



UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME  
Water for African Cities

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Peter ND



# *Lake Victoria Region Water and Sanitation Initiative*

*Supporting Secondary Urban Centres  
in the Lake Victoria Region to Achieve the Millennium  
Development Goals*

# UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME (UN-HABITAT)

## Water for African Cities Programme

### Lake Victoria Region Water and Sanitation Initiative

*Supporting Secondary Urban Centres in the Lake Victoria Region to Achieve  
the Millennium Development Goals*

#### *Introduction*

UN-HABITAT has been implementing the Water for African Cities Programme since 1999. The programme is a direct follow-up to the Cape Town Declaration, adopted by African Ministers in December 1997, addressing the urgent need for improved water management in urban areas of the continent.

The first phase of the programme focused on three inter-linked priorities:

- Introducing effective urban water management strategies in African cities – Demand management and other related measures were implemented in seven participating cities through pilot demonstrations;
- Protecting freshwater resources from the growing volumes of urban waste – Assisting participating cities to strengthen capacity for monitoring of freshwater pollution from urban waste and to take mitigating measures;
- Enhancing regional capacity for urban water management through information sharing, enhancing public awareness, training and education.

The programme was launched in 1999, initially with funding support from the United Nations Foundation for International Partnerships (UNFIP/UNF). A growing number of multi-lateral and bilateral external support agencies have since extended their support, with a resulting increase in the scope and outreach of the programme.

The Water for African Cities programme has demonstrated in seven African countries (Cote d'Ivoire, Ethiopia, Ghana, Kenya, Senegal, South Africa and Zambia) how to put in place an integrated urban water resource management strategy that could bring three key sectors: urban, environment and water, to work together. Tanzania is the eighth country to have joined the programme.

In a relatively short span of time the programme has created a new demand-side focus in water management. By cutting down on wastes and containing excessive demand, several

cities have clearly demonstrated how service coverage, especially to the urban poor, could be extended with modest additional investments.

Catchment management strategies introduced by the programme in the participating cities are demonstrating practical application of Integrated Water Resource Management at the local level. The programme provides a unique platform to bring together diverse stakeholders from the urban, water and environment sectors and community groups into action-planning, monitoring and implementation of local environment management of water resources.

The regional activities of the programme are primarily aimed at extending its outreach and benefits to other cities on the continent that are not directly participating in demonstration projects, but could gain from sharing of information and experience of good practices. Regional activities also promote synergy among the demonstration cities and the optimal use of programme resources.

The programme, has already been endorsed by NEPAD for further support. The United Nations General Assembly, in its resolution 57/275 adopted in December 2002, has also called upon UN-HABITAT to further support the implementation of the Water for African Cities Programme.

Phase II of the Water for African Cities Programme, which has received wide donor support, is now fully operational, and collaborative arrangements are being developed with the African Development Bank to facilitate follow up investments to ensure scaling up of the results of the programme at the country level. Results from Phase I and from various regional consultations have led to a broadening in the scope of activities to be supported, and additional cities have joined the programme. Phase II now covers the following key substantive activities:

- ❑ Pro-poor water governance and follow-up investment to achieve MDGs;
- ❑ Sanitation for the urban poor;
- ❑ Urban catchment management;
- ❑ Water demand management;
- ❑ Water education in schools and communities;
- ❑ Awareness creation and advocacy.

A key objective of phase II of the programme will be to create an enabling environment in African cities to stimulate follow-up investments in water and sanitation. From early on, in this phase, the programme would work in close collaboration with governments and international financing institutions so that the capacity building efforts of the programme lead to concrete investments.

## *Millennium Development Goals on Water and Sanitation*

One of the important outcomes of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, attended by over 100 Heads of State and Governments, was the endorsement of the targets and goals of the Millennium Development Goals (MDG) put forward at the Millennium Summit in 2000, and a renewed commitment to implementing actions to achieve them.

The MDGs and the outcomes of WSSD underlined that the global water crisis is a threat to economic development, poverty reduction and the environment and, hence, to peace. The UN Millennium Declaration and the preparatory process for WSSD further affirmed the role of water as a key to sustainable development, and the urgency of immediate action.

## *Lake Victoria Initiative*

An important initiative is now being undertaken to address some of the key issues that constrain improved access to water and sanitation by the population bordering Lake Victoria. The *Lake Victoria Region Water and Sanitation Initiative* aims to provide the necessary support to secondary urban centres in the Lake Victoria Region to enable them to achieve the Millennium Development Goals (MDGs) and to reduce pollution loads entering the lake.

In collaboration with country governments (Kenya, Tanzania and Uganda), UN-HABITAT has facilitated a rapid appraisal of the current status of water and sanitation provision, by undertaking questionnaire surveys (verified by field missions) in ten secondary towns in each country with the aim of:

- Assessing the state of water and sanitation infrastructure;
- Quantifying the infrastructure investment needs to attain the MDGs;
- Identifying capacity building needs;
- Developing infrastructure investment plans for selected urban centres;
- Assessing the needs of the low-income urban population.

This initiative would from the beginning seek to ensure synergy with the Lake Victoria Environmental Management Programme and the Nile Basin initiative (equatorial), coordinated under the East African Community through its Lake Victoria Development unit. Additionally, the initiative would seek to establish links, in a collaborative framework with the NEPAD Water Agenda facilitated by the African Development Bank, for the region.

## *Rationale*

Rapid urbanization in many towns bordering Lake Victoria is severely impacting lake water quality. There is a need to address the decayed infrastructure, the state of deterioration of which is exacerbated by the lack of financial resources and capacity amongst local authorities where specialist assistance and skills are not available.

The gaps in service provision are grossly underestimated. At the same time, it is wrongly assumed that water and sanitation infrastructure rehabilitation in secondary towns will require huge investments or capital expenditure. This is not necessarily the case, as rehabilitation of existing infrastructure and provision of capacity-building to ensure efficient operation of the utilities, as well as to provide the revenue base to operate and maintain the systems, do not require very large investments.

While the proposed investments under this Initiative target the rehabilitation and upgrading of water and sanitation infrastructure, the ultimate aim of the Initiative is to improve the living conditions of the urban and peri-urban poor. In particular, the Initiative aims to improve the livelihoods of low-income urban populations that lack adequate water and sanitation facilities.

### *Why is this Initiative different ?*

Current approaches to the provision of infrastructure often focus on the provision of entirely new infrastructure and neglect the alternative of rehabilitating existing systems and extending service coverage by these systems to the poor. The Lake Victoria Region Water and Sanitation Initiative focuses on improving facilities that are already in place. By combining improvements to the existing bulk service deliveries with an increase in the rate of service connections, under a governance framework favourable to the poor, the rapid attainment of the MDGs can be achieved in these secondary urban centres.

### *Why is the Initiative focusing on secondary urban centres ?*

UN-HABITAT's *Water and Sanitation in the World's Cities Report 2003* shows that the majority of the low- and middle-income populations in secondary urban centres do not have access to piped water supplies and that the provision of sanitation has very much been left to individual households. As these secondary urban centres grow, however, the emphasis on the provision of water and sanitation facilities moves away from household provision to city wide provision, implying the construction of a piped water system and off-site sanitation. By assisting these urban centres to develop their water and sanitation infrastructures alongside their development and expansion, the Initiative ensures that the coverage of these facilities is extended to a larger population.

Furthermore, secondary towns and urban centres are neglected in national and regional development plans. By focusing on secondary urban centres, where the pressure on existing infrastructure is greatest, the Initiative can achieve a much greater impact. In many cases, the legislative environment is adequate but due to the lack of financial and human resources, many people endure an unacceptably low-level of service provision.

The preliminary selection of secondary urban centres in the Lake Victoria Basin has been made on the basis of the following criteria:

- Geographical distribution;
- Size of population;
- Percentage of population not served with water and sanitation;
- Present (negative) environmental impact on Lake Victoria;
- Available level of water and sanitation infrastructure;
- Available human resources capacity at utility level;
- Progress with MDGs;

- Performance on past investments; and
- Preparedness for new investments.

The secondary centres selected are as follows:

KENYA		TANZANIA		UGANDA	
Name	Population	Name	Population	Name	Population
Kisii	85,000	Mwanza	600,000	Ggaba	10,000
Bondo	30,000	Sengerema	53,000	Mukono	50,000
Busia	55,000	Geita	72,000	Jinja	87,000
Mumias	109,000	Biharamulo	33,000	Mayuge	15,000
Webuye	60,000	Muleba	15,000	Mutukala	15,000
Siaya	48,000	Bukoba	81,000	Busia	30,000
Homa Bay	56,000	Musoma	115,000	Wakiso	25,000
Kendu Bay	15,000	Bunda	51,000	Mpigi	20,000
Migori	58,000	Nansio	12,000	Masaka	65,000
Kisumu	440,000	Tarime	16,000	Kyotera	12,000

Note: For the larger towns (Kisumu, Mwanza, Masaka, Jinja) the Initiative focuses on the low-income areas.

## *Where are the key problem areas?*

Monitoring programmes that have been undertaken to assess the water quality in Lake Victoria tend to indicate that although the water quality in the main body of the lake is polluted to varying degrees, the narrower bays and gulfs experience very severe pollution. The close proximity of wastewater discharge and raw water abstraction result in serious risks of contamination of water supplies in these areas. The situation is exacerbated by the poor state of operation and maintenance of wastewater treatment facilities. In some secondary urban centres, untreated raw water is piped directly to local residents.

Although in 80% of the urban centres surveyed some form of piped water supply is in place, the provision of sanitation is far from adequate. The sewage treatment works are only located in the bigger urban centres, but their infrastructure is old and, in most cases, there are no adequate laboratory facilities to monitor the treatment process. This results in effluents high in nutrients and biochemical oxygen demand (BOD) being discharged directly into Lake Victoria. In other urban centres where there are no treatment works, the main form of sanitation in both formal and informal settlements is the simple pit latrine (though a small percentage do have septic tanks). Whilst ventilated improved pit (VIP) latrines can provide adequate sanitation, they have to be managed properly with efficient emptying and disposal systems in place. All the towns surveyed lacked adequate facilities to empty pit latrines.

The survey of solid waste management in all the towns revealed only a limited amount of household collection. The town councils in most cases are responsible for the collection of solid waste. However, the final disposal of waste is at open unplanned dumpsites, often located on the outskirts of the urban centres. In many unplanned informal settlements, further problems result from inadequate surface water drainage and an indifferent attitude towards littering and the use of drains for disposal of domestic wastes. The present Initiative seeks to identify and remedy situations where such waste contaminates water supplies, in order to



**UN-HABITAT**

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**LAKE VICTORIA REGION  
WATER AND SANITATION INITIATIVE**

**LOCATION OF 15 TOWNS**

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break the cycle of disease transmission and, in so doing, to protect the health and livelihoods of the poor.

## *How is the Initiative being implemented?*

The Initiative is being implemented in three phases:

### *Phase I: Rapid Assessment*

Phase I has been implemented using a novel approach developed by UN-HABITAT consisting of a rapid assessment carried out in two parts in consultation with the respective Ministries in charge of water and sanitation in each country. The first part comprised collection of primary data by means of a questionnaire designed to capture information from national and local authority levels and referenced to random household surveys. The second part of the assessment included field visits by experts to verify the data collected and assess the proposed interventions.

The overall objective of this assessment has been to collect and analyze information pertinent to the following:-

- Infrastructure investment potential in the surveyed towns;
- National policies, strategies and development plans/priorities (including PRSPs) and how they impact on town-level provision of water and sanitation services, to both the served and the un-served;
- Current and planned donor-supported projects and investment plans;
- Present governance structure;
- Capacity building needs for water and sanitation infrastructure in selected towns;
- Ability of selected towns to manage investment projects;
- Physical interventions required and estimates of costs for both physical interventions and capacity building requirements;
- Information on environmental impact studies in the Lake Basin and provision of guidance on the main environmental problems resulting from rapid urbanization and insufficient service provision

### *Phase II: Development of Investment plans*

The necessary interventions identified in the rapid assessment have been costed in more detail, so that investment plans could be developed for five selected urban centres, in the first stage, in each country.

The five selected urban centres in each country area as follows:-

KENYA	TANZANIA	UGANDA
Kisii	Sengerema	Ggaba
Mumias	Geita	Mukono
Webuye	Bukoba/Muleba	Jinja/Bugembe
Homa Bay	Musoma	Masaka
Migori	Bunda	Kyotera



The selection of these urban centres has been made in consultation with the respective National Authorities on the basis of the criteria identified in the preliminary selection of the urban centres. The selection was also reconfirmed from the results of the rapid assessment which indicated that these towns were contributing significantly to the pollution of the Lake because of their dilapidated, if not non-existent sanitation infrastructure and lack of capacity in the municipalities to cope with the increasing waste generation and inadequate sanitation infrastructure.

