the years adopted several high-impact, short-term performance improvement programs. The programs include: the 100 Days Program; the Service and Revenue Enhancement Project (SEREP) I and II; Area Performance Contracts I, II and III; the Stretch Out Program; the One Minute Management Concept; and Internally Delegated Area Management Contracts (IDAMCs). This was accompanied by financial and commercial reforms, which comprised strengthened management of information systems (MIS) and tariff structure changes.

The NWSC has recently formulated a Five-Year Strategic Direction (2013–2018) which is aligned to the Corporate Strategic Plan of 2012–2013. The Five-Year Strategic Direction is aimed at gearing up NWSC for sound transformational changes within its operational and geographical mandate. The Strategic Direction is to be implemented through a tactical performance improvement program (PIP) code-named "The STEP-UP 90 Program," premised on four perspectives of the balance score card: business process and growth; customer perspective; financial perspective; and learning and people perspective.

The Five-Year Strategic Direction was prepared within the following context:

- It is aligned to the NWSC Corporate Plan for 2012–2015, and therefore does not in any way conflict with the plan's aspirations.
- It contextualizes the NWSC's future goals in a longer-term perspective, which implies that the next Corporate Plan cycle will seamlessly flow in tandem with the Strategic Direction.
- It takes into account the strategic and dynamic overarching government policy direction of transforming the Ugandan economy from a peasantry to a modern and prosperous economy, as enshrined in the National Development Plan (NDP) and Vision 2040.
- It is also aligned to the ambitious and achievable urban water sector goal of achieving 100% water coverage in the medium term through building synergies via expanding the corporation's mandate to cover all urban areas.

Suffice it to say here that the undertakings and aspirations of the Strategic Direction are in alignment with the Corporate Plan and Performance Contract and are all geared towards achieving the following key outputs: financial sustainability; infrastructure growth; increased coverage for water and sewerage services; learning and growth; improving customer care; and meeting stakeholder expectations.

## 2.0 KEY WASH PROJECT OBJECTIVES

The PREPARED Project's overall goal is to strengthen the resiliency and sustainability of East African economies, transboundary freshwater ecosystems, and communities. The project targets three key development challenges. Among them is improved access to drinking water supply and sanitation services. The WASH objective fits well within the overall NWSC Corporate Strategic Plan (2012–2015) and the Five-Year Strategic Direction (2013–2018), which focuses on increased access to water supply and sewerage services, among other things. The PREPARED Project interventions in NWSC-Jinja and NWSC-Entebbe will enable the utilities to increase not only service coverage but also revenues, which will subsequently assist the utilities in asset development and hence in attaining financial viability. In order to attain the aforesaid, assessment of the current WASH situation in NWSC areas was necessary to enable effective intervention planning and design. This study was therefore conducted at NWSC-Entebbe and NWSC-Jinja with the following objectives:

1. Collect and characterize baseline information in the following categories:
  - Sources of raw water supply (e.g., spring, river, lake, or groundwater)
  - Drinking water treatment processes and facilities
  - Sanitation treatment processes and disposal procedures
  - Type, length, and size of distribution network
  - Percentage and area of service provision
  - Level of billing and NRW
  - Personnel management and capacity building
  - Financial sustainability
2. Analyze and describe service delivery effectiveness by determining the following:
  - Institutional and governance framework that adequately describes the type of WSSP utility, legal basis, operational modalities, management structure, and existence and content of strategic or operational plans
  - Challenges in meeting the national and regional standards for service provision
  - Levels of WSSP regulation, including provisions for establishing and revising tariffs
  - Mechanisms for developing and implementing performance service improvement programs
  - Compliance with required subsidiary legislation on managing water resources and protecting the environment
  - National or local government subsidies, if any, and level to which they are targeted at specific groups (e.g., pro-poor)

## 3.0 METHODOLOGY AND APPROACH

To enable smooth execution of the assignment, the team—in collaboration with the WASH technical advisor—prepared a baseline survey tool, which was sent in advance to NWSC Jinja and Entebbe. In addition the LVBC PREPARED Coordinator sent a letter to the Ministry of Water and Environment to introduce the Team on the assignment ahead. To achieve the mission objective, the Team used the following methods to collect the needed data.

### 3.1 ENTRY/BRIEF MEETINGS

The team started with brief meetings to the top management of the utility, where explanations about the mission, PREPARED Project, its components and objectives and what the Project intends to do (Figure 3.1). Management were able to ask various questions where the team responded by giving the needed clarification. In addition to meetings with top management, a discussion with key staffers was held when clarification was sought on a particular matter.

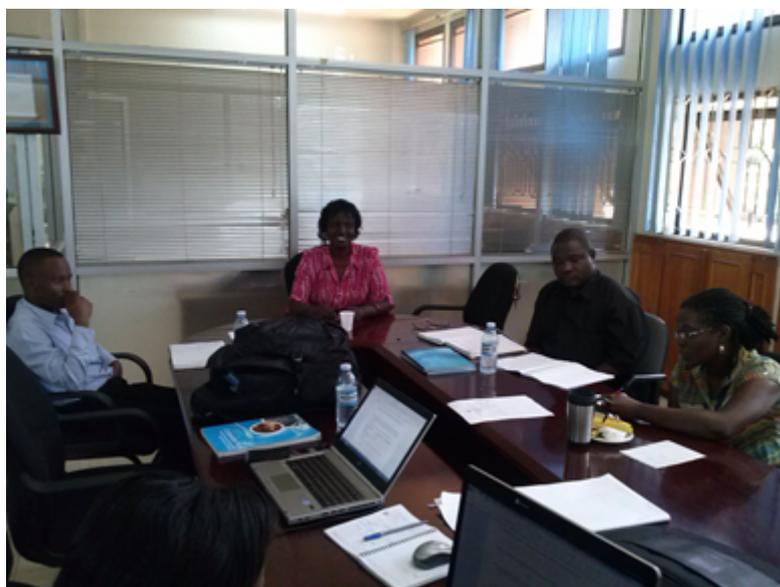


Figure 3.1: NWSC-Entebbe staff meets with the WEMA team.

### 3.2 DOCUMENTARY REVIEW

Various documents provided by management were reviewed and information relevant to the assignment was recorded. Valuable information about the corporation and its areas was accessed from the NWSC website ([www.nwsc.co.ug](http://www.nwsc.co.ug)).

### 3.3 FIELD VISITS

The team visited water treatment plants in Jinja and Entebbe to see various operations. Plant managers explained how raw water is tapped at the intake and how treatment processes were done (Figure 3.2). Visits were also made to water stabilization ponds and wetlands used to discharge waste water. Field visits, which entail physical observation, enabled team members to gain a better understanding and thus generate better data.



Figure 3.2: The WEMA team visits the Entebbe Water Treatment Plant.

### **3.4 EXIT/DEBRIEFING MEETING**

This was held at the end of the assignment at each of the two utilities. The purpose was to explain how the assignment was successful and to highlight some of key issues observed. This meeting gave the two utilities' general managers an opportunity to express their expectations of the project.

### **3.5 ANALYSIS OF COLLECTED DATA**

Descriptive statistics, content analysis, and pairwise ranking were employed for data analysis. Descriptive statistics such as frequencies, percentages, and means were used to obtain the variability and central tendencies of variables. Content analysis was used to analyze the qualitative data obtained through the entry/briefing meeting, field visits, exit/debriefing meeting, and discussions with key informants. This entailed transcribing responses and categorizing information obtained into main themes and issues.

# 4.0 FINDINGS AND DISCUSSION

## 4.1 WATER SUPPLY SYSTEMS IN JINJA AND ENTEBBE

### 4.1.1 WATER SUPPLY SYSTEM IN NWSC-ENTEBBE

NWSC-Entebbe abstracts raw water from Lake Victoria via a common DN 500 underground pipe to the WTP; its bulk meter is not functional. The pump rate is used to estimate the average abstraction rate, which is estimated to be 14,590 cubic meters day. The quality of water abstracted from the lake requires treatment so as to be suitable for human use. The water treatment plant system consists of six unit processes: the main intake, which is positioned 150 meters from lake shoreline; the alum chamber; the flocculation tank; the sedimentation tank; the rapid sand filter; and the clear water tank, which is followed by disinfection at full scale (Figure 4.1). The system has a capacity of treating 20,000 cubic meters of raw water and producing an average of 18,400 cubic meters of treated water per day. It was designed to serve 216,750 people; currently, it serves 233,637 people. This means that installation capacity has been exceeded, and meeting current demand is a challenge.

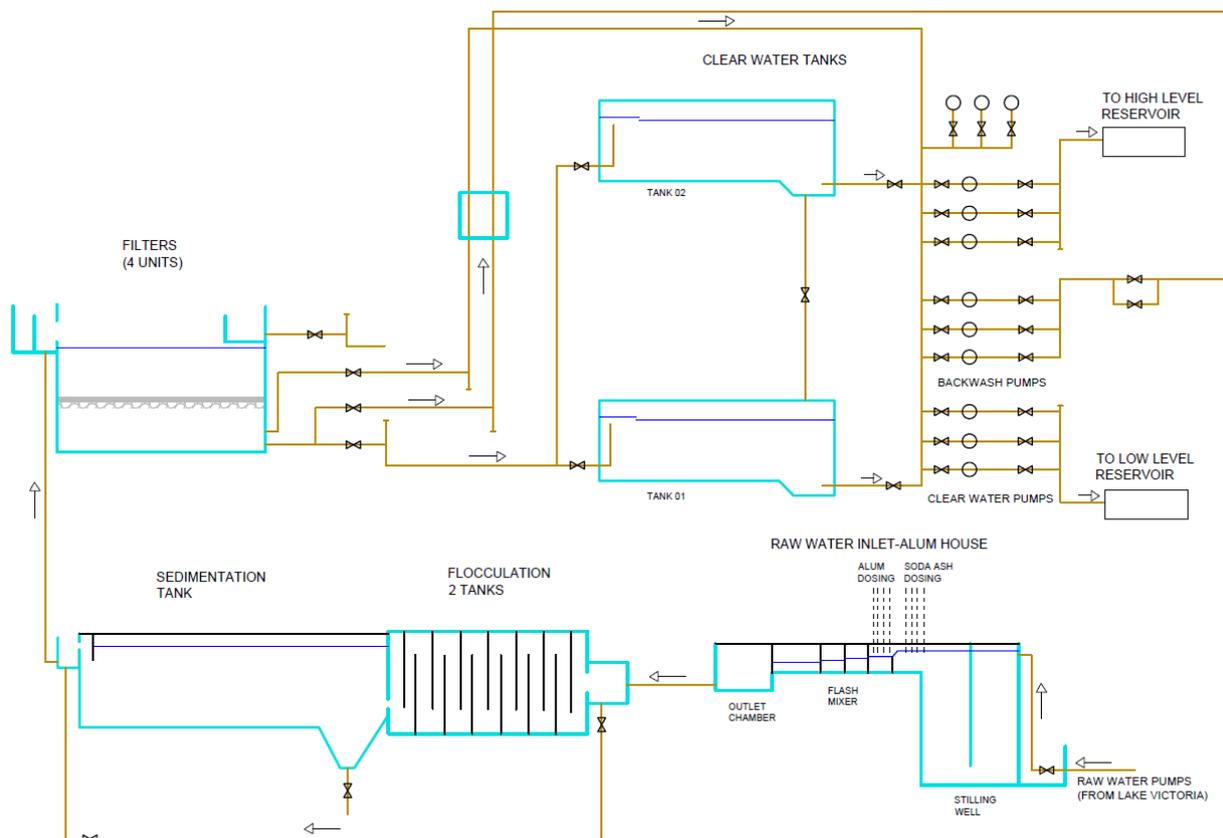


Figure 4.1: Schematic layout of NWSC-Entebbe's water treatment plant

The supply network consists of trunk main and reticulation networks made of polyvinyl chloride (PVC), high-density polyethylene (HDPE), galvanized steel (GS), ductile iron (DI), steel, and asbestos cement (AC), ranging from a diameter of 40 to 400 mm. The system comprises reservoirs, transmission mains, distribution mains, and online boosters and pumps. From the treatment plant, water is pumped to storage reservoirs (7,000 cubic meters) before it is distributed to consumers through a reticulation network. The total length is about 72 km for the trunk mains and 252 km for distribution lines, including consumer

connections. Table 4.1 presents the details of the network in terms of pipe material, size, running length, and pipe ages.

**Table 4.1: Distribution pipe network characteristics in NWSC-Entebbe**

MATERIAL	SIZE RANGE (MM. DIA)	LENGTH IN (KM)	AGE RANGE(IN YEARS)
PVC	50–300	7.1	9-25
HDPE	40–100	191.6	1–15
Galvanized Iron (GI)	50–150	28.3	11–35
Ductile Iron	80–400	22.1	7–8
Steel	50–300	16.5	40–57
Asbestos Cement	80–200	18.4	40–57

In Entebbe the main challenges to the distribution network were reported to be the following:

1. Meter tampering
2. Poor urban planning, which leads to destruction and breakage of the network system when other development activities, such as road construction, are undertaken; this makes the network expansion very difficult and expensive, and sometimes compensation may be required.
3. High service demand due to increased population growth
4. Inadequate measures for pressure management

#### **4.1.2 WATER SUPPLY SYSTEM IN NWSC-JINJA**

NWSC-Jinja draws its water from Lake Victoria, where the raw water is abstracted via a common DN 600 underground pipe to the WTP. The raw water abstraction meter (i.e., the bulk meter) is currently not functional. As in Entebbe, the pump rate is used to estimate the average abstraction rate, which is estimated at 22,000 cubic meters per day. Such use of the pump rate is not accurate in measuring abstracted volume due to flow variations.

NWSC-Jinja runs a conventional system to treat abstracted raw water. The system consists of unit processes which are: the main intake, which is positioned 50 meters from the lake shoreline; the microstrainer; the sedimentation tank; the slow sand filter; the rapid sand filter; the contact tank; and the clear water tank, which is followed by disinfection at full-scale (Figure 4.2). The system has a capacity of treating 30,610 cubic meters of raw water and producing an average of 20,000 cubic meters of treated water per day.