The investment plans include detailed listings of the interventions required to improve the service coverage of water and sanitation in order to take a significant step towards meeting the MDGs and estimating the impact in terms of the number of persons who will benefit from the intervention. In the second stage, investment plans will also be compiled for the remaining fifteen towns, while training and capacity-building interventions will be implemented in the region as a whole.

### ***Phase III: Implementation***

Taking due cognisance of other on-going and planned activities, the Initiative can move to rapid field implementation. Assuming a process of fast procurement using local suppliers and local labour, implementation on the ground can proceed immediately.

### ***What are the outcomes to date?***

The field appraisals carried out so far have revealed that the problems in each of the lakeside towns are quite similar in the three countries. In all urban centres, lack of water and sanitation is a major problem, especially in low-income settlements. The problem is exacerbated by inadequate and malfunctioning raw water treatment plants, as well as lack of sewerage networks and sewage treatment plants. The latter create serious point-sources of contamination for Lake Victoria water, in particular near the larger urban centres. Problems with solid waste collection and disposal are very similar around the Lake, while drainage is a problem in the majority of the towns.

In recent years a significant amount of investment has gone into the water and sanitation sector, but considerable additional investment is still needed to provide better living conditions for the urban poor in particular. Several large-scale projects are in the process of implementation, but the smaller urban centres suffer from a lack of attention and investment.

### ***Physical interventions***

The interventions now being proposed for the urban centres around Lake Victoria generally comprise rehabilitation of existing water distribution networks involving modest expansions in some cases; provision of additional raw water pumping capacity; rehabilitation and expansion of water treatment works and significant expansion of distribution through customer connection; metering and, in many cases, communal water points. With regard to sanitation, the Initiative has focused on minor improvements to the treatment works and on provision of communal facilities in the low-income areas. The latter are communal latrines,

either having a connection to the sewerage network, or using a septic tank. Solid waste management and drainage are given due attention.

## ***Capacity-building***

It is recognized that a balance has to be struck between investments in rehabilitation and improvement works and investment in capacity-building for operational management in order to ensure sustainability. Due prominence has been given to capacity-building in operation of raw water and waste water treatment facilities. In addition, training and associated facilities will be provided to put in place efficient billing and revenue collection systems. Water demand management capabilities will be established by specialised training courses for management and technical staff. All training courses will be given in the sub-regional context, e.g. the workshop focusing on the technical aspects of water treatment works operation will involve participants from all the towns in the sub-region.

On the consumers side, emphasis will be given to providing the communities with the skills required to run communal water supply systems and communal sanitation facilities.

## ***Who are the partners and how will it work with existing initiatives?***

The implementation framework of the initiative will seek to complement bilateral and multilateral funded water and sanitation activities in the Lake Victoria region such as: French Development assistance in water supply in Kenya and Tanzania; the European Development Initiative in Northern Tanzania; the African Development Bank's water supply and sanitation programme in the region; Danish Small Towns Water and Sanitation Project in Uganda and Swedish support to environmental initiatives in the Lake Victoria region.

UN-HABITAT will also seek to build partnerships with community-based organizations (CBOs) and non-governmental organizations (NGOs) in order to implement community water and sanitation infrastructure projects.

## ***How long will it take?***

Once funding is in place, time will be required to engage consultants, carry out detailed inspection of the facilities in each town, firm up on the scope and design of the rehabilitation and improvement works to be undertaken, prepare contract documentation and commission the works. The time required for implementation of these works will vary from town to town. However, it is anticipated that this will typically be one to two years.

The training and capacity building process will proceed on an appropriate schedule. Some of these activities can proceed in parallel with construction, whilst others will require new facilities to be operational before they can be sensibly started. The training and capacity

building can therefore be expected to continue for 6 months beyond completion of the physical works. Therefore within two and half years, a significant step will have been taken in these towns towards achieving the MDGs.

### ***Coordination with Local Authorities***

Close co-operation has been established with the authorities responsible for water and sanitation in each of the three riparian countries. The institutional arrangements in place are as follows:

In *Kenya*, a task force has been set up at the Ministry of Water Resources Management and Development under the chairmanship of the Deputy Director. The Chairperson of the Lake Victoria South Water Service Board is also a member of the task force. Weekly progress meetings are held to monitor progress. The Ministry has issued instructions to all District Water Officers, Utility Managers and Municipal Engineers of the towns involved.

In *Uganda*, the Initiative is being coordinated by the Ministry of Lands, Water and Environment under the direct guidance of the State Minister for Water. The National Water and Sewerage Corporation provides important technical and logistical support.

In *Tanzania*, the Initiative will be co-ordinated at the national level by the Ministry for Water and Livestock Development. At the regional level, the Initiative will be coordinated by the Regional Water Engineers in Kagera, Mwanza and Mara Regions, respectively.

### ***Coordination with Regional Authorities***

A good working relationship has been established with the Lake Victoria Environmental Management Project, involving its local offices in Entebbe, Kisumu and Mwanza respectively.

The East African Community has officially recognized the Initiative and has invited UN-HABITAT to become a permanent member of the Sectoral Council for Lake Victoria Basin.

### ***What are the interventions for the towns and what is it going to cost ?***

In the following country report a description of the findings and recommended interventions for each town are given. A detailed matrix of proposed interventions including the cost estimates is also attached.

**OVERVIEW OF PROPOSED INTERVENTIONS – LAKE VICTORIA WSS INITIATIVE**

	WS – source study	WS – intake works	WS – treatment plant	WS – distribution	WS – metering	WS – communal w/p	SAN – sewerage	SAN – treatment works	SAN – communal facil.	Solid Waste	Urban Drainage	Physical Planning	Campaigns & Advocacy	CB – water treatment	CB – water billing	CB – WDM	CB – Health & hygiene	CB – Community	Estimated total physical works investment cost (USD)	Estimated total capacity building and training (USD)	Total investment (USD)
<b>KENYA</b>																					
Homa Bay																			3,309,620	235,000	3,544,620
Kisii																			1,724,144	250,000	1,974,144
Migori																			4,647,465	255,000	4,902,465
Murmas																			5,618,394	290,000	5,908,394
Webuye																			2,017,008	245,000	2,262,008
<b>Total Kenya</b>																			17,316,631	1,275,000	18,591,631
<b>TANZANIA</b>																					
Bukoba/Muleba																			3,432,885	345,000	3,777,888
Bunda																			5,013,954	165,000	5,178,954
Geita																			3,529,764	200,000	3,729,764
Musoma																			1,347,570	230,000	1,577,570
Sengerema																			5,069,844	195,000	5,264,844
<b>Total Tanzania</b>																			18,394,020	1,135,000	19,529,020
<b>UGANDA</b>																					
Bugembe (Jinja)																			2,155,284	80,000	2,235,284
Ggaba (Kampala)																			1,989,684	85,000	2,074,684
Kyotera																			2,582,216	180,000	2,762,216
Mukono																			4,299,804	80,000	4,379,804
Nyendo (Masaka)																			2,138,724	85,000	2,223,724
<b>Total Uganda</b>																			13,165,712	510,000	13,675,712
<b>Total Initiative</b>																			48,876,363	2,920,000	51,796,363

WS Water Supply  
 UD Urban Drainage  
 SAN Sanitation  
 WDM Water Demand Management  
 SW Solid Waste Management  
 CB Capacity Building

56,976,899  
 56,976,899  
 56,976,899

UNITED NATIONS HUMAN SETTLEMENTS  
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Water for African Cities Programme

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Achieve the Millennium Development Goals*

**GEITA TOWN**

**TANZANIA**

August 2004

**LAKE VICTORIA REGION WATER AND SANITATION  
INITIATIVE**

**GEITA TOWNSHIP**

**TANZANIA**

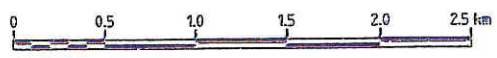
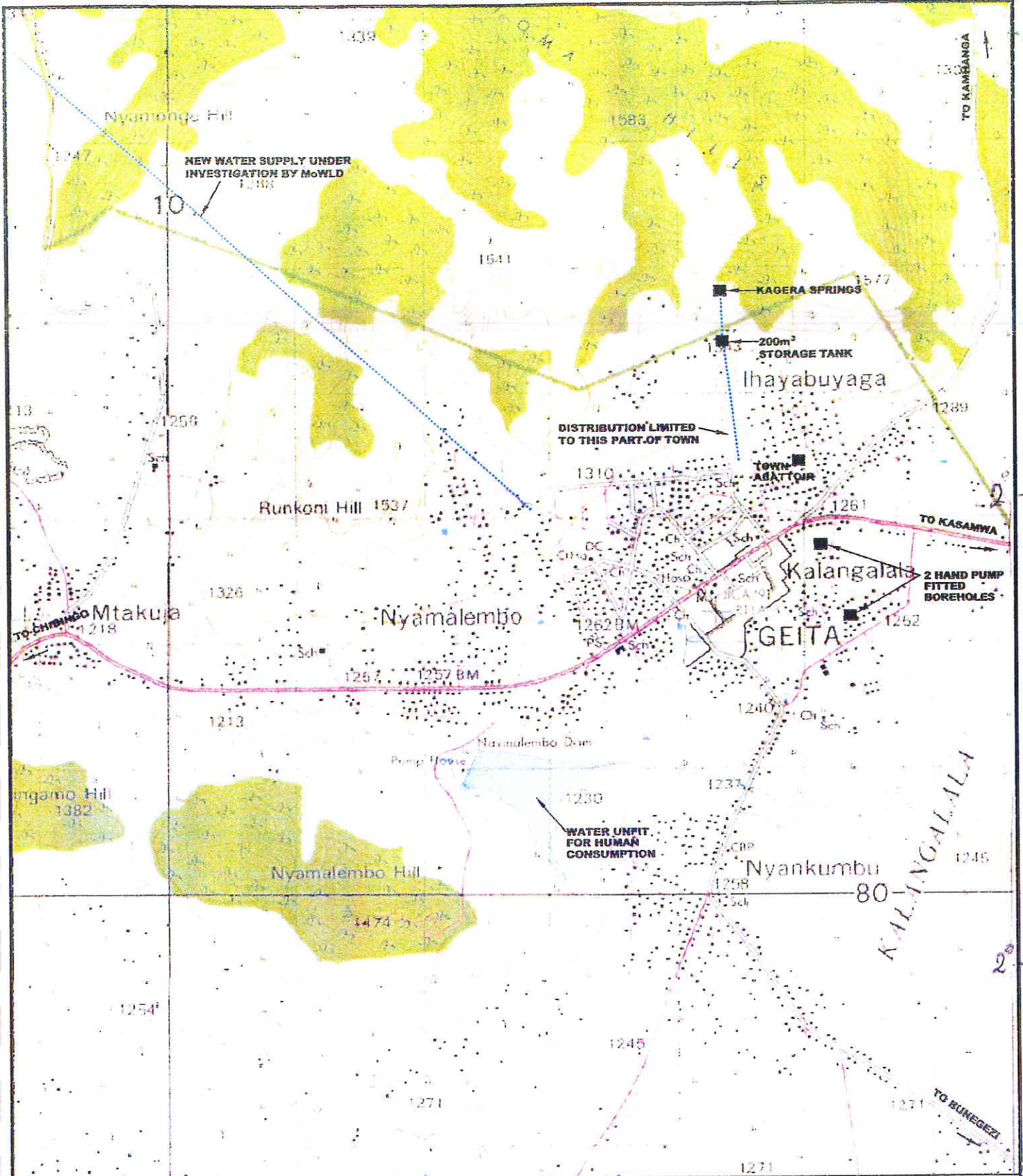
**GEITA TOWN,  
Geita, Tanzania**