Water distribution is another core function of NWSC after production. It is through the reticulation system that water reaches the customers. The system comprises reservoirs, transmission mains, distribution mains, and on-line boosters and pumps. Once treated, water is pumped from the treatment plant and/or clear water tank through DN 600 underground pipes to storage reservoirs, where it is distributed to nearly 254,532 customers. NWSC-Jinja has three main reservoirs: Walukuba (4,000 cubic meters), Rubaga (24,000 cubic meters), and Nakibizi (1,000 cubic meters).

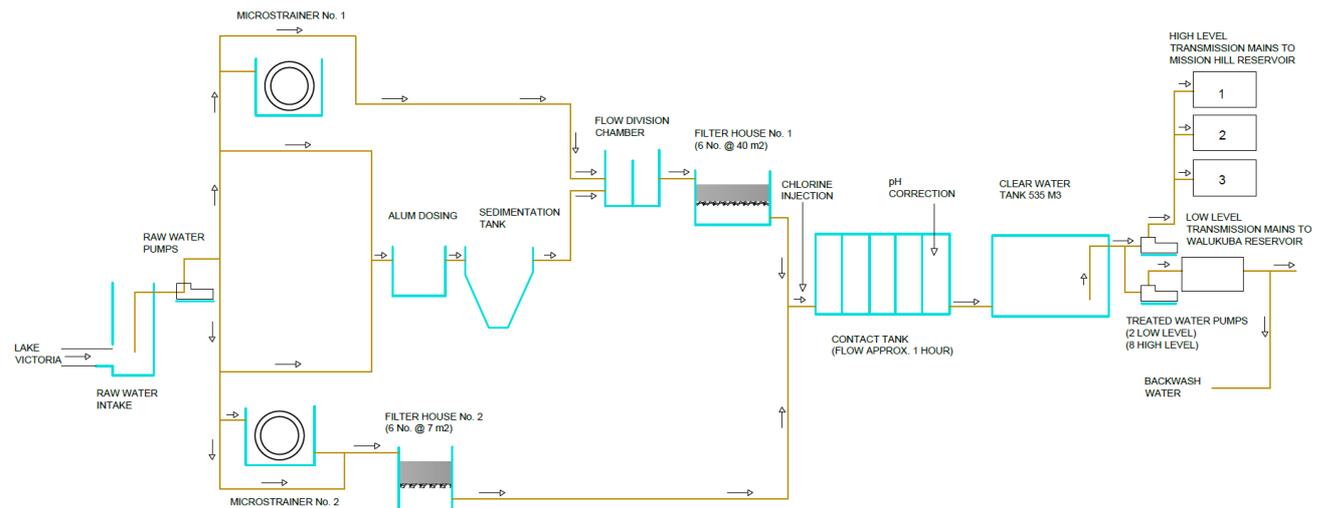


Figure 4.2: Schematic layout of NWSC-Jinja’s Mulukuba Water Treatment Plant

The supply network consists of trunk main and reticulation networks made of PVC, HDPE, GS, DI, steel, AC, and cast iron materials with diameters of up to 400 mm. The total length is about 520 km for the trunk mains and 511 km for distribution lines, including consumer connections. Table 4.2 describes in detail the pipe material, size, running length, and age of NWSC-Jinja’s pipe network.

Table 4.2: Distribution pipe network characteristics in Jinja

MATERIAL	SIZE RANGE (MM. DIA)	LENGTH IN (KM)	AGE RANGE(IN YEARS)
PVC	50–400	74.281	25
HDPE	Up to 100	111.881	0–20
GI	Up to 80mm	1.067	0–20
Steel	100–300	0.419	50
Asbestos Cement	80–350	112.588	50
Cast Iron	80–150	0.560	50

As in Entebbe, Jinja has the following challenges: meter tampering; poor urban planning, which leads to destruction of the network; illegal connections; poor pressure management; and low capacity to meet service demand.

### 4.2 SEWERAGE AND SANITATION SERVICES IN ENTEBBE AND JINJA

NWSC-Entebbe runs a centralized sewerage system for collecting, treating and disposing wastewater generated from domestic, commercial, institutional, and industrial centers within its area of jurisdiction. The sewerage treatment plants are located at Kitooro and Lunyo areas. The service coverage is 0.1% of the population served with water supply, while the sewer network covers an area of 7.5 square kilometers, which is equivalent to 7% of the jurisdiction area. The remaining population (99.9%) uses on-site sanitation, mostly septic tank systems and pit latrines. The high use of on-site sanitation is due to the high cost involved in sewer connection. Private exhauster services are involved in providing sanitation services by emptying the septic tanks and pit latrines and transporting and emptying the waste to the sewerage treatment plant.

In Jinja, the treatment plant is located at Kirinya. The current service coverage is 25%. The sewer network covers an area of 10 square kilometers, slightly more than Entebbe's. Those who are not connected to the sewerage system use on-site sanitation such as septic tank systems (25%) and pit latrines (50%).

In order to determine the sewerage effluent quality, final effluent points are tested for biochemical oxygen demand (BOD<sub>5</sub>), which is the amount of oxygen required to biologically degrade the waste in five days, total suspended solids (TSS) and fecal coliforms. In tests taken from December 2013 to April 2014, the results indicate that 29.3% of the samples taken from the final effluent points complied with the national standard for effluent discharge for BOD<sub>5</sub> of max 50mg/l, 52.1% of the samples tested complied to the total suspended solids standard of 10,000 CFU/100mL. Cases of substandard effluent discharge were due to design inadequacy; operation and maintenance inadequacy; storm water ingress into sewers; and disposal/dumping of waste water from industries and other non-domestic origins into sewerage systems.

According to the result of this study, the major issues affecting sewerage services in Entebbe include low coverage of the sewer network; inconsistent performance of waste stabilization ponds, as sometimes the effluent BOD<sub>5</sub> quality varies; and high tariffs limiting connections to the system.

In Jinja, the key issues under sewerage service provision include: low coverage; high tariffs; lack of mechanisms to dislodge the ponds; a lack of manhole covers (so during the rainy season, water enters the manholes and ends up in the open pond system); and the use of chemicals by factories, whose sewerage enters the ponding systems and kills bacteria, thus contributing to the treatment plant's lower efficiency.

In order to improve sewage effluent quality, NWSC is considering the following: timely dislodging of ponds; use of wetlands or rock filters for effluent polishing; adequate operation and maintenance procedures; and stringent measures both to control the discharge of strong municipal and industrial effluents into the sewer and to minimize storm water entry into sewer systems. If all these are implemented, it is likely that sewerage service provision challenges will be to a large extent addressed; thus, efforts are recommended.

### **4.3 WATER QUALITY**

In order to ensure quality water provision, NWSC strives to meet both international and national standards. Sample testing is done to determine the quality of water and to take appropriate measures to rectify the situation should there be inefficiencies. It was reported that on average, 25 and 324 bacteriological tests are done per year in Jinja and Entebbe, respectively. None of the bacteriological tests done was reported to have been failed, implying that the water supplied to customers meets the required drinking water standards.

In addition to sample testing of water quality, the Uganda National Water Quality Management Strategy (2006) adopted the Water Safety Plan (WSP) as a tool for assessing water supplies and as part of Uganda Standard Drinking (potable) water specification US 201:2008. Uganda has also recognized the International Water Association and World Health Organization (IWA-WHO) 2009 WSP guidelines as best practices that Ugandan water utilities should adhere to.

NWSC has therefore been implementing WSPs as one of the approaches to improve quality assurance. WSP implementation entails putting in place control measure monitoring for mitigation of possible water quality risks, from catchment to the consumer. NWSC-Jinja has in place its WSP, while Entebbe has a draft that is in the approval process. In Jinja, the WSP committee is in place and is responsible for ensuring that stakeholders adhere to control measures detailed in the plan. This is a good way of doing things, as it is a proactive approach towards enhancing provision of quality water services. However, implementation of the plan faces challenges. One of the major challenges is that while NWSC is fully in charge of the middle stages of the water supply system (namely, the treatment and distribution system), limitations exist in terms of risk management at the catchment level and on consumer premises, where NWSC lacks control of the activities. It is evident that in order for WSP implementation to be effective, other stakeholders' involvement at catchment level and on consumer premises is inevitable.

#### 4.4 REGULATION OF SERVICE PROVISION AND TARIFF SETTING

In Uganda, there is no independent authority responsible for regulating water and sewerage services. Instead, the MWE, through its Directorate of Water Development (DWD), is responsible for providing overall technical oversight in planning, implementation, and supervision of delivering urban and rural water and sanitation services across the country, including water production. DWD is also responsible for regulating provision of water supply and sanitation.

Because the directorate itself is responsible for actual provision of water and sanitation services in small towns not under jurisdiction of NWSC, it seems to be overloaded with responsibilities. In addition, because DWD is the actor in service provision, it acts as “a player and referee” at the same time and hence jeopardizes the principles of good governance. Efforts to establish an independent regulatory authority are recommended here.

Tariffs are set through consultation of various stakeholders; the MWE, through the DWD, coordinates the process. After consultation with stakeholders, the minister of state responsible for water and environment submits the proposal to Parliament for approval.

The current tariffs, which were approved in 2011, are seen by NWSC as not-cost reflective, because the water production costs are very high. The tariffs that are currently in use are as shown on Table 4.3.

**Table 4.3: Water tariffs currently used in Uganda**

USER CATEGORY	UShs PER CUBIC METER
Household	1,919
Government institutions	2,353
Commercial and industrial	2,887

#### 4.5 NON REVENUE WATER

Non-revenue water (NRW) is defined as water that is processed and supplied by a water utility but cannot be accounted for. In other words, this is the water that is lost and cannot be paid for. NRW results from physical and commercial losses. In Jinja and Entebbe, factors responsible for physical losses include leakages due to an aging pipe network; illegal connections; and unrecorded users. Factors responsible for NRW through commercial losses include meter reading errors; slow running meters; meter tampering; faulty meters; illegal connections; billing errors; and inefficient revenue collection (as collection efficiency is not 100%). During the past three years, NRW in Entebbe has increased from 11% in 2010–2011 to 23% in 2012–2013. For Jinja, NRW decreased from 25% in 2010–2011 to 23% in 2011–2012; thereafter, it increased to 42.7% in 2012–2013. Table 4.4 indicates the trend of NRW in the two utilities and in the NWSC at large.

**Table 4.4: Percentage of NRW from 2010–2011 to 2012–2013 for NWSC, Entebbe, and Jinja**

WATER UTILITY	2010–2011	2011–2012	2012–2013
NWSC	32.8	32.6	34.7
Entebbe	11	17	23
Jinja	25	23	42.7

The utilities have plans to reduce NRW so as to increase not only service provision but also revenue, which could enable expansion of asset development and hence viability of the utilities. Based on the Corporate Plan 2012–2015 and the Five-Year Strategic Direction 2013–2018, NWSC has planned to reduce average NRW from 32.6% to no more than 30.1%. NWSC-Entebbe has the target of attaining maximum NRW of 22%, with the SMART target of 16% and the STRETCH target of 7.8%. On the other hand, NWSC-Jinja aims to attain a maximum NRW of 37.0%, with the SMART target of 28% and the stretch target of 16%. In order to attain the aforesaid targets, the NWSC Five-Year Strategic Direction 2013–2018 highlights NRW-reduction action plans, which include:

1. Replacing bulk meters, faulty meters, and meters 7 years and older
2. Closely monitoring big consumers and accounts with registered declining or zero consumption
3. Effective disconnections of suppressed accounts
4. Installation of bulk meters
5. Hold routine follow-up meetings to track progress on implementing area NRW-reduction action plans

NWSC-Jinja and NWSC-Entebbe areas, together with the corporate-level strategies, have specific mechanisms to reduce NRW as indicated in Table 4.5.

**Table 4.5: Mechanisms in place for NRW reduction in Entebbe and Jinja areas**

STRATEGY	ENTEBBE	JINJA
Existence of replacement policy for aged and non-counting meters: During 2012–2013, a total of 132 and 261 meters were replaced in Jinja and Entebbe, respectively,	✓	✓
Serious monitoring and detection of illegal connections: It was reported that through this strategy, the Jinja Area has been able to identify 30 illegal connections per month.	✓	✓
Detection of visible leakages	✓	✓
Increased meter-reading efficiency to reduce meter-reading estimations		✓
Strict penalty for technicians who are not reading meters efficiently: The penalty includes non-renewal of contract and a reduction of gratuity at the end of the year.	✓	✓
The NRW Committee is in place although not facilitated. It's reactionary other than proactive.	✓	
Provision of NRW budget line	✓	✓
Existence of draft performance improvement plan with strategies to reduce NRW	✓	
Existence of water safety plan (draft for Entebbe)	✓	✓
Effective disconnections of suppressed accounts	✓	✓
Installation of bulk water meters	✓	✓

In addition, a 2013 report by USAID and Further Advancing the Blue Revolution Initiative (FABRI) mentioned other mechanisms dedicated to reducing NRW for NWSC, which include giving incentives for good-performing territories and branches as well raising NRW as a key performance indicator. The report also recommended various actions for reduction of NRW that are in line with findings of the present study. It is therefore sufficient to say here that concerted efforts are needed sooner than later to prevent future loss of revenues. However, in order for the intended interventions to be effective, the areas need to be demarcated technically in order to enable efficient monitoring of the water system. Despite the fact that both utilities are subdivided into branches and territories, it is difficult to assess water losses per territories, as demarcation does not consider hydraulic modeling. It is therefore important that zoning through district metering areas (DMAs) should go hand-in-hand with hydraulic modeling so as to enable effective zone-monitoring activities of the water network as well as accurate identification of the causes of NRW and pressure management.

#### 4.6 CUSTOMER CONNECTIONS

As of December 31, 2013, NWSC had 341,511 connections, of which 303,019 (89%) were active accounts. Jinja and Entebbe has total connections of 18,305 and 24,474, respectively. The active accounts in Jinja are 1701 and inactive accounts were estimated to be 2893, which is equivalent to 15% of all accounts. In Entebbe, there are 22,870 total active accounts, while there are 1,604 inactive accounts, which is equivalent to 6.6% of the total number of accounts. All accounts in Jinja and Entebbe are metered (100%). The types of connections in both utilities are as indicated on Tables 4.6 and 4.7.