Municipality Population Town Population Population growth rate Municipality surface area:	72,482 (2002) 3.2%	Project inhabitants in 2015 is 109 161
Water Undertaker: Ministry of Water and Livestock Development		
Sewerage, Sanitation and Solid Waste Operator: Geita Town Council		
Geita township lies within the Lake Victoria zone, southwest of Sengerema. The township is accessible by road from either Sengerema or Kahama of Shinyanga region. People in Geita Township are engaged in mining agriculture, fishing, and commerce as economic activities.		
<b>Issues/problems:</b>	<ul style="list-style-type: none"> <li>• Town used to have a piped water supply from Nyamalembo Dam. The Dam is no longer functioning and the residents rely mainly on water supplied from shallow and deep wells.</li> <li>• Water abstraction from wells is slow and people spend a significant part of their time in queuing water.</li> </ul>	
• Sewerage and Sanitation	• Pit latrines are the most common sanitation infrastructure. The latrines are located near boreholes in residential areas and there is a high risk of faecal contamination	
• Solid waste and drainage	• There is no waste collection, residents have to dispose of household waste themselves.	
• Capacity building:	<ul style="list-style-type: none"> <li>• No capacity within Council to provide a waste collection service</li> <li>• Urban plans and drawings of water distribution system are out of date</li> </ul>	
<b>Proposed interventions:</b>	<ul style="list-style-type: none"> <li>• Develop local water sources, including a study on supplying water from the Lake.</li> <li>• Develop a wellfield and construct water storage reservoirs and distribution pipework to the town.</li> </ul>	
• Sewerage and Sanitation	<ul style="list-style-type: none"> <li>• Construction of new waste stabilisation ponds (to include the disposal and septic tank and pit latrine sludge).</li> <li>• Provision of vacuum tanker</li> </ul>	
• Solid waste and drainage	<ul style="list-style-type: none"> <li>• Construction of sanitary landfill</li> <li>• Construction and procurement of equipment for waste collection and transfer</li> </ul>	
• Capacity building	<ul style="list-style-type: none"> <li>• Community training in hygiene and sanitation</li> <li>• Training in engineering, O&amp;M, water demand management, water resource management, sanitation and hygiene education, health and safety</li> <li>• Training to improve waste collection and management.</li> </ul>	
<b>Expected Outcomes:</b>	<ul style="list-style-type: none"> <li>• Improvement of the percentage of the town's population receiving clean and safe water from the current 0% to about 50%</li> </ul>	
• Water Supply	• Reduce faecal-oral contamination of water source	
• Sewerage and Sanitation	• Introduction of household collection and environmentally sustainable disposal of waste	
• Solid waste & drainage	• Improve capacity in local authority to provide a waste collection service and to meet the high demand of water and sanitation	
• Capacity building		
<b>Required Investment:</b>	<ul style="list-style-type: none"> <li>• Water Supply</li> <li>• Sewerage and Sanitation</li> <li>• Solid Waste and Drainage</li> <li>• Capacity Building</li> </ul>	USD 2,235,600 USD 529,092 USD 765,072 USD 200,000
	<b>TOTAL</b>	<b>USD 3,529,764</b>
<b>Anticipated effect on MDGs</b>	Increased coverage of water supply and sanitation to at least 50% of the population currently unserved.	
<b>Anticipated effect on Lake Victoria</b>	Reduce possible leachate into ground water and protection of springs and wells.	

410E

3214

32.15



 <p><b>UN - HABITAT</b> United Nations Human Settlement Programme</p>	<p>Project Title <b>LAKE VICTORIA REGION WATER AND SANITATION INITIATIVE</b></p>	<p>Drawing Title <b>TANZANIA GEITA TOWN EXISTING WATER SUPPLY FACILITIES</b></p>		<p>Date: AUGUST 2001 Scale:</p>
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# 1. INTRODUCTION

## 1.1 Location

Geita Township lies within the Lake Victoria zone, southwest of Sengerema. The township is located within the latitudes 2°51'05"-2°55'00"S and longitudes 32°10'00"-32°15'00"N and is accessed by road from either Sengerema or Kahama of Shinyanga region.

## 1.2 Population

The 2002 population census gives a population of 72,482 inhabitants in Geita Town. Geita town has been growing steadily since the 1967 National Census. Based on the 3.2% regional growth rate per annum, the population of Geita town is expected to increase by 51% to 109 161 inhabitants in the year 2015.

## 1.3 Socio-economic conditions

People in Geita Township are engaged in mining, agriculture, fishing, and commerce as their main economic activities.

## 1.4 Water Demand

With a current population estimated at 72482 inhabitants and assuming a per capita demand of 100 l/day, the current water supply demand is of the order of 7,248 m<sup>3</sup>/day. This is projected to increase to about 11000m<sup>3</sup>/day by 2015

# 2. WATER SUPPLY

## 2.1 Institutional Background

Currently, the district water engineer's office handles all matters related to the water supply in Geita town.

## 2.2 Water Supply Systems

### 2.2.1 General

There was a water supply system based on the Nyamalembo dam source, which used to serve the then urban population. However, this source was abandoned following a declaration that water stored in the reservoir was unfit for human consumption due to high levels of mercury.. Since then, the Geita population relies mainly on the supply from wells. However, only the Kagera area is supplied by the piped gravity system from these sources.

### 2.2.2 Existing Water Sources and Quantity

As indicated above, the main sources of water for the town after abolition of the Nyamalembo water source are the wells. Currently, there are only two water sources utilised for water demand in Geita town. These are:

- The Kageru spring that is piped from the surrounding hills to the Ihayabuyaga storage tank with a capacity of approximately 200m<sup>3</sup>. This reservoir supplies water under gravity to the adjacent Ihayabuyaga residential area only (an

estimated 4,000 people). The water supply is limited and residents only receive water every second day. The storage reservoir never fills due to the over-demand for water; and

- Groundwater abstracted from 9 boreholes and 6 shallow wells scattered all over the town that serves the remainder of town inhabitants. Two of these boreholes have been fitted with hand pumps. The other boreholes belong to businesses, private owners or institutions. Some of these wells have high hourly yields reaching up to 15m<sup>3</sup> per hour. For short term plans to improve water supply of the town to alleviate the water shortages, these high yield wells are essential sources particularly when fitted with pumps and provided with storage tanks. For long-term plans of water supply to the Geita town, the Lake source is the only alternative that can provide adequate water supply to people. The most probable location of the lake intake at Nungwe bay is about 21 kilometres from the township.

### **2.2.3 Water Treatment**

The absence of a functioning distribution system implies a lack of a treatment plant which is usually an integral part of the water supply system. Therefore, inhabitants are advised to boil water before it is consumed.

### **2.2.4 Transmission and Distribution**

The existing transmission and distribution pipe systems for the Geita Township needs to be replaced by a newly designed system to include the newly developed areas of the township. It is to be noted that in its late stages of operation, just before the water supply from Nyamalembo was abandoned, these pipes were heavily corroded to the extent that consumers were receiving coloured water at their taps.

### **2.2.5 Problems with water supply**

The demand for water far exceeds the capacity of the Kageru spring source with the effect that the storage tank is nearly always empty. Even though there are reportedly high yields from ground water sources in the Geita area, an analysis of water from the existing boreholes and wells show water of a generally good quality but is slightly alkaline. The relatively higher nitrate level of the water from the institutional boreholes is indicative of faecal groundwater pollution.

Due to the slow abstraction of water by means of the utilisation of hand pumps, people start queuing from early morning till late afternoon in order to buy a few litres of water. The public water supply is totally inadequate and water vendors charge high prices for water. As on-site sanitation is the only means of waste treatment (mainly pit latrines) and the boreholes are mostly located within the residential areas, there is a distinct danger of faecal ground water pollution.

## **2.3 Tariff**

Water vendors, who dominate the water distribution business in the township, determine the price of water. The vendors are members of the groups that own the production wells. Four 20 litres buckets currently sell for between TSh 300/- and 400/- which translates into TSh 3.75/- to 5/- per litre of water, too expensive for a local Geita inhabitant to afford. Moreover, these prices increase with increasing distance from the well.

### **3. SANITATION, SOLID WASTE MANAGEMENT AND DRAINAGE**

#### **3.1 Institutional Background**

The Geita Town Council's has the responsibility for sanitation, solid waste management and drainage for the town.

#### **3.2 Sanitation**

##### **3.2.1 Off-site sanitation**

There is no waterborne sewerage (or sewage) treatment system in Geita town and area residents rely on pit latrines, and to some extent on septic tanks (people with private boreholes). With increasing water supply, sullage and wastewater will become an issue and has to be catered for in future planning for the town. Geita township is not sewered at all and only few have septic tanks. As a result most of the people depend on on-site sanitation. Since the township has no septic emptier, the people in Geita suffer when it comes to emptying their septic tanks.

##### **3.2.2 On-site sanitation**

As indicated above, on-site sanitation is the main mode of sanitation in the town since there is currently no alternative. The Geita Town Council has no vacuum tanker and does not have the means to empty septic tanks or pit latrines. Treating sewage sludge properly will prevent contamination and spread of disease as well as pollution of the environment.

#### **3.3 Solid waste management**

There is no form of waste collection or solid waste management in Geita town. Waste disposal is mainly indiscriminate in available open spaces by the residents. Acquisition of waste collection and transport facilities will enable the Council to collect wastes on a daily basis to keep the town clean and create a pleasant living environment. Collecting solid wastes but not having a disposal site leads to rubbish being dumped anywhere people may find convenient, leading to unsightly areas with pollution potential.

#### **3.4 Drainage**

There are no surfaced roads in Geita town and no constructed drainage channels. Except for the main road which is maintained by the mine, other roads and streets are severely eroded by storm-water run-off. Proper drainage management will prevent erosion of roads and the environment, and protect valuable soils from being washed into the lake. A study would need to be conducted for a drainage master plan for the township. Although Geita town has a Development Plan the mapping is outdated and needs to be updated to facilitate a more realistic town planning for the area.

#### **3.5 Sanitation in low income areas**

As in most places, the low income areas are in a poor state due to congestion, poor drainage and inadequate infrastructural facilities. In particular, sanitation facilities are inadequate and in very poor state.

#### **4. INSTITUTIONAL CAPACITY**

In the long run, an autonomous authority dealing with water and sewerage may have to be established in Geita. The staff to be assigned to the authority, as well as staff of the town council, would also have to be trained in all aspects of water supply, sanitation, waste management and drainage issues to facilitate the efficient operation and maintenance of these facilities in the town

#### **5. FINDINGS AND PROPOSED INTERVENTIONS**

##### **5.1 Water supply**

Since there is effectively no water supply distribution system, there is an urgent need to re-establish a new system and ensure its reliability with respect to supplying the public with adequate amounts of clean and safe water. The reliable Lake Victoria source should be exploited on a long-term basin.

##### **5.2 Sanitation, Solid Waste Management and Drainage**

- There is no sewerage system in Geita township. All inhabitants depend on on-site sanitation facilities.
- Most of the people have pit latrines but water closets are also in use especially in the well to do areas of the town.
- There are no wastewater treatment facilities in Geita township. In such a situation raw sewage is disposed off directly to receiving bodies.
- It is not yet well established how the residents dispose off the wastes from septic tanks when they get filled up, since there is not a single vacuum emptier in the town.

##### **5.3 Training and capacity-building**

- Capacity building in this context would involve setting up an appropriate institutional framework for water supply and sanitation and offering appropriate training in all areas of the sector to the incoming staff.
- Similar training activities would have to be extended to the personnel of the town councils to enhance their roles in ensuring effective waste management and the provision and maintenance of drainage systems in the town.

##### **5.4 Proposed Interventions**

The interventions proposed in respect of the rehabilitation and expansion of the water supply, sewerage and sanitation, solid waste disposal, urban drainage and other requirements to meet the MDGs are summarized in the *Matrix of Proposed Interventions* overleaf. This matrix also describes the anticipated impact of the proposed interventions and assigns a priority ranking, as well as the estimated costs.

In addition to the identified physical interventions, the recommended inputs with respect to training and capacity building necessary to ensure the viability and sustainability of the water and sanitation infrastructure in Geita town have also been incorporated in the matrix. The training and capacity building activities proposed are described separately in the introductory chapter.