Table 4.6: Types of connections in NWSC-Jinja

CONNECTION TYPE	TOTAL NO. OF CONNECTIONS	METERED	NUMBER OF PERSONS SERVED	CONNECTION TYPES AS % OF TOTAL CONNECTIONS
Household connections	12,849	12,849	64,849	81.8
Public tap/standpipe	657	657	3,285	4.2
Commercial and industrial use	1,597	1,597	7,985	10.2
Institutional use	609	609	3045	3.9
Bulk water supply	01	01		
<b>Total</b>	<b>15,713</b>	<b>15,713</b>	<b>154,077</b>	

Table 4.7: Types of connections in NWSC-Entebbe

CONNECTION TYPE	TOTAL NO. OF CONNECTIONS	NUMBER OF PERSONS SERVED	METERED	CONNECTION TYPES AS % OF TOTAL CONNECTIONS
Household connections	18,815	94075	18815	76.9
Public tap/standpipe	103	11,845	103	0.4
Commercial and Industrial use	4,349	52,188	4349	17.8
Institutional use	1,207	138,805	1,207	4.9
<b>Total</b>	<b>24,474</b>	<b>296,913</b>	<b>24,272</b>	

According to the set targets, NWSC-Entebbe has the target of increasing the number of connections at a rate of 200 per month. This implies that the number of new connections targeted per year is 2,400. This target is big and will require a high level of management in order to keep on track all the proposed interventions and targets related to network management, including NRW reduction.

#### **4.7 METER READING EFFICIENCY**

Efficiency in meter reading is very critical in enhancing efficient billing. In Jinja, meter reading is done during the last week of each month, while NWSC Entebbe branch maintains a 30-day billing cycle. It was noted that meter reading is hampered by various factors, including a high workload for meter readers. In Jinja for instance, one meter reader is required to read 285 meters per day. This is reported to be too many, as under normal circumstances it requires a person to work 15 hours per day to accomplish the targeted number of meters. It can be assumed here that because of the heavy workload, meter readers do estimate some of the customer meter readings with the purpose of achieving their individual meter reading set targets. During discussion with respondents at the utility, it was reported that this heavy workload could be the justification for such a practice by meter readers.

This situation was not the case in NWSC-Entebbe. Other factors reported to affect meter reading efficiency were denial of access to customer premises and failure to locate customer premises, as customers are not mapped. Another issue that was reported in NWSC-Jinja is that some customers possess more than one meter (one legal and one illegal). These two meters are interchangeable. When it's near time for a meter reading, a different meter (legal) is fitted, which shows a smaller unit reading. Once the meter reader has done a reading and left, the illegal meter is refitted for use until it's near time for the next reading. As a result, the utilities record very little water use and lose income. USAID/FABRI also reported on customer malpractice, which includes meter tampering, meter bypasses and illegal connections. During this study, NWSC-Jinja indicated that 30 illegal connections are reported every month. This is a serious problem that needs to be addressed accordingly.

#### **4.8 CUSTOMER BILLING**

NWSC has adopted an on-the-spot billing system, which has the advantage of saving time in the production and delivery of bills to customers. With the use of on-spot billing, meter-reading errors are reduced, as the system requires the reading to be entered three times before the bill is printed. However, during our visit to NWSC-Jinja and NWSC-Entebbe, it was reported that some billing devices were not working properly. Proper maintenance of the devices is of great importance to enhance their effectiveness. This was also noted by the NRW audit study by USAID/FABRI.

The average volume of water billed monthly in Jinja is estimated at 277,302 cubic meters; while in Entebbe, it is 312,767 cubic meters. The monthly water billing in Entebbe is about US\$919,530,059, which is equivalent to US\$367,812; while in Jinja, monthly water billing is US\$832,000,000, equivalent to US\$332,800.

#### **4.9 REVENUE COLLECTION**

In revenue collection, NWSC has changed whereby staffs are not involved with cash collection. Instead, NWSC made a strategic decision of introducing an "e-water" payment system by entering into an agreement with financial institutions. This has enabled the corporation to free up human and financial resources that had been engaged in cash collection to tackle core NWSC business functions, such as customer service and reduction of NRW and illegal connections.

According to NWSC, an e-water payment is the most convenient, efficient, and easy way of paying water bills through partnering banks, direct debit, mobile banking, and mobile money transfers. At the bank, the e-water payment system is a simplified payment method in which transactions made to the banks are immediately reflected on the NWSC system. This simply means an NWSC official is able to check with the system and know that a certain customer has paid through the bank. A customer presents his or her bill or customer reference number to the teller and upon payment, receives a receipt and an SMS on his/her phone confirming the transaction from both the bank and National Water.

The customer's account therefore is credited within 24 hours. Some of the mobile money transfer connected banks include Bank of Africa, Centenary, Post Bank, Crane, and Deseret First Credit Union (DFCU). Other partnering banks have not yet connected but customers can still make their payments with them physically at the banking hall. These include Standard Chartered, Barclays, United Bank for Africa (UBA), Ecobank, National Bank of Commerce, Citibank, Kenya Commercial Bank (KCB), Equity, Diamond Trust, and Global Trust Bank.

Because of technology advancement at NWSC, revenue collection at the corporate level has been increasing each year. Revenue collection efficiency was 96% in 2010–2011; 95% in 2011–2012; and 98% in 2012–2013. NWSC-Entebbe's and NWSC-Jinja's revenue collection is also shown in Table 4.8.

**Table 4.8: Revenue collection efficiency for NWSC from 2010–2011 to 2012–2013**

YEAR	REVENUE COLLECTION EFFICIENCY (%)		
	ENTEBBE	JINJA	NWSC
2010–2011	91	81	96
2011–2012	98	85	95
2012–2013	94.2	85.5	98

The corporation and its areas are not attaining 100% revenue collection efficiency due to most government institutions not paying their bills. The arrears are significant, and thus affect performance of the corporation and its areas. As of December 2013, government ministries owed NWSC US\$ 63 billion in unpaid arrears. Table 4.9 presents unpaid debts from government institutions as of June 2012 to December 2013 for NWSC at large as well as for Entebbe and Jinja.

**Table 4.9: NWSC Government institutions arrears in US\$**

UTILITY	DEC 2013	JUNE 2013	JUNE 2012	JUNE 2011
NWSC in totality	63,130,150	57,139,801	48,410,733	42,914,947
Entebbe	4,585,310	3,644,467	2,572,513	2,219,458
Jinja	6,458,031	5,949,269	5,253,924	4,989,562

Due to increase of arrears of public institutions, the NWSC managing director asked the president of Uganda to ensure that public institutions settle their arrears and continue paying bills accordingly, otherwise the corporation will not meet the targets set by the government under the delegated contract-management system. It was reported that the president directed the Ministry of Finance and Economic Development to ensure that all public institutions pay their water bills and that the arrears also be settled.

As a result of the president's directive, the NWSC and the Ministry of Finance and Economic Development signed a memorandum of understanding that focuses on measures to control accumulating arrears from government ministries and departments. In addition, NWSC introduced a prepaid metering system that is intended to help users manage their water bills and avoid arrears. The system is a simple technology with three components: a card, an internal unit, and a meter. Both the meter and the card reader are installed at the premises. Each card is tailored to the meter and is auto loaded with credit at NWSC-approved vending points; then it is inserted into the card reader internal unit to recharge the meter. Before the credit runs out, the meter will produce an alert noise. If the card is not recharged, the valve of the meter closes, and water flow is stopped. According to NWSC, the system has the following benefits: it encourages water-consumption control; it shows current credit and the corresponding water left; and customers can see current and past consumption and identification of any leaks.

## 4.10 CUSTOMER CARE

Customer satisfaction is an important indicator of quality service provision. NWSC has strategized to improve customer care through better customer service. The corporate customer service charter clearly indicates the need of improving service delivery to satisfy its customers. According to the Corporate Strategic Plan and the Five-Year Strategic Direction, the customer satisfaction index should be increased from 81% in 2012 to 90% in 2015. To attain the aforesaid index, the NWSC Corporate Plan identifies the following strategies: improve call center performance; develop a communication strategy for NWSC; improve response times to customer complaints; put in place effective and proactive communication to customers; conduct a customer satisfaction survey to identify and resolve any customer satisfaction gap; and tailor the service to specific customer segments in order to improve customer services.

Based on the Corporate Plan, NWSC-Jinja and NWSC-Entebbe aligned themselves to improve customer satisfaction. The utilities have put in place the means of which customers can report their complaints. Currently, the common means used include in-person visits, SMS, letters, and telephone calls to a toll-free number. Technology developments have also made it possible for customers to register their complaints through E-mail, Twitter, and Facebook.

For the past three years, NWSC-Entebbe and NWSC-Jinja received a total of 708 and 3,241 customer complaints, respectively (see Table 4.10). Complaints related to not receiving bills were more serious in Jinja, which accounted for 28.8% of all complaints received. For Entebbe, despite the fact that only two complaints records were provided, no water and erroneous billing complaints stood at 49% and 51%, respectively.

Table 4.10: Customer complaints received from 2010–2011 to 2012–2013 at NWSC Entebbe and Jinja

TYPE OF COMPLAINT	ENTEBBE		JINJA	
	NUMBER	PERCENTAGE	NUMBER	PERCENTAGE
Leaks on service connection	–	–	777	23.9
Faulty stop corks	–	–	754	23.2
New connection delays	–	–	436	13.4
No Bills	–	–	936	28.8
Defective meters	–	–	338	10.4
No Water	348	49	–	–
Erroneous billing	360	51	–	–
<b>Total</b>	<b>708</b>		<b>3,241</b>	

However for Entebbe, which managed to provide data that were disaggregated per year for the past three years, it seems to have a downward trend for erroneous billing and an increasing trend for no-water cases, as shown in Table 4.11. It was difficult for Jinja to know exactly the trend, as the data were not disaggregated.

Table 4.11: Types and frequency of customer complaints received by NWSC-Entebbe from 2010–2011 to 2012–2013

TYPE OF COMPLAINT	NUMBER OF COMPLAINTS RECEIVED		
	2010–2011	2011–2012	2012–2013
No water	60	120	168
Erroneous billing	156	120	84

#### 4.11 STAKEHOLDERS INVOLVEMENT

NWSC is striving to ensure maximum collaboration with its stakeholders to enable quality service provision to its customers. Involvement of various stakeholders in the utility’s operation helps to attain sustainability of services provided as stakeholders also assume ownership. To enable participation of stakeholders, NWSC-Jinja and NWSC-Entebbe have put in place the following organs:

1. Local water user committee: The Ugandan Water Act of 1997, Section 51, established this committee to perform various functions at a local level, including management of water sources. The committee comprises the district water engineer, the customer representative, the NGO representative, the municipal environmental officer, the local council, and NWSC area representatives. This committee meets quarterly.
2. Water safety plan committee: This committee is responsible for coordinating implementation of all interventions of the WSP. In Entebbe, the WSP is under preparation; when it’s ready and approved, the committee will be operational.
3. Stakeholders management committee: This exists in NWSC-Jinja, where the management and stakeholders meet for planning and also for receiving progress reports of various activities.
4. Strategic and alliance meeting at village level: This exists in Entebbe, where issues pertaining to proper use of water resources and the way forward are discussed.
5. Customer week: an event in which utilities do exhibitions explaining various activities undertaken by the utilities, and customers get an opportunity to learn about operations and about how customers are supposed to be served. This provides an avenue for the utility to meet with customers and learn their expectations. Thus, the information gathered is used as feedback for the utility to improve its services.

In addition to the above mentioned arrangements, putting in place a framework that enables strategic involvement of stakeholders in various activities would highly benefit utility operations. As it has been done for revenue collections—in which banks and mobile phones are involved in revenue collection—mobile companies and other media could be used in various other ways, such as creating awareness on proper water use; reporting leakages; reporting illegal connections; reporting improper water use; reporting water resource pollution; etc. In addition, WSP implementation requires multi-stakeholder involvement, especially in regards to catchment and connection premises, as NWSC has no control over these segments. Efforts to approach and engage parties relevant to such matters are recommended.

#### 4.12 WISE UTILIZATION OF WATER

NWSC and its service areas are serious in ensuring that supplied water is utilized in a sustainable manner so as to meet the demand of its customers. To ensure proper use of water in the household, NWSC has a policy of ensuring that the pipe materials used for water supply are of good quality to avoid unnecessary bursts. The corporation does provide a subsidy on materials for connections for the first 50 meters from the water mains to the premises/houses. This assures the NWSC that proper materials for water

connections have been used. This was due to the fact that initially, customers were purchasing low-quality/substandard pipes and fittings that were prone to leaks and bursts. For connections that exceed 50 meters, the customer has to meet the cost of the additional connection materials to the premise/house. However, customers are required to purchase these materials under supervision of NWSC staff. The purpose is to ensure that the purchased materials are of the same quality as those subsidized by the utility. Another strategy used by utilities is discouraging lavish water use. This includes sensitization of water users through meetings and the media on the importance of proper use. Furthermore, NWSC has initiated on its website a “Tips” page, where explanations are given on saving water. All these efforts are commended and should be upheld.

# 5.0 PROPOSED WASH INTERVENTION PROJECT ACTIVITIES

Based on the findings of this baseline study, the following are the proposed interventions for Jinja and Entebbe.

## 5.1 REDUCTION OF NON-REVENUE WATER

NRW affects the two utilities significantly. Jinja suffers more than Entebbe. The two utilities and the NWSC at large highly prioritized NRW reduction. This issue was also high on the agenda during the meeting of the RWSHTF in Bujumbura February 11–13, 2014. The Task Force requested that the PREPARED Project address this issue so as to reduce the amount of loss and hence not only improve service access coverage but also increase utilities' revenues to enhance their viability.

The USAID/East Africa PREPARED Project should therefore undertake a detailed diagnostic study to determine the aspects leading to physical and commercial losses. This is very important to enable formulation of specific interventions for NRW reduction, as contributing factors to NRW (i.e., aspects related to physical and commercial losses) are not well known. This is because currently, NRW calculation is simply done by subtracting water sold from water supplied. Inadequate understanding of the NRW accounting system leads to failure to identify where, why, how, and how much water is being lost.

With such a situation, it is very difficult to have in place appropriate and specific oriented interventions that would minimize revenue losses caused by NRW. It is therefore very crucial for the suggested study to consider the whole water supply system—i.e., from water production to revenue collection—to identify and ascertain the possible causes of physical and commercial losses as indicated in Figure 5.1. It is anticipated that after the study, more specific interventions will be designed and implemented.