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

MATRIX OF PROPOSED INTERVENTIONS

COUNTRY: TANZANIA	TOWN: GEITA	REGION GEITA	2004 MUNICIPALITY POPULATION (ESTIMATED) 50,000	1999 MUNICIPALITY POPULATION	1999 CORE URBAN POPULATION	MUNICIPALITY AREA (km <sup>2</sup> )	WATER AND SEWERAGE UNDERTAKER Ministry of Water and Livestock Development	DRAINAGE AND SOLID WASTE OPERATOR. GEITA TOWN COUNCIL
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NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
1.0	WATER SUPPLY					
1.1	Kageru spring	The demand for water far exceeds the capacity of this water source with the effect that the storage tank is nearly always empty.	<ul style="list-style-type: none"> <li>No intervention is proposed as water supply cannot be improved.</li> </ul>	No impact		
1.2	Develop groundwater resources	The public water supply is totally inadequate. Serious risk of ground water pollution in town as a result of inadequate sanitation.	<ul style="list-style-type: none"> <li>Commission a ground water survey to identify possible high yield aquifers in the surroundings of Geita; develop a wellfield; construct water storage reservoirs and distribution pipework to town;</li> <li>Provide chlorination facilities as well as a number of water kiosks spread around the town.</li> <li>Alternatively, carry out a feasibility study for bringing lake water to town and provide water treatment facilities</li> </ul>	Ensure that treated and adequate water is supplied to the town with an estimated population of about 50,000 people at 70lpcd, which would alleviate occurrence of waterborne diseases. The burden of water collection will be lessened and health and living conditions will be improved. - same -	A	1,350,000
1.3	Develop surface water resources	- same -				
2.0	SEWERAGE AND SANITATION					
2.1	Sewage treatment works and sewers	There is no waterborne sewerage or sewage treatment systems in Geita town and area residents rely on pit latrines, and to some extent on septic tanks (people with private boreholes). With the event of increasing the water supply, sullage and wastewater will become an issue and has to be catered for.	<ul style="list-style-type: none"> <li>A sewage treatment works site is to be identified and procured and the first stages of a waste stabilisation ponds are to be constructed;</li> <li>A main collector sewer line draining the main water consumers and institutions is to be laid. Provisions for future connections onto the sewer are to be made;</li> </ul>	Sewage treatment prevents the spread of water borne disease and also pollution of the environment	B	275,000
2.2	Sanitation	Inadequate sanitation facilities	<ul style="list-style-type: none"> <li>For areas where there is no water supply, especially in the low cost areas of the town, ablution and washing blocks are to be provided</li> </ul>			
2.3	Sanitation – Attendance to septic tanks and pit latrines	The Geita Town Council's has no vacuum tanker and does not have the means to empty septic tanks.	<ul style="list-style-type: none"> <li>Supply one vacuum tanker of 9,000 litre capacity. This will enable emptying of septic tanks and pit latrines on regular basis considering that the town is not sewerred;</li> <li>Make provision at the new waste stabilisation ponds for disposal and treatment of septic tank and pit latrine sludge.</li> </ul>	Treating sewage sludge properly will prevent contamination and spread of disease as well as pollution of the environment.	B	44,500
3.0	SOLID WASTE					
3.1	Collection and transport	There is no waste collection or solid waste management in Geita town. Waste disposal is mainly done on site by the residents themselves.	<ul style="list-style-type: none"> <li>Supply two small tractors with 10 trailers for solid waste collection;</li> <li>Construct 8 properly designed collection points at strategic places around town where the trailers will be left for filling;</li> <li>Supply 30 no. handcarts and spades for collection and transportation of waste to designated collection points to ensure orderly collection and disposal of solid waste.</li> </ul>	Supply of collection and transport facilities will enable the Council to collect refuse on a daily basis to keep the town clean and create a pleasant living environment.	C	152,000
3.2	Waste disposal site	Collecting solid wastes but not having a disposal site leads to rubbish being dumped anywhere people may find convenient leading to unsightly areas with pollution potential.	<ul style="list-style-type: none"> <li>Identification of an appropriately located landfill site;</li> <li>Construction of the landfill site to accepted standards.</li> </ul>	A properly constructed and managed solid waste disposal site will prevent leachate filtering out and polluting the environment.	C	100,000
4.0	URBAN DRAINAGE					

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

MATRIX OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
4.1	Storm water drains	There are no surfaced roads in Geita town. Except for the main road which is maintained by the mine, other roads and streets are severely eroded by storm-water run-off.	<ul style="list-style-type: none"> <li>Conduct a drainage study of the urban area in order to define storm water run-off routes and channels;</li> <li>Construct culvert crossings at strategic positions and rehabilitate roads to prevent further storm water erosion.</li> </ul>	Proper drainage management will prevent erosion to roads and the environment and protect valuable soils washed into the lake.	C	90,000
5.0	OTHER REQUIREMENTS					
5.1	Mapping	Although Geita town has a Development Plan the mapping is outdated and needs to be updated. Without updated mapping (town population has increase tenfold over the last 15 to 20 years) infrastructure services cannot be planned properly. There is a need for 1:5,000 ortho maps.	<ul style="list-style-type: none"> <li>Commission an aerial mapping company to prepare 1:5000 ortho maps from new aerial photographs.</li> </ul>	An updated development plan make for more realistic town planning.	A	25,000
5.2	Engineering consultancy services	Due to the lack of capacity at the Town Council the proposed interventions are unlikely to be adequately addressed without outside engineering services.	<ul style="list-style-type: none"> <li>Procure external engineering services to assist in the detailed assessment, design and supervision of the required interventions. Ensures appropriate expertise in the implementation of the proposals.</li> <li>Water source development and optimisation study</li> <li>Re-plan and re-organise the market area;</li> <li>Improve waste collection and ablation facilities.</li> </ul>	Well planned and designed infrastructure is essential for improvement and maintaining proper living conditions and standards.	A	
5.3	Market area upgrading	The market area is in need of upgrading. Surface drainage of stormwater is not catered for and the ablation facilities are inadequate and in a poor state.	<ul style="list-style-type: none"> <li>Re-plan and re-organise the market area;</li> <li>Improve waste collection and ablation facilities.</li> </ul>	Proper waste collection, stormwater drainage and ablation facilities will lessen the pollution impact on the town.	C	20,000
5.4	Town abattoir	The abattoir at Geita is located in the midst of a residential area. As an abattoir needs space for holding livestock and generates substantial amounts of waste such as blood, paunch contents, fats etc. it needs to be relocated to an industrial designated area. At present these wastes are merely discharged to holding tanks which are foul smelling and polluting the surrounding area.	<ul style="list-style-type: none"> <li>Demolish the existing abattoir building;</li> <li>Build a new abattoir at a new site in the industrial area conforming to normal acceptable abattoir standards.</li> </ul>	Proper abattoir waste management will prevent the spread of disease and ensure hygienic meat products.	B	75,000
<b>TOTAL</b>						<b>2,131,500</b>
Add 20% for preliminary and general items						426,300
<b>Subtotal A</b>						<b>2,557,800</b>
Add 15% for physical contingencies						383,670
<b>Subtotal B</b>						<b>2,941,470</b>
Add 20% for consultancy services for design and construction						588,294
<b>TOTAL COST OF THE PROPOSED INTERVENTION</b>						<b>3,529,764</b>

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME  
MATRIX OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY	SECTOR	PROPOSED ACTION	IMPACT	PRIORITY RANKING	ESTIMATED COST USD(\$)
	PHYSICAL WORKS		COST OF PROPOSED PHYSICAL INTERVENTIONS B/F			3,529,764
6.0	CAPACITY BUILDING					
6.1		Water Demand Management	Reduction of unaccounted for water/leakage detection	Reduction of UFW by 50%	B	30,000
			Campaigns and advocacy	Increased awareness on water usage	B	20,000
6.2		Health and hygiene education	Health and hygiene awareness campaigns	Reduced incidence of water related disease	A	20,000
6.3		Water resources management	Water quality assessment and monitoring	Improved utilisation of available water resources	C	30,000
6.4		Solid waste management	Development of management strategy*	Improved capacity at city level for waste management	B	20,000
			Community level waste management initiative	Improved livelihoods of those involved in waste collection	B	15,000
6.5		Training and Capacity Building	IT Training and hardware installation	Data base management	B	30,000
			Training of billing and revenue staff**	Improved billing and revenue collection	A	15,000
			Training for water treatment plant operators**	Efficient information gathering and retrieval	B	10,000
			Training for wastewater treatment plant operators**	Improved operation of water and wastewater treatment facilities	B	10,000
				Improved treatment plant and improved effluent quality into Lake Victoria	B	10,000
			Total Capacity Building and training			200,000
			GRAND TOTAL			3,729,764

NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY  
\* assumes development of strategies on a regional scale  
\*\*assumes training will be carried out on a regional scale/

UNITED NATIONS HUMAN SETTLEMENTS  
PROGRAMME (UN-HABITAT)

Water for African Cities Programme

*Lake Victoria Region Water and  
Sanitation Initiative*

*Supporting Secondary Urban Centres in the Lake Victoria Region to  
Achieve the Millennium Development Goals*