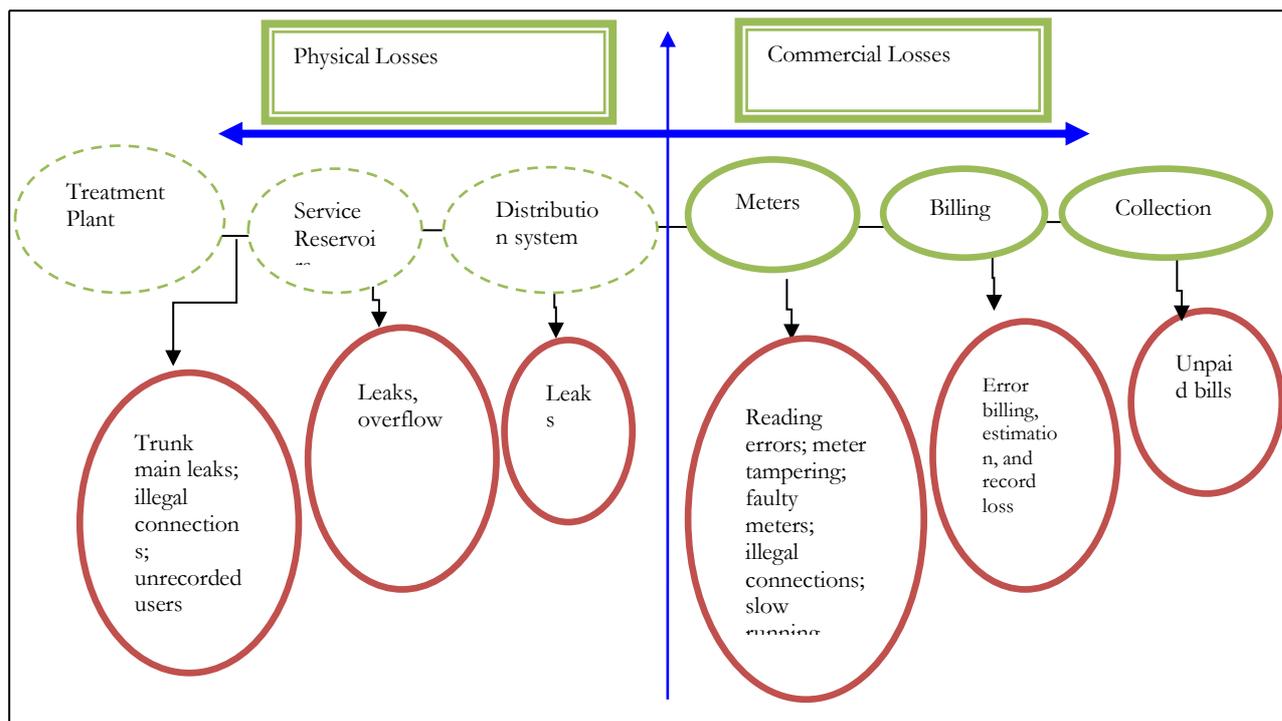


Figure 5.1: Possible causes of physical and commercial water losses

NRW reduction will lead to more people accessing water supply without increasing the network area. It will also result in additional revenue, which can be used to develop more utility assets. Proposed interventions for NRW reduction were recommended by the USAID/FABRI report.

## 5.2 CUSTOMER/ZONE MAPPING

Customer mapping is very critical, as it enables utilities to gain valuable information about customers and thus easily monitor their behavior. In addition, mapping of an area will help utilities know exactly where the network problem is located so they can institute appropriate measures. Despite the fact that the two areas are subdivided into territories, they are not zoned technically through the use of hydraulic modeling—and are therefore difficult to manage. Therefore, introduction of DMAs will improve management of the water network.

## 5.3 IMPROVEMENT OF THE INFORMATION MANAGEMENT SYSTEM

Billing, revenue collection, and accounting are computerized for NWSC-Jinja, NWSC-Entebbe, and NWSC in general. This provides an opportunity for more improvement to the utilities' information-management systems. Information and communication technologies (ICT) such as mobile phones and computers, in combination with a geographical information systems (GIS), can be used innovatively by utilities to obtain real-time information about water leaks; water theft; unauthorized water consumption and metering inaccuracies; data handling errors; and customer satisfaction. Having a system in place that can allow instant availability of information for decision making without going physically to a site would significantly improve utilities' performance. It is therefore important for the PREPARED Project to assist utilities in improving their information management system to ensure that all operations are computerized.

## 5.4 INTRODUCE QUALITY SERVICE IMPROVEMENT PROGRAM

A quality service improvement program (QSIP) is an interlocking series of activities within an organization that move it towards a more service-and customer-focused culture. Sometimes called an “organizational culture change” campaign, it attempts to change attitudes, behaviors, and the actual practices within an organization. It is therefore important that the PREPARED Project introduce, demonstrate, and

institutionalize a QSIP that will foster a service culture by involving managers, staffers who provide the service, and customers (or service users) in establishing service standards and in defining the means to achieve them. In order for NWSC-Entebbe and NWSC-Jinja to implement the program successfully, the PREPARED Project should train Entebbe and Jinja staffers in QSIP and assist in piloting it. NWSC-Entebbe and NWSC-Jinja can implement QSIP by conducting service audits and preparing service improvement strategies that will complement the currently used performance improvement programs.

## **5.5 PROTECTION OF WATER CATCHMENT AREAS**

Protection of water sources is of great importance as it assures continuous availability of water. The two water utilities get raw water from Lake Victoria, which has a diverse catchment area characterized by a high population density. The increase in the number of factories dealing with processing edible oil, soap, wheat, fish packing, tanneries, and petroleum depots—whose waste/effluent together with surface runoff end up directly in the lake—has a significant impact on the quality of raw water abstracted by the two utilities. Nevertheless, the rest of the catchment has been taken up for settlement, and other human activities like growing crops, animal farming, and charcoal burning have left the ground bare, thus reducing surface runoff. Surface rainfall runoff carries various types of waste (solid and other surface dumping) and significantly contributes to water source pollution. Thus, it has a direct impact on water production costs due to high energy and chemical use by the utility.

To ensure water quality, both Entebbe and Jinja have prepared WSPs (although the one for Entebbe is still in its approval process). If implemented successfully they will ensure availability of quality water. However, implementation of the plans is limited in catchment areas and customer premises, as the utilities have no control over them. Therefore, this requires multi-stakeholder involvement. The involvement of communities and NGOs could help utilities in managing water sources as well as in monitoring proper water use at the consumer level. Managing catchment areas and mobilizing the community on the proper use of water resources are some suggested activities.

# 6.0 PROPOSED INTERVENTION AND IMPLEMENTATION FRAMEWORK

The implementation approach is a key factor towards successful implementation of any intervention. To ensure successful implementation and sustainability of the project interventions, the PREPARED Project should use the existing NWSC organizational structures, as these will allow mainstreaming project activities into the organization framework easily. In this case, NWSC-Jinja and NWSC-Entebbe should be the lead agencies in implementing project activities.

However, in some aspects, involvement of community groups and NGOs is inevitable. Areas where community groups and NGOs could be involved include: implementing interventions related to managing water sources; protection of the water supply system; management of water kiosks; and community sensitization on the proper use of water resources. In addition, outsourcing of expertise in areas where NWSC lacks it is very important to ensure project intervention success.