**MUSOMA TOWN**

**TANZANIA**

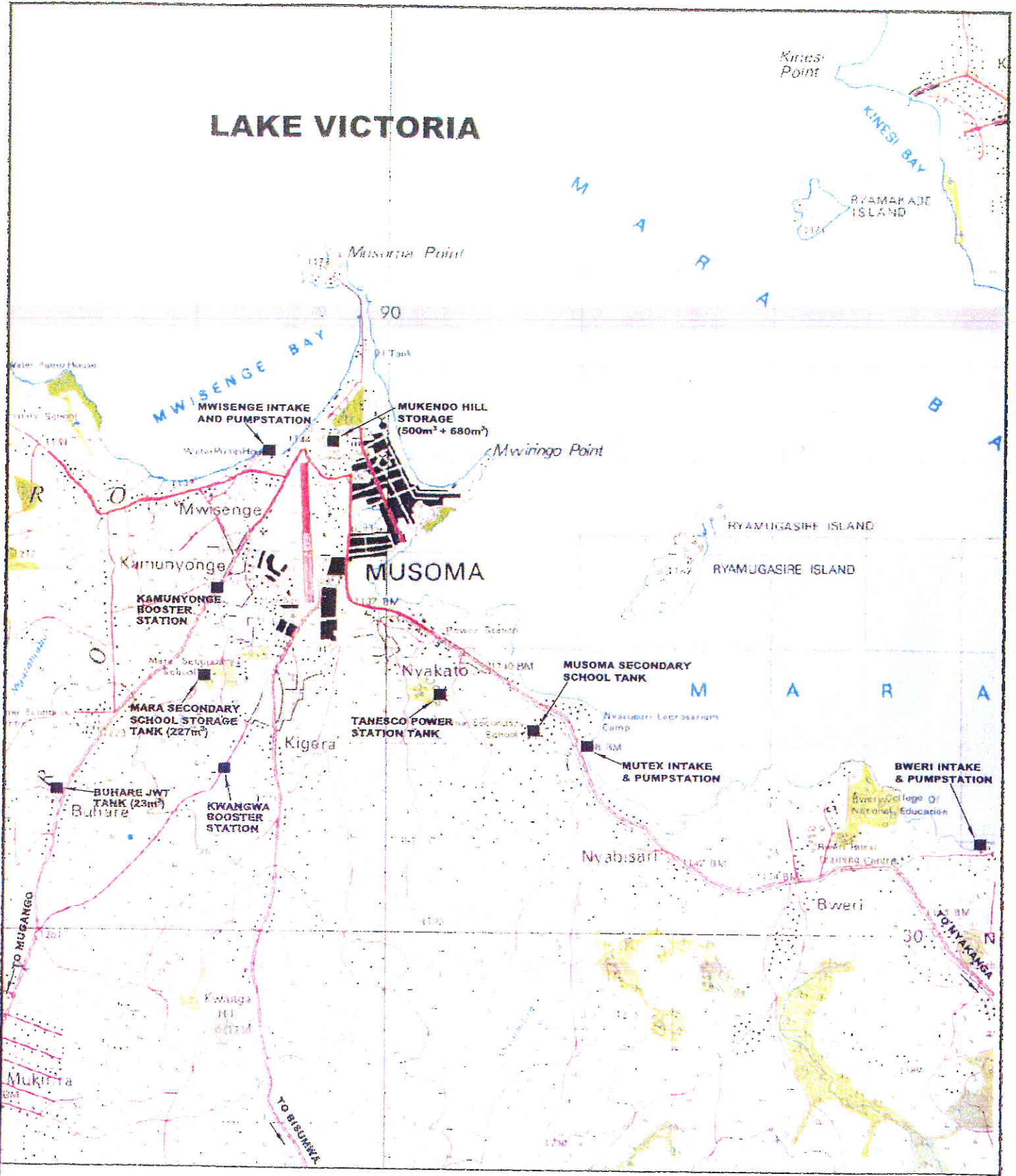
August 2004





**MUSOMA TOWN**  
**Mara, Tanzania**

Municipality Population	108,242 (2002)	114,000 (2004)
Town Population	5%	
Population growth rate	63 km <sup>2</sup>	
Municipality surface area:		
Water Undertaker: Musoma Water and Sewerage Authority		
Sewerage, Sanitation and Solid Waste Operator: Musoma Town Council		
Musoma town lies in the eastern shores of Lake Victoria. It is approximately 150km north west of Mwanza. The town has been growing steadily since the 1967 National Census, at 5% per annum. The people of Musoma are mainly engaged in agriculture, fishing, pastoralism and commercial activities.		
<b>Issues/problems:</b>	<ul style="list-style-type: none"> <li>The level of the Lake has dropped thus affecting the suction lift, consequently all the pumps are in operation and there are none on standby</li> <li>Chlorinating facility not working and raw water is pumped into the storage tank</li> <li>Water supply only meets half the demand, and</li> <li>low income areas have to resort to unsafe water sources</li> </ul>	
• Water supply:		
• Sewerage and sanitation	<ul style="list-style-type: none"> <li>No waterborne sewerage in Musoma Town</li> <li>Septage disposal is in makeshift holes dug in open ground next to season stream</li> </ul>	
• Solid waste and drainage	<ul style="list-style-type: none"> <li>The council has no vehicle for collection of waste and because of lack of capacity the Council can only service the market area</li> <li>Only 20 of the drains are lined.</li> </ul>	
• Capacity building:	<ul style="list-style-type: none"> <li>The council lacks facilities, equipment and personnel to provide waste collection and efficient water supply and sanitation service</li> </ul>	
<b>Proposed interventions:</b>	<ul style="list-style-type: none"> <li>Expected to be provided under the AFD Project: Modify the intake; install new pumps; rehabilitate chlorination facilities; improve access roads; fencing and security; install laboratory equipment; install bulk meters, domestic meters, repair leaking tanks and pipes. Lay new pipes where necessary.</li> </ul>	
• Water supply:		
• Sewerage and sanitation	<ul style="list-style-type: none"> <li>Carry out EIA on location of septage disposal, design and construct drying beds</li> <li>Procure Vacuum exhauster trucks</li> </ul>	
• Solid waste and drainage	<ul style="list-style-type: none"> <li>Design engineered landfill sites, Close down existing site</li> <li>Provide equipment for efficient waste collection and transfer</li> </ul>	
• Capacity building	<ul style="list-style-type: none"> <li>Improve O&amp;M, meter reading, billing and revenue collection.</li> <li>Public awareness campaigns on hygiene and sanitation</li> </ul>	
<b>Expected Outcomes:</b>	<ul style="list-style-type: none"> <li>Propose AFD intervention will supply water to at least 75% of the population</li> </ul>	
• Water Supply		
• Sewerage and sanitation	<ul style="list-style-type: none"> <li>Reduce discharge of raw sewage in the ground and water courses</li> </ul>	
• Solid waste & drainage	<ul style="list-style-type: none"> <li>Waste removed from the middle of the town.</li> <li>Improved maintenance of roads and drainage by the Council's Engineering Department</li> </ul>	
• Capacity building	<ul style="list-style-type: none"> <li>Improved sanitation service, include the neighboring towns and waste collection service</li> <li>Enhancing capacity within the Council for billing and revenue collection and O&amp;M</li> </ul>	
<b>Required Investment:</b>	<ul style="list-style-type: none"> <li>Water Supply</li> <li>Sewerage and Sanitation</li> <li>Solid Waste and Drainage</li> <li>Capacity Building</li> </ul>	USD - USD 312,984 USD 1,034,586 USD 230,000 <b>TOTAL USD 1,577,570</b>
<b>Anticipated effect on MDGs</b>	Provide adequate water supply and sanitation to at least 50% of the towns growing population	
<b>Anticipated effect on Lake Victoria</b>	Reduce point source of pollution from feeder streams into the Lake	

# LAKE VICTORIA



 <p><b>UN - HABITAT</b> United Nations Human Settlement Programme</p>	<p>Project Title <b>LAKE VICTORIA REGION WATER AND SANITATION INITIATIVE</b></p>	<p>Drawing Title <b>TANZANIA MUSOMA TOWN EXISTING WATER SUPPLY FACILITIES</b></p>		<p>Date: AUGUST 2001 Scale: 1:50,000 Page: 1 of 1</p>
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## 1. INTRODUCTION

### 1.1 General Location

Musoma town lies in the eastern shores of Lake Victoria within the latitudes 2°02'12''-2°07'43'' and longitudes 33°41'22''-33°42'15''. It lies approximately 150 km north west of Mwanza.

### 1.2 Population

The town has been growing steadily since the 1967 National Census. The 2002 census report show Musoma town had a population of 114,000 with an estimated growth rate of 5% per annum. Based on the 5% annual growth rate, the population of Musoma in 2015 is expected to almost double to 200,000 inhabitants.

### 1.3 Socio-economic Conditions

People in Musoma town are mainly engaged in agriculture, fishing, pastoralism and commercial economic activities.

### 1.4 Water Demand

The current estimated population of Musoma Town is 114,000. At an average per capita water demand of 100 lpcd, the current estimated water demand for the town is 25,000 m<sup>3</sup>/day (including institutional, commercial and industrial demand) against a current supply of only 14,120 m<sup>3</sup>/day. Due to the inadequate water supply residents resort to unsafe water sources thus being exposed to waterborne diseases.

With inadequate water supply, service to the urban poor who live in the peri-urban and rural areas of the town are not being served and the situation gets worse as water is restricted to the core urban population.

## 2. WATER SUPPLY

### 2.1 Institutional Background

Musoma Urban Water Supply Authority (BUWSA) is the utility mandated to supply water and rendering sanitation services to Musoma town. The supply is entirely from Lake Victoria through a piped system. A large proportion of the population fetch water directly from the lake especially those living close to the lake.

### 2.2 Water Supply System

#### 2.2.1 General

Water for Musoma town is based on three intakes located on Lake Victoria as follows:

- Mwisenge intake and Pump station
- MUTEX intake and Pump station
- Bweri Intake and Pump Station

#### 2.2.2 Existing Water Sources

##### (i) Mwisenge intake and Pump station

The Mwisenge intake and pump station, located about 600 m from the Musoma Air Strip, was constructed in the 1950s and rehabilitated in 1988. The infrastructure at the works comprise the following:

- Six suction pipes supported on makeshift metal stands that are used for direct suction from the lake. The pipes are of 150 mm (3 no.) and 300 mm (3 no.) in diameter and about 100 m long.

- Six suction pipes supported on makeshift metal stands that are used for direct suction from the lake. The pipes are of 150 mm (3 no.) and 300 mm (3 no.) in diameter and about 100 m long.
- Pump house that houses six pumps as follows:
  - 2 no. KSB (2885RPM) with rating of 210m<sup>3</sup>/hr at 87m head
  - 1 no. KSB (WKL 150/2, 1440RPM) of rating 270m<sup>3</sup>/hr at 87m head
  - 3 no. KSB (WKL 100/4, 1440RPM) of rating 100m<sup>3</sup>/hr at 87m head
- Chlorination building
- Office building

The design capacity of the intake is reported as 20,352m<sup>3</sup>/day. However, flow measurements carried by the water authorities in the year 2003 indicated an average daily production of 15,072m<sup>3</sup>/day while similar recent measurements indicate a daily average of 11,808m<sup>3</sup>/day.

### **(ii) MUTEX intake and Pump station**

The MUTEX intake and pump station was constructed in the 1970s to serve the Musoma Textiles Factory. However, the supply area was extended to include parts of the high areas of the town but there has never been any commensurate expansion of the head works. The infrastructure at the works comprise the following:

- One suction pipe supported on makeshift metal stands that are used for direct suction from the lake. However, this is located in shallow water near the shore.
- Simple timber shelter that houses one pump as follows: KSB (WKL 100/4, 1440RPM) of rating 100m<sup>3</sup>/hr at 87m head. The pumping is now delivering 148m<sup>3</sup>/hr against a dynamic delivery head of 32m at MUTEX.

The design capacity of the intake is reported to be 3,552 m<sup>3</sup>/day, but the current output is estimated at 2,200 m<sup>3</sup>/day.

### **(iii) Bweri Intake and Pump Station**

The Bweri intake and pump station was constructed in the 1960s. This is a small intake that was originally designed to serve only the Development College and a teachers college, however the supply area was extended to include neighbouring institutions and newly developed residential areas, making demand outstrip supply. The infrastructure at the works comprise the following:

- One suction pipe supported on makeshift metal stands that is used for direct suction from the lake. However, this is located in shallow water near the shore.
- Simple timber shelter that houses one old pump of 7.5kw.

The design capacity of the intake is reported as 192m<sup>3</sup>/day, however the present output is estimated to be 110m<sup>3</sup>/day, which is attributed to age.

### **2.2.3 Existing Water Treatment Works**

Direct on-line chlorination facilities had been installed on Mwisenge intake but have now broken down and raw water is now pumped to the storage tanks. For the Mutex and Bweri intake works, the water is supplied raw as there are no chlorination facilities.

At Mukendo Hill storage tank located Northwest of the town centre chlorination is carried out. Although chlorination facilities have been improvised at the site, the dosing point is direct into the tank but away from the inlet resulting in inadequate mixing. In addition, the dosing is irregular and depends on the presence of the operator on site. At the time of visit, there was no dosing despite water being pumped into the tank. There is no contact time as the tank is virtually empty due to inadequate water supply.

## 2.2.4 Transmission and Distribution

The main problems in the distribution system are as follows:

- The pipes in the existing distribution system are old. The age of the pipes has resulted in high losses in the system due to leakage, especially in the town centre and Kamunyonge areas. Also the pipes used in the Kamunyonge area are of non-standard size such that appropriate fittings are not available for connections and repairs.
- The pipeline to the Lakeside, where there are four fish industries, is small and inadequate for the industrial demand.

### (i) The Mwisenge Rising Main

There are two existing rising mains from Mwisenge intake with diameters of 200mm (Cast Iron) and 300mm (Ductile Iron) that feed the storage tanks located on Mukendo Hill. The particular problems on the mains are as follows:

- The two air valves on each main are non-functional that has resulted in airlocks thus increasing head losses on the main that lead to high power consumption and reduction in the volume of water delivered to the tanks.
- The non-return valve on the main at the pump house is broken down.
- There are no bulk water meters on the lines.
- The capacity of the pipelines is in doubt due to age and may not be adequate for any increased pumping volumes from the intake.

The above problems have restricted the pumping capacity of the raw water system that is now 11,808m<sup>3</sup>/day as compared to the design capacity of 20,352m<sup>3</sup>/day.

### (ii) The Bweri rising main

The limitations of the pipeline are as follows:

- The present rising main from Bweri intake to storage is 80mm diameter reduced to 50mm diameter before the storage tank. The pipeline is inadequate for the present pumping and any proposed increase in pumping volumes.
- Metering for management of water volumes produced is not carried out.

#### 2.2.4.1 Booster Station

Kamunyonge Booster Station has the following problems:

- The valve on the inlet to the sump is leaking and oversized for the 150mm inlet pipe.
- The pumps are old and frequently break down, thus causing interruptions in the water supply.
- Fencing is broken and there is no security lighting.

## 2.2.5 The Storage Tanks

### (i) Mukendo Hill Tanks

There are two storage tanks at Mukendo Hill located to Northwest of the town centre. The capacities of the tanks are as follows: 500m<sup>3</sup>, constructed of concrete in the 1960s and 680m<sup>3</sup> masonry tank constructed in the 1980s

The main problems identified during field inspection are as follows:

- \* The inlet pipework is inefficiently laid such that they are longer than necessary within the compound. It was also noted that a large tree has grown over the inlet pipes jeopardising the structural integrity of the pipes.
- \* The 680m<sup>3</sup> tank has leaks in the walls due to poor construction. This tank is presently not being utilised due to inadequate water from the intake.

- \* The floor of the 500m<sup>3</sup> tank is eroded, especially below the inlet due to water fall direct on the floor as the supply is inadequate to fill the tank. It was noted that water level in the tank rarely rises above the outlet.
- \* Both tanks have no access ladders to the roof and the covers to roof openings are missing. This would result in contamination of the water in the tanks.
- \* Scour and overflow pipes inappropriately arranged such that the scour discharges directly to the ground next to tank foundation, resulting in undermining of the foundation.
- \* The outlet from the 680m<sup>3</sup> tank is connected to that from the 500m<sup>3</sup> tank, however the pipeline alignment is very irregular, not properly supported above ground and may be rising above the tank floor in some sections, thus restricting the effective capacity of the 680m<sup>3</sup> tank.
- \* Security is inadequate as there is no proper fencing. Guard house and store building is not available, despite chlorination being carried out at the compound.
- \* Access to the site is steep with sharp and raised rocks such that delivery of chemicals and materials is difficult.

### **(ii) Mara Secondary School (227m<sup>3</sup>) and Buhare Tanks**

The Mara secondary school and Buhare tanks have the following impediments:

- The capacity is adequate, however the compounds at the two tanks are not fenced and there are no guard houses.
- Metering is not carried out.

### **2.2.6 Problems with the Water Supply**

- Operation and maintenance tools and transport facilities are not available.

#### **(i) Mwisenge Intake**

The particular problems at the Mwisenge intake include the following:

- Since construction of the Mwisenge intake it is reported that the lake level has dropped thus affecting suction lift and hence the amount of raw water, which has reduced. In addition, the suction pipes are long and not laid to appropriate gradient thus occasioning suction of air that has caused cavitation of the pumps. The foot valves on the suction pipes are suspected to be non-functional occasioning difficulty in pump priming and causing air in the suction. In addition, there are leaks in the suction pipes and it is reported that pipe supports usually collapse due to age, resulting in interruptions to water supply to the town.
- Due to inadequate pumping volumes, all the pumps are put on duty. One of the pumps is also broken down, thus the works are operated with no standby facilities.
- Power factor correction equipment is not functioning properly thus occasioning high power consumption with associated power bills. In addition, the MCB was rated at 600A but due to the operation of all the six pumps, an MCB with a higher rating is required.
- Facilities for handling heavy equipment like pumps, motors and pipe fittings were not installed thus resulting in difficulties during maintenance.
- There are no bulk water meters for monitoring the volume of water delivered to the system.