Because it is sometimes difficult to roll out project activities on both utilities concurrently, it is proposed that Jinja be the first to roll out its interventions because Jinja has a high level of NRW (42.7%) compared with Entebbe (23%). This implies that Jinja is suffering from high revenue losses—which need to be rectified immediately.

## 7.0 RISKS ANALYSIS

Successful implementation of the proposed interventions will depend on how various actors and stakeholders will be involved and on their willingness to actively participate in executing the proposed interventions. Thus, the dependence factor creates a risk level for each of the proposed interventions. The consultant has envisaged the risks as presented in the table below.

The risks have been analyzed by identifying their level of significance to the proposed interventions. During the risk analysis, two levels of impact have been identified as likely/expected to happen during the implementation. These are:

- High risk
- Medium risk

For each identified risk, the consultant has established mitigation measures. The mitigation measure is aimed at reducing the impact of the risks. The following risks are anticipated and could lead to unsuccessful or difficult implementation of the proposed interventions. The table below provides analysis of the foreseen risks and of their proposed mitigation measures. If implemented, the proposed mitigation measures will be useful in reducing the anticipated impact (Table 7.1).

Table 121: Risk analysis to the proposed interventions

<b>RISK</b>	<b>RISK LEVEL BEFORE MITIGATION</b>	<b>MITIGATION MEASURE</b>	<b>RISK LEVEL AFTER MITIGATION</b>
Inadequate commitment of NWSC to implement PREPARED Project interventions and mainstream into NWSC operations for sustainability of the interventions	Medium	Holistic engagement of the utility management, district management, and ministry officials/representative	Low
The funding of PREPARED Project interventions depends on co-funding mechanisms from key actors, including NWSC. If NWSC will not set aside adequate funds to enable funding of the proposed interventions, it is obvious that the suggested interventions will be at high risk.	High	PREPARED demonstrates to NWSC the importance of the proposed intervention and supports some of the activities through grants. This may be done through funding of very important activities.	Medium
The key target dates are missed by project partners, hence causing a domino effect on other target dates, disrupting target project objectives.	Medium	PREPARED makes sure that partners are reminded through E-mails and other means of communication.	Low
Unwillingness of NGOs and community-based groups to participate in PREPARED Project interventions.	Medium	Engage the NGO and the community from the project onset; PREPARED supports them through grants.	Low
Unavailability of competent NGOs and community groups to execute project interventions	Medium	Use of task force member in the country to find competent NGOs; allow NGO at EAC to associate	Low

		with local NGOs to enhance capacity	
Quality of concept papers and proposals from key partners falling short of PREPARED Project expected standards	Medium	Ensure close collaboration during preparation of papers to streamline the requirements of the PREPARED Project	Low

# 8.0 CONCLUSION AND RECOMMENDATIONS

The NWSC is currently one of the best water and sewerage service providers not only in East Africa but also in Africa. NWSC has been recognized for its innovations and efforts that have resulted in a significant increase in service coverage and water supply reliability. NWSC won the prestigious 2014 Water Leaders Award during the Global Water Summit in Paris. Global Water Awards are an annual competition rewarding excellence and innovation, recognizing noteworthy projects and technologies in the water sector. The Water Leaders Award is unique among the Global Water Awards. It recognizes the people who are making a difference in their work for safe water and good sanitation. NWSC was recognized for its innovations and efforts, which have resulted in a significant increase in service coverage and supply reliability.

Despite this achievement, NWSC faces several challenges that impact its effectiveness and thus need to be addressed. These serious challenges include low water supply and sewerage coverage; high NRW, especially in Jinja; illegal connections; meter tampering; inaccurate meters; meter reading errors; pressure management problems; an unmapped network system; and customers who hamper effective monitoring and management of the network.

Based on the findings of this study, the following are the proposed actions/recommendations to address these challenges:

1. Conduct diagnostic study to determine the causative factors for physical and commercial water loss
2. Implement recommendations from the diagnostic study so as to reduce NRW to the recommended level/target
3. Establish DMAs to enhance monitoring of the network system and of customers
4. Improve effectiveness of information management system using current technology
5. Introduce quality service management system to complement current Performance Contract management to enhance organization productivity
6. Enhance protection of water catchment areas, water network reticulation system, and enhance monitoring of water resource use through the involvement of various actors such as NGOs, community groups, and mobile phone service providers
7. Establish stringent measures for those who tamper with water meters and make illegal connections
8. Prepare framework for engaging NGOs on managing water resources, managing catchment areas, and monitoring the network system

# 9.0 LIST OF CONTACTED LITERATURE

1. USAID. March 2010. Uganda Water and Sanitation Profile Report.
2. Republic of Uganda. 1999. National Water Policy. [www.ruwas.co.ug/reports/National%20Water%20Policy.pdf](http://www.ruwas.co.ug/reports/National%20Water%20Policy.pdf).
3. Republic of Uganda. 1997. Water Act. [www.ulii.org/ug/legislation/consolidated-act/152](http://www.ulii.org/ug/legislation/consolidated-act/152).
4. Republic of Uganda. 1995. Constitution of Uganda. [www.parliament.go.ug/new/images/stories/constitution/Constitution\\_of\\_Uganda\\_1995.pdf](http://www.parliament.go.ug/new/images/stories/constitution/Constitution_of_Uganda_1995.pdf).
5. Republic of Uganda. 1995. National Water and Sewerage Corporation Act. [www.ulii.org/ug/legislation/consolidated-act/317](http://www.ulii.org/ug/legislation/consolidated-act/317)
6. National Water and Sewerage Corporation. 2010–2011. Annual Report for 2010–2011. Kampala, Uganda.
7. National Water and Sewerage Corporation. 2011–2012. Annual Report for 2011–2012. Kampala, Uganda.
8. National Water and Sewerage Corporation. 2012. Corporate Plan 2012–2013 – Enhancing Financial Sustainability and Infrastructure Growth. Kampala, Uganda.
9. NWSC-Jinja. 2013. Management of Internal Stakeholders in Jinja Area. The Herald Vol. 4, Issue 2, July–September 2013. Kampala, Uganda.
10. National Water and Sewerage Corporation. 2013. The Five-Year Strategic Direction 2013–2018. Kampala, Uganda.
11. National Water and Sewerage Corporation. 2014. Biannual Report July–December 2013. Kampala, Uganda.
12. National Water and Sewerage Corporation. 2013. Water Safety Plan Revue: Final Draft Report.
13. National Water and Sewerage Corporation – Jinja. Water Safety Plan Development and Implementation.
14. National Water and Sewerage Corporation – Entebbe: Water Safety Plan (Final Draft).
15. National Water and Sewerage Corporation website. [www.nwsc.co.ug](http://www.nwsc.co.ug).
16. African Water Association/USAID-FABRI. 2013. Africa Non-Revenue Water Programme Audit Report: National Water and Sewerage Corporation (NWSC) Jinja and Iganga Areas 13–20 January, 2013.
17. African Water Association/USAID-FABRI. 2013. Africa Non-Revenue Water Programme Audit Report: National Water and Sewerage Corporation (NWSC) Entebbe Area 13–20 January, 2013.
18. Tetra Tech ARD. 2014. Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development (PREPARED): Proceeding of the Regional WASH Task Force Meeting Report Held at Royal Palace Hotel from 11–13th February, 2014, Bujumbura, Burundi.

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