The above problems have resulted in inadequate water supply to the town that is even below the original design capacity of the system. The current supply is averaging about 11,800m<sup>3</sup>/day, a shortfall of about 8,500m<sup>3</sup>/day that would serve 85,000 people at 100lpcd

#### **(ii) MUTEX intake and pump station.**

Main problems experienced at the MUTEX intake are as follows:

- \* Suction pipe is located in shallow waters close to the shore thus occasioning suction of polluted water from the public who have easy access to the intake that has no fencing.
- \* The pump is not appropriately designed for this station as it was removed from Mwisenge, which has a higher head. Thus the current pump is operating at low efficiency and therefore high costs in power. In addition, there is no standby pump that would be utilised in the case of breakdown. The housing for the pump is also a simple timber structure with inadequate security.
- \* The power factor correction facilities do not function adequately resulting in high power consumption.
- \* Although the supply area was expanded to include Ruamulini, which increased demand from the source, the works have not been expanded to increase output to cater for demand in the new areas that are now suffering constant lack of adequate supply. Also storage for the area relies on a private storage tank belonging to the local church who have only allowed temporary public use. Demand in the additional area is estimated as 1,336m<sup>3</sup>/day that would serve 19,000 people in the low-income areas at 70lpcd. Distribution is also inadequate.
- \* The water is supplied raw as there are no chlorination facilities.

### **(iii) Bweri Intake and Pump Station.**

The main problems experienced at the Bweri intake are as follows:

- \* The intake area is not fenced thus enabling members of the public have easy access to the intake with associated likely insecurity to the facilities.
- \* The pump is small and old with no standby pump in case of breakdown. This would occasion interruptions in water supply.
- \* Although the supply area was expanded to include neighbouring institutions and newly developed residential areas, which increased demand from the source, the works have not been expanded to increase output to cater for the additional demand. Also storage for the area relies on a small 25m<sup>3</sup> tank. Distribution is also inadequate.
- \* The water is supplied raw as there are no chlorination facilities.

## **2.3 Tariff and Metering**

At the moment there are no bulk water meters in the system and out of the estimated 3,500 active consumer connections 1,260 are metered but only 1140 have working meters. Because of inadequate metering, billings are made on estimated quantities or flat rate charges. This makes accounting for system water difficult.

## **3. SANITATION, SOLID WASTE MANAGEMENT AND DRAINAGE**

### **3.1 Institutional Background**

Musoma Town Council is responsible for sanitation and solid waste management within the town. There is no sewerage system in Musoma town. Under such circumstances, only on-site sanitation is used in the town. In most cases the people use pit latrines (65%) and septic tanks (35%). There is lack of sanitary landfill. Currently only crude dumping is done.

### **3.2 Sanitation**

#### **3.2.1 Off-Site Sanitation**

There is no waterborne sewerage system in Musoma town and area residents rely on pit latrines, and septic tanks. As a result contamination of water sources is inevitable which leads to occurrence of waterborne diseases such as typhoid, cholera, diarrhoea, and dysentery.

### **3.2.2 On -Site Sanitation**

The Musoma Town Council has 2 no. exhauster vehicles with tanks of 9,000 litres and 7,000 litres. The vehicles are relatively new and in good condition. However, the vehicles are used for serving other towns in the whole Mara Region and are therefore not adequate.

Septage disposal is in makeshift holes dug in open ground next to a seasonal stream that discharges into Lake Victoria, thus causing pollution of the lake. The Town Council has identified an area for the location of drying beds but not constructed.

### **3.3 Solid Waste Management**

The Musoma Town Council has no vehicle for collection of solid waste in the whole town and rely on only 2 no. hand carts that are used to deliver waste to the dump site. Due to lack of capacity, the Council is only able to service market areas while residents collect and dispose their own refuse, sometimes by digging holes in the streets for burial.

In addition, there are inadequate tools and implements for collection of waste during street cleaning, which encourages workers dumping the waste in the roadside drains. Due to transport problems, the disposal site has been located in the middle of the town. The Council has however identified and acquired an area called Nyamitwebi, about 12km from the town. However, this requires assessment for suitability and acceptance by the area residents.

The solid waste disposal site has not been designed.

### **3.4 Urban Drainage**

Currently Musoma Town has a total road network of 146.4 km, categorised as follows: Tarmac roads – 14.6 km; Gravel roads – 104.6 km and Earth roads – 27.2 km. The road network will increase, as new roads are planned for the newly surveyed and developed areas. Out of the total 146.4 km, only 29.2 km have lined storm water drainage. However, these were constructed of inferior material and the drains are damaged. Also the drains are undersized for the expected storms. As a result water is flooding the roads and damaging these.

The Council has embarked on the construction of the storm water drains in addition to gravelling and tarmacking of roads but is hampered by lack of funding. The exercise was started in the year 2001 and the status is as follows:

- Year 2001 – 1000m of stormwater and 4000m of gravelling completed
- Year 2002 – 500m of stormwater and 4000m of gravelling completed
- Year 2003 – 1000m of stormwater and 5000m of gravelling completed
- Year 2004 – 4000m of stormwater and 6000m of gravelling completed

The aim was to achieve 12,000 m of gravelling and 4,000 m of storm water drains yearly. However, due to shortage of funds the target has not been achieved. In addition, there is lack of transport and equipment.

### **3.5 Planning**

During the survey it was noted that information on existing infrastructure such as layout drawings and operation and maintenance manuals, vital for adequate operation and maintenance of the works, was not available.



#### 4. INSTITUTIONAL CAPACITY

From the observations made in the field, it is concluded that the capacity of the relevant institutions in Musoma town is not to the required level and needs strengthening as recommended for the different personnel as detailed below:

- Policy makers: Policy formulation, environmental issues, institutional issues and water quality management.
- Senior and Middle management: Technical, legal, environmental, financial and administrative issues.
- Technical Staff: Capacity building is required in utility mapping, water quality and supply management and O&M. The skills that are lacking which negatively impact on provision of safe water and sanitation among this group include chemical handling, O&M of plants, rehabilitation, water quality and environmental impact assessment. There is need for leakage survey and monitoring skills in order to reduce the leakage water losses.
- Community groups: awareness creation, participatory approaches to water supply development environmental and sensitisation issues. Watsan issues and PRA are required .
- Complete metering of the whole Musoma town is essential and a proper maintenance plan of these meters should be initiated together with a programme to inspect and test the meters regularly.
- Records need to be updated to include additional installations of mains and distribution pipes that are to be constructed in unserved areas. There is a need to gain skills on use of software for this purpose.
- Instrumentation and the Data Recording: Information technology within BUWA need to be strengthened by acquiring computers and training in proper use of the same for records, billing and tracing problems of non-compliance of the regulations or non-payment of water bills. Digital maps can be used to zero-in on fictitious customers.

#### 5. FINDINGS AND PROPOSED INTERVENTIONS

From the appraisal, the following findings, conclusions and proposed interventions are made.

##### 5.1 Water Supply

###### 5.1.1 *Mwisenge intake and pump station.*

Carry out the following short-term measures to restore the capacity of the works to 20,352 m<sup>3</sup>/day:

- \* Modify the intake by extending the pipes deeper into the lake, shorten the pump suction, construction of a sump close to the pump house and provide a non-return valve.
- \* Install new pumps of equal rated capacity, to operate on 4 duty and 2 standby basis.
- \* Install beam and crane for handling heavy equipment
- \* Rehabilitate the chlorination house and equipment for direct on-line chlorination.
- \* Provide workshop and laboratory building, bulk metering on the rising mains and lockable gate and security lighting at the compound.
- \* Provide tools for M&E works maintenance.

###### 5.1.2 *Mwisenge rising main*

It is proposed to carry out the following in order to improve the capacity of the rising mains from Mwisenge intake:

- \* Construct new 900 mm diameter rising main for increased capacity of water supply system.
- \* Supply and install water meters, non-return valve and washout.

The above measures will result in increased water supply of about 9,000 m<sup>3</sup>/day that will serve additional 90,000 people, especially in the disadvantaged areas at 100 lpcd. Chlorination at the station would reduce the number of consumers of raw untreated water and alleviate occurrence of waterborne diseases.

### **5.1.3 MUTEX Intake and Pumping Station**

It is proposed to carry out the following interventions:

- \* Move suction pipe deeper into the lake, in addition to increasing abstraction quantities.
- \* Install 2 no. new pumps on a one duty, one standby basis, switchgear and controls.
- \* Construct new pump house, chlorination and store rooms, fence, security gate, and lighting
- \* Install chlorination facilities and construct a new 700 m<sup>3</sup> storage tank at Ruamulini and supply and install float valve at MUTEX tank.
- \* Provide additional reticulation to cover Ruamulini area.

### **5.1.4 Bweri Intake and Pump Station**

The following interventions are proposed:

- \* Move the suction pipe deeper into the lake, in addition to increasing abstraction quantities by installing 2 no. new pumps for operation on a one duty and one standby basis, switch gear and controls.
- \* Rehabilitate the existing pump house, and construct a new pump house, chlorination and store rooms, fence, security gate and site lighting
- \* Install chlorination facilities and a new 150m<sup>3</sup>-storage tank.
- \* Provide additional reticulation to cover unserved areas.
- \* Construct new rising main of larger diameter commensurate with the proposed increase in water quantities.
- \* Install bulk water meter.

The proposed measures will result in adequately serving 10,000 people at 100 lpcd who presently rely on unsafe sources due to water shortage, with treated water. This would alleviate occurrence of waterborne diseases.

### **5.1.5 Mukendo Hill Storage Tank**

In order to improve on the situation at the storage site, the following measures are proposed:

- \* Improve the 500m access road by paving and providing side drains, fencing (100m) and one security gate.
- \* Re-align the inlet and outlet pipework, including concrete supports stabilize the pipework .
- \* Extend the scour/overflow pipes away from the tanks to avoid undermining tank foundations.
- \* Remove the chlorination facilities after dosing at the Mwisenge intake.
- \* Repair leaking tank walls and floor to stop leaks and provide covers and roof access ladders
- \* Construct new guard hut and store building, including toilet facilities.
- \* Supply and install bulk water meter on the main outlet from the tanks.

The above measures are aimed at improving on the quality of water, water supply management and reduction of un-accounted for water.

### ***Mara Secondary School and Buhare Tanks***

The following findings and proposed interventions are made:

- Provide fencing and gate
- Supply and install 1 no. bulk water meter
- Construct guard house.

### ***Kamunyonge Booster Station***

The following findings and proposed interventions are made to improve output from the booster station:

- Supply and install four pumps with higher pumping capacity for pumping to Buhare and Mara Secondary School tanks, switchgear and controls.
- Replace broken fencing, provide security lighting and guard house with toilet facilities.
- Provide bulk water meters on the two pumping mains.

### ***Distribution System***

To improve the distribution of water in the town, it is proposed to construct a 300 mm diameter pipe Class C to replace the constantly leaking and bursting pipe in the middle of town. This would ensure adequate and reliable water supply especially in the low income areas by reducing leakages.

### ***Metering***

Metering should be undertaken to improve revenue collection, and monitor the UFW.

- Supply domestic water meters to avoid wastage of water, improve revenue collection and reduce the volume of unaccounted-for water.
- Construct a meter store/workshop building
- Carry out a leak detection exercise in the town.
- Install a meter testing and repair bench to enable servicing and testing of meters.

### ***Operation and Maintenance***

It is proposed to carry out the following in order to improve on the O&M of the water supply service:

- Procure motor vehicle, motor cycles for O&M, meter reading and delivery of bills for improved revenue collection.
- Install radio communication equipment between intakes, storage areas, booster stations and main office
- Supply portable generator and welding equipment.
- Install computer equipment for records and billing.
- Provide fencing, security gate at the water office, and security lighting.
- Supply leak detection equipment, including clamp-on portable meter.

## **5.2 Sanitation, Solid Waste Management and Drainage**

### ***5.2.1 Sanitation***

The following recommendations and proposed interventions are made::

- Construction of a waterborne sewerage system, including sewage treatment works.
- Improvement on on-site sanitation e.g VIP latrines and public awareness campaigns on hygiene and proper sanitation in low-income peri-urban and rural urban areas where there is no water supply.
- Provide transport by supplying two tractors with trailer-mounted exhauster tankers.
- Carry out environmental impact assessment on the location of the selected area for septage disposal in terms of location and acceptability by the resident communities.
- Design the drying beds for the septage disposal at the selected location

### **5.2.2 Solid waste**

In order to ensure timely and adequate coverage in the collection and disposal of solid waste it is proposed to supply collection and transport facilities. This enables the Council to collect refuse on a daily basis in all premises. It is therefore recommended to:

- Supply 57 no. handcarts and spades for collection and transportation of waste to designated collection points
- Assess to confirm suitability of the area and design for disposal of solid waste. With the supply of vehicles, this will enable closure of the present site, located in the middle of the town causing pollution of the environment.

### **5.2.3 Urban drainage**

It is proposed to carry out the following to improve on the drainage of the town roads:

- Provide adequate drains on the 20 km of township roads to avoid flooding and destruction of the road surfaces.
- Provide three double cabin vehicles and four motor bikes for effective O&M of the works.
- Supply two computers, printers, photo copying machine and scanner and one laptop computer.

The above measures will safeguard the roads and enable the Town Engineer's Department efficient maintenance of the roads and keep inventory data in readily retrievable form.

### **5.2.4 Planning**

It is proposed to carry out survey and mapping of the existing infrastructure, formulation and updating of the Physical Plan and technical co-ordination of all services within the municipality i.e. roads, drainage and physical planning. In addition it is proposed to prepare operation and maintenance manuals for the various facilities. This will ensure that staff has a thorough understanding of the structure and functioning of the systems.

## **5.3 Capacity Building**

It was observed that the capacity for both personnel and communities is inadequate for proper management of the water supply hence the need for further capacity building.

- Water supply and sanitation management personnel need to be empowered and capacitated for proper service provision.
- The financial, billing and legal skills need to be improved.
- The technical group lacks skills in O & M of plants, rehabilitation, water quality and environmental issues.
- The community group needs strengthening in PR and awareness creation techniques.
- Community organizations need to be formed to manage water and sanitation services in informal settlements.
- Community mobilization and awareness creation is required to sensitize the people to the benefits of services, and campaigns undertaken for health and hygiene.
- Recruitment and training of community trainers in low income areas is necessary.

## **5.4 Proposed Interventions**

The interventions proposed in respect of the rehabilitation and expansion of the water supply, sewerage and sanitation, solid waste disposal, urban drainage and other requirements to meet the MDGs are summarized in the *Matrix of Proposed Interventions* overleaf. This matrix also describes the anticipated impact of the proposed interventions and assigns a priority ranking, as well as the estimated costs.

In addition to the identified physical interventions, the recommended inputs with respect to training and capacity building necessary to ensure the viability and sustainability of the water and sanitation infrastructure in Musoma town have also been incorporated in the matrix.

# LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

## MATRIX OF PROPOSED INTERVENTIONS

<b>TOWN:</b> MUSOMA	<b>DISTRICT:</b> MUSOMA	<b>REGION:</b> MARA	<b>2004 TOWNSHIP POPULATION (ESTIMATED)</b> 114,000	<b>2002 TOWNSHIP POPULATION</b> 108,242	<b>TOWNSHIP AREA (km<sup>2</sup>)</b> 63	<b>WATER AND SEWERAGE UNDERTAKER</b> MUSOMA WATER AND SEWERAGE AUTHORITY	<b>SANITATION AND SOLID WASTE OPERATOR.</b> MUSOMA TOWN COUNCIL
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NOTES ON PRIORITY RANKING:    A    VERY URGENT    B    ESSENTIAL    C    NECESSARY

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
1.0 1.1	Water intake and pump station	<ul style="list-style-type: none"> <li>• Lake level has dropped thus affecting suction lift and hence the amount of raw water, which has reduced. In addition, the suction pipes are long and not laid to appropriate gradient thus occasioning suction of air that has caused cavitation of the pumps. The foot valves on the suction pipes are suspected to be non-functional occasioning difficulty in pump priming and air in the suction. In addition, there are leaks in the suction pipes and it is reported that pipe supports usually collapse due age, which results in interruptions in water supply to the town.</li> <li>• Due to inadequate pumping volumes, all the pumps are put on duty. One of the pumps is also broken down; thus the works are operated with no standby facilities.</li> <li>• Power factor correction equipment is not functioning properly thus occasioning high power consumption with associated power bills. In addition, the MCB was rated at 600A but due to the operation of all the six pumps, an MCB with a higher rating is required.</li> <li>• Facilities for handling heavy equipment like pumps; motors and pipe fittings were not installed thus resulting in difficulties during maintenance.</li> <li>• Direct on-line chlorination facilities had been installed but these are broken down and raw water is now pumped to the storage tanks.</li> <li>• There are no bulk water meters for monitoring the volume of water delivered to the system.</li> </ul>	<ul style="list-style-type: none"> <li>* Modify the intake by extending the pipes to a deeper section of the lake. In addition, shorten the pump suction by constructing a sump close to the pump house and providing non-return valve to stop emptying of the suction pipes during stoppages.</li> <li>* As most pumps are old, design and install new pumps that are of equal rated capacity, to operate on 4 duty and 2 standby basis, including switchgear and controls.</li> <li>* Supply and install beam and crane for handling heavy equipment within the pump house</li> <li>* Rehabilitate the chlorination house and equipment for direct on-line chlorination.</li> <li>* Provide workshop and laboratory building.</li> <li>* Provide bulk metering on the rising mains.</li> <li>* Provide lockable gate and security lighting at the compound.</li> <li>* Provide tools for M&amp;E works maintenance.</li> </ul>	<p>The proposed interventions would enable increased water supply that would enable additional 66,000 people, especially in the low income areas, to receive water instead of relying on unsafe sources. Also chlorination at the station would ensure that families in the following areas, served from a direct offtake from the pump station with a total population of about 40,000, receive disinfected water unlike at present when raw water is delivered thus alleviating occurrence of waterborne diseases.</p> <ul style="list-style-type: none"> <li>• Mwisenge</li> <li>• Makoko</li> <li>• Kamunyonge</li> <li>• Buhare</li> <li>• Educational institutions neighbouring the above areas.</li> </ul>	A	489,500
1.2	MUTEX intake and pumping station	<ul style="list-style-type: none"> <li>• Suction pipes are located in shallow waters close to the shore thus occasioning suction of polluted water.</li> <li>• The pump is not appropriately designed for this station as it was removed from Mwisenge, which has a higher head. Thus the current pump is operating at low efficiency and therefore high costs in power. In addition, there is no standby pump that would be utilised in the case of breakdown. The housing for the pump is also a simple timber structure with inadequate security.</li> <li>• There is no fencing and members of the public have easy access to the intake, increasing the risk of theft and contamination as they bath and wash next to the intake.</li> <li>• The power factor correction facilities do not function adequately resulting in high power consumption.</li> <li>• Despite growth in demand, the works have not been expanded to increase output to cater for demand in the new areas that are now suffering constant lack of adequate supply. Storage has also not been provided. Demand in the additional area is estimated as 1,336m<sup>3</sup>/day that would serve 19,000 people in the low-income areas at 70lpcd.</li> <li>• The water is supplied raw, as there are no chlorination facilities.</li> </ul>	<ul style="list-style-type: none"> <li>* Investigate, design and move the suction pipe to the deeper sections of the lake, away from the shores, in addition to increasing abstraction quantities.</li> <li>* Supply and install 2 no. new pumps designed to appropriate capacities for operation on a 1 no. duty and 1 no. standby basis, including switchgear and controls.</li> <li>* Construct new pump house with chlorination and store rooms.</li> <li>* Construct fence and gate for security, including site lighting</li> <li>* Supply and install chlorination facilities</li> <li>* Construct a new 700m<sup>3</sup>-storage tank at Ruamulini and supply and install float valve at MUTEX tank.</li> <li>* Provide additional reticulation to cover the Ruamulini area, a total estimated length of 4.0km of varying diameters.</li> </ul>	<p>This will ensure that a population of about 19,000 people, especially in the low income areas, receive adequate and treated water instead of relying on unsafe sources that would result in waterborne diseases.</p>	A	360,000
					C	

# LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

## MATRIX OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
1.3	Bweri intake and pumping station	<ul style="list-style-type: none"> <li>The intake area is not fenced thus enabling members of the public have easy access to the intake with associated likely insecurity to the facilities.</li> <li>The pump is small and old with no standby pump in the case of breakdown. This would occasion interruptions in water supply.</li> <li>Although the supply area was expanded to include neighbouring institutions and newly developed residential areas, which increased demand from the source, the works have not been expanded to increase output to cater for the additional demand. Also storage for the area relies on a small 25m<sup>3</sup> tank. Distribution is also inadequate.</li> <li>The water is also supplied raw, as there are no chlorination facilities.</li> </ul>	<ul style="list-style-type: none"> <li>Investigate, design and move the suction pipe to the deeper sections of the lake, away from the shores, in addition to increasing abstraction quantities.</li> <li>Supply and install 2 no. new pumps designed to appropriate capacities in addition, rehabilitate the existing pump house.</li> <li>Construct new chlorination and storage house</li> <li>Supply and install chlorination facilities</li> <li>Construct a new 150m<sup>3</sup> storage tank.</li> <li>Provide additional reticulation to cover the inadequate reticulation in the area, a total estimated length of 3.0km of varying diameters.</li> </ul>	The proposed interventions will ensure that treated and adequate water is supplied to the largely low income area with an estimated population of about 10,000 people at 70lpcd, which would alleviate occurrence of waterborne diseases.	A	320,000
1.4	Mwisenge rising mains	<ul style="list-style-type: none"> <li>The two air valves on each main are non-functional that has resulted in airlocks. The non-return valve on the main at the pump house is broken down.</li> <li>There are no bulk water meters on the lines.</li> <li>The capacity of the pipelines is in doubt due to age and may not be adequate for any increased pumping volumes from the intake.</li> </ul>	<ul style="list-style-type: none"> <li>Investigate, design and construct rising main that would be appropriate for increased capacity of the water supply system, which will entail laying a new main of larger diameter of 900mm.</li> <li>Supply and install water meters, non-return valve and washout.</li> </ul>	The proposed measures will result in increased water supply of about 9,000m <sup>3</sup> /day that will serve additional 60,000 people, especially in the disadvantaged areas at 70lpcd.	C	16,000
1.5	Bweri rising main	<ul style="list-style-type: none"> <li>The present rising main from Bweri intake to storage is 80mm diameter reduced to 50mm diameter before the storage tank. The pipeline is inadequate for the present pumping and any proposed increase in pumping volumes.</li> <li>Metering for management of water volumes produced is not carried out.</li> </ul>	<ul style="list-style-type: none"> <li>Design, supply and lay a new rising main of larger diameter commensurate with the proposed increase in water quantities.</li> <li>Supply and install 1 no. bulk water meter.</li> </ul>	The proposed measures will result in adequately serving 10,000 people, who presently rely on unsafe sources due to water shortage, with treated water.	B	47,500
1.6	Mukendo Hill storage tanks	<ul style="list-style-type: none"> <li>The inlet pipework is inefficiently laid such that they are longer than necessary within the compound. It was also noted that a large tree has grown over the inlet pipes jeopardising the structural integrity of the pipes.</li> <li>The 680m<sup>3</sup> tank has leaks in the walls due to poor construction. This tank is presently not being utilised due to inadequate water from the intake.</li> <li>The floor of the 500m<sup>3</sup> tank is eroded, especially below the inlet due to water fall direct on the floor as the supply is inadequate to fill the tank. It was noted that water level in the tank rarely rises above the outlet.</li> <li>Both tanks have no access ladders to the roof and the covers to roof openings are missing. This would result in contamination of the water in the tanks.</li> <li>Scour and overflow pipes inappropriately arranged such that the scour discharges directly to the ground next to tank foundation, resulting in undermining of the foundation.</li> <li>The outlet from the 680m<sup>3</sup> tank is connected to that from the 500m<sup>3</sup> tank, however the pipeline alignment is very irregular, not properly supported above ground and may be rising above the tank floor in some sections, thus restricting the effective capacity of the 680m<sup>3</sup> tank.</li> </ul>	<ul style="list-style-type: none"> <li>Improve the 500m access road by paving and providing side drains</li> <li>Provide fencing (100m) and 1 no. gate to improve on security</li> <li>Re-align the inlet and outlet pipework (80m) concrete supports for pipes above ground, to improve on the stability of the pipework. Also remove the large tree that has grown on top of the incoming rising mains.</li> <li>Extend the scour/overflow pipes away from the tanks to avoid undermining tank foundations.</li> <li>Remove the chlorination facilities after dosing at the Mwisenge intake.</li> <li>Provide covers (4 no.) and roof access ladders (2 no.).</li> <li>Repair the leaking tank walls and floor to stop leaks.</li> <li>Supply and install bulk water meter on the main outlet from the tanks.</li> </ul>	The proposed measures are aimed at improving on the quality of water, water supply management and reduction of un-accounted for water.		65,500
1.7	Mara secondary school tank.	<ul style="list-style-type: none"> <li>The capacity is adequate, however the compounds at the two tanks are not fenced and there are no guard houses.</li> <li>Metering is not carried out.</li> </ul>	<ul style="list-style-type: none"> <li>Provide fencing and gate</li> <li>Supply and install 1 no. bulk water meter</li> <li>Construct guard house.</li> </ul>	Improved security at the storage compounds and staff morale.		17,500
1.8	Buhare storage tank.	<ul style="list-style-type: none"> <li>The capacity is adequate, however the compounds at the two tanks are not fenced and there are no guard houses.</li> <li>Metering is not carried out.</li> </ul>	<ul style="list-style-type: none"> <li>Provide fencing and gate.</li> <li>Supply and install 1 no. bulk water meter.</li> <li>Construct guard house.</li> </ul>	Improved security at the storage compounds and staff morale.		17,500
1.9	Kamunyonge booster station.	<ul style="list-style-type: none"> <li>The valve on the inlet to the sump is leaking and oversized for the 150mm inlet pipe.</li> </ul>	<ul style="list-style-type: none"> <li>Supply and install 4 no. pumps with higher capacity for pumping to Buhare and Mara</li> </ul>	The proposed measures will increase water supply to the largely low-income areas that would enable serving		160,500

## LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

### MATRIX OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
1.10	Distribution system	<ul style="list-style-type: none"> <li>The pumps are old and frequently break down, thus causing interruptions in the water supply.</li> <li>Fencing is broken and there is no security lighting.</li> <li>The pipes in the existing distribution system are old. The age of the pipes has resulted in high losses in the system due to leakage, especially in the town centre and Kamunyonge areas. Also the pipes used in the Kamunyonge area are of non-standard size such that appropriate fittings are not available for connections and repairs.</li> <li>The pipeline to the Lakeside, where there are four fish industries, is small and inadequate for the industrial demand.</li> </ul>	<ul style="list-style-type: none"> <li>Secondary School tanks, Provide security lighting and guard house with toilet facilities.</li> <li>Provide bulk water meters on the two pumping mains.</li> <li>Supply and lay 300mm diameter pipe Class C to replace the constantly leaking and bursting pipe in the middle of town (1,500m)</li> <li>Supply and lay pipes to the Lakeside Industrial area.</li> <li>Supply repair fittings to suit the pipes in Kamunyonge area.</li> <li>Supply and lay additional pipes in the system as follows to serve Mwisenge, Buhare, Nyakato and Baruti areas:</li> <li>Supply and install zonal water meters in the distribution system</li> <li>Supply 2,530 no. domestic water meters</li> <li>Construct a meter store/workshop building</li> <li>Supply and install a meter testing bench</li> <li>Carry out a leak detection exercise</li> <li>Supply 1 no. 3-ton double cabin pick up</li> <li>Supply 10 no. motor bikes for operation and maintenance, including meter reading</li> <li>Supply and install radio communication equipment between intakes, storage areas, booster stations and main office</li> <li>Supply portable generator and welding equipment.</li> <li>Supply computer equipment for records and billing.</li> <li>Supply leak detection equipment, including clamp-on portable meter.</li> </ul>	<p>of at least 10,000 people with clean water instead of relying on unsafe sources.</p> <p>The proposed measures would ensure adequate and reliable water supply to the residents, especially in the low income areas by reducing leakage.</p>		134,100
1.11	Metering and unaccounted for water	<p>At the moment there are no bulk water meters in the system and out of the estimated 3,500 active consumer connections 1,260 are metered but only 1140 have working meters. Because of inadequate metering, billings are made on estimated quantities or flat rate charges. This makes accounting for system water difficult.</p>	<ul style="list-style-type: none"> <li>Supply 1 no. 3-ton double cabin pick up</li> <li>Supply 10 no. motor bikes for operation and maintenance, including meter reading</li> <li>Supply and install radio communication equipment between intakes, storage areas, booster stations and main office</li> <li>Supply portable generator and welding equipment.</li> <li>Supply computer equipment for records and billing.</li> <li>Supply leak detection equipment, including clamp-on portable meter.</li> </ul>	<p>A major objective of the management of water supply systems is to account for water volumes within the system. Thus monitoring of the water system's water balance is essential for estimating demand trends, expenditure, as well as to account for water losses and collect revenue.</p>		435,750
1.12	Operation and maintenance	<p>Maintenance tools and transport facilities are not available.</p>	<ul style="list-style-type: none"> <li>Supply 1 no. 3-ton double cabin pick up</li> <li>Supply 10 no. motor bikes for operation and maintenance, including meter reading</li> <li>Supply and install radio communication equipment between intakes, storage areas, booster stations and main office</li> <li>Supply portable generator and welding equipment.</li> <li>Supply computer equipment for records and billing.</li> <li>Supply leak detection equipment, including clamp-on portable meter.</li> </ul>	<p>Improved provision of services and staff morale. In addition, availability of transport will ensure that prompt attendance to emergencies on time thus reduce water wastage in the case of pipe bursts.</p>	B	135,500
1.13	Expansion of water supply infrastructure	<p>The current estimated population of Musoma Town is 114,000. At an average per capita water demand of 150 lpcd, the current estimated water demand for the town is 25,000m<sup>3</sup>/day (including institutional, commercial and industrial demand) against a current supply of only 14,120 m<sup>3</sup>/day. Due to the inadequate water supply residents resort to unsafe water sources thus being exposed to waterborne diseases.</p>	<p>Increase water supply to the town to alleviate shortage by expanding the water supply facilities, including intakes, rising water mains and pumping units.</p> <p>Consideration should also be given to full treatment of the water as pollution and turbidity sources are high.</p>	<p>This would supply treated water to additional 70,000 people at 100 lpcd. This measure would alleviate poverty by reducing time spent on fetching water that would be spent on other income generating activities.</p>	C	
				SUBTOTAL Water supply		(2,199,350) (Expected to be provided under the AFD project)
<b>SEWERAGE AND SANITATION</b>					A	189,000
2.1	Sanitation – Attendance to septic tanks and pit latrines	<p>The Musoma Town Council has 2 no. exhauster vehicles with tanks of 9,000 litres and 7,000 litres. The vehicles are relatively new and in good condition. However, the vehicles are used for serving other towns in the whole Mara Region and are therefore not adequate.</p> <p>Septage disposal is in makeshift holes dug in open ground next to a seasonal stream that discharges into Lake Victoria, thus causing pollution of the lake. The Town Council has identified an area for the location of drying beds but not constructed.</p>	<ul style="list-style-type: none"> <li>Supply 2 no. tractors with trailer-mounted exhauster tankers. This will enable emptying of septic tanks and pit latrines on regular basis considering that the town is not sewered.</li> <li>Carry out environmental impact assessment on the location of the selected area for septage disposal.</li> <li>Design the drying beds for the septage disposal at the selected location</li> </ul>	<p>Improved sanitation and reduced pollution of the environment and water sources, including Lake Victoria.</p>		

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

MATRIX OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
2.2	Construction of sewerage system	There is no waterborne sewerage system in Musoma town and area residents rely on pit latrines, and septic tanks. As a result contamination of water sources is inevitable which leads to occurrence of waterborne diseases such as typhoid, cholera, diarrhoea, and dysentery.	<ul style="list-style-type: none"> <li>For long term, carry out feasibility studies, design and construct a waterborne sewerage system, including sewage treatment works, for the town.</li> <li>For areas where there is no water supply, especially in the rural areas of the town, there should be improvement on on-site sanitation such as Ventilated Improved Pit latrines and public awareness campaign on hygiene and proper sanitation.</li> </ul>	This would have a positive impact on the environment due to reduced discharge of raw sewage in the ground and water courses.  Improved sanitation in the low income areas, where due to the nature of the housing, sewerage infrastructure facilities may not be provided.	C	
3.0	<b>SOLID WASTE</b>					
3.1	Collection and transport	The Musoma Town Council has no vehicle for collection of solid waste in the whole town and rely on only 2 no. hand carts that are used to deliver waste to the dump site. Due to lack of capacity, the Council is only able to service market areas while residents collect and dispose their own refuse, sometimes by digging holes in the streets for burial. In addition, there are inadequate tools and implements for collection of waste during street cleaning, which encourages workers dumping the waste in the roadside drains.	<ul style="list-style-type: none"> <li>Supply three tractors with tipping trailers.</li> <li>Supply 57 no. handcarts and spades for collection and transportation of waste to designated collection points to ensure orderly collection and disposal of solid waste.</li> </ul>	Supply of collection and transport facilities will enable the Council timely and adequate coverage in the collection and disposal of solid waste instead of piling up in town causing environmental pollution.	A	122,250
3.2	Waste disposal site	Due to transport problems, the disposal site has been located in the middle of the town. The Council has however identified and acquired an area called Nyamitwebi, about 12km from the town. However, this requires assessment for suitability and acceptance by the area residents. The solid waste disposal site has not been designed.	Assess to confirm suitability of the area and design for disposal of solid waste. With the supply of vehicles, this will enable closure of the present site that is located in the middle of the town causing contamination of the environment.	Positive impact on the environment due to improved site and disposal procedures.	A	130,000
4.0	<b>URBAN DRAINAGE</b>					
4.1	Storm water drains	Out of the total 146.4km in Musoma Township only 29.2km have lined storm water drainage. However, these were constructed of inferior material and the drains are damaged	Provide adequate drains on the 20km of township roads to avoid flooding and destroying of the road surfaces.	The proposed measures will safeguard the roads and reduce the maintenance costs.	B	200,000
4.2	Operation and maintenance	There is lack of transport and equipment.	<ul style="list-style-type: none"> <li>Provide 3 no. double cabin vehicles and 4 no. motor bikes for effective operation and maintenance of the works.</li> <li>Supply 2 no. computers, printers, photo copying machine and scanner and one laptop computer.</li> </ul>	The proposed interventions will enable the Town Engineer's Department to maintain the roads and keep inventory data in readily retrievable form.	B	97,500
5.0	<b>OTHER REQUIREMENTS</b>					
5.1	Information on existing services	During the survey it was noted that information on existing infrastructure such as layout drawings and operation and maintenance manuals, vital for adequate operation and maintenance of the works, was not available.	Carry out survey and mapping of the existing infrastructure and also prepare operation and maintenance manuals for the various facilities. This will ensure that staff has a thorough understanding of the structure and functioning of the systems.	This will ensure that staff has a thorough understanding of the layout of the existing infrastructure for adequate maintenance and future planning for expansion.	A	50,000
5.2	Town physical development plan	An updated physical development of the town is not available.	Carry out surveys and update/develop the town physical development plan.	Will ensure that expansion of facilities is implemented in accordance with the planned physical development of the town that would avoid future conflict in terms of land ownership and other public amenities.	B	25,000
<b>TOTAL</b>						<b>813,750</b>
Add 20% for preliminary and general items						162,750
<b>Subtotal A</b>						<b>976,500</b>
Add 15% for physical contingencies						146,475
<b>Subtotal B</b>						<b>1,122,975</b>
Add 20% for consultancy services for design and						224,595
<b>TOTAL COST OF THE PROPOSED INTERVENTION</b>						<b>1,347,570</b>



**LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME  
MATRIX OF PROPOSED INTERVENTIONS**

ITEM NO.	FACILITY	SECTOR	PROPOSED ACTION	IMPACT	PRIORITY RANKING	ESTIMATED COST USD(\$)
	<b>PHYSICAL WORKS</b>					
6.0	<b>CAPACITY BUILDING</b>					<b>1,347,570</b>
6.1		Water Demand Management	Reduction of unaccounted for water/leakage detection	Reduction of UFW by 50%	B	45,000
6.2		Health and hygiene education	Campaigns and advocacy	Increased awareness on water usage	B	25,000
6.3		Water resources management	Health and hygiene awareness campaigns	Reduced incidence of water related disease	A	20,000
6.4		Solid waste management	Water quality assessment and monitoring	Improved utilisation of available water resources	C	30,000
			Development of management strategy*	Improved capacity at city level for waste management	B	20,000
6.5		Training and Capacity Building	Community level waste management initiative	Improved livelihoods of those involved in waste collection	B	25,000
			IT Training and hardware installation	Data base management	B	30,000
			Training of billing and revenue staff**	Improved billing and revenue collection	A	15,000
			Training for water treatment plant operators**	Efficient information gathering and retrieval	B	10,000
			Training for wastewater treatment plant operators**	Improved operation of water and wastewater treatment facilities	B	10,000
				Improved treatment plant and improved effluent quality into Lake Victoria	B	10,000
				<b>Total Capacity Building and training</b>		<b>230,000</b>
				<b>GRAND TOTAL</b>		<b>1,577,570</b>

NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY  
 \* assumes development of strategies on a regional scale  
 \*\* assumes training will be carried out on a regional scale/

UNITED NATIONS HUMAN SETTLEMENTS  
PROGRAMME (UN-HABITAT)

Water for African Cities Programme

*Lake Victoria Region Water and  
Sanitation Initiative*

*Supporting Secondary Urban Centres in the Lake Victoria Region to  
Achieve the Millennium Development Goals*

**SENGEREMA TOWN**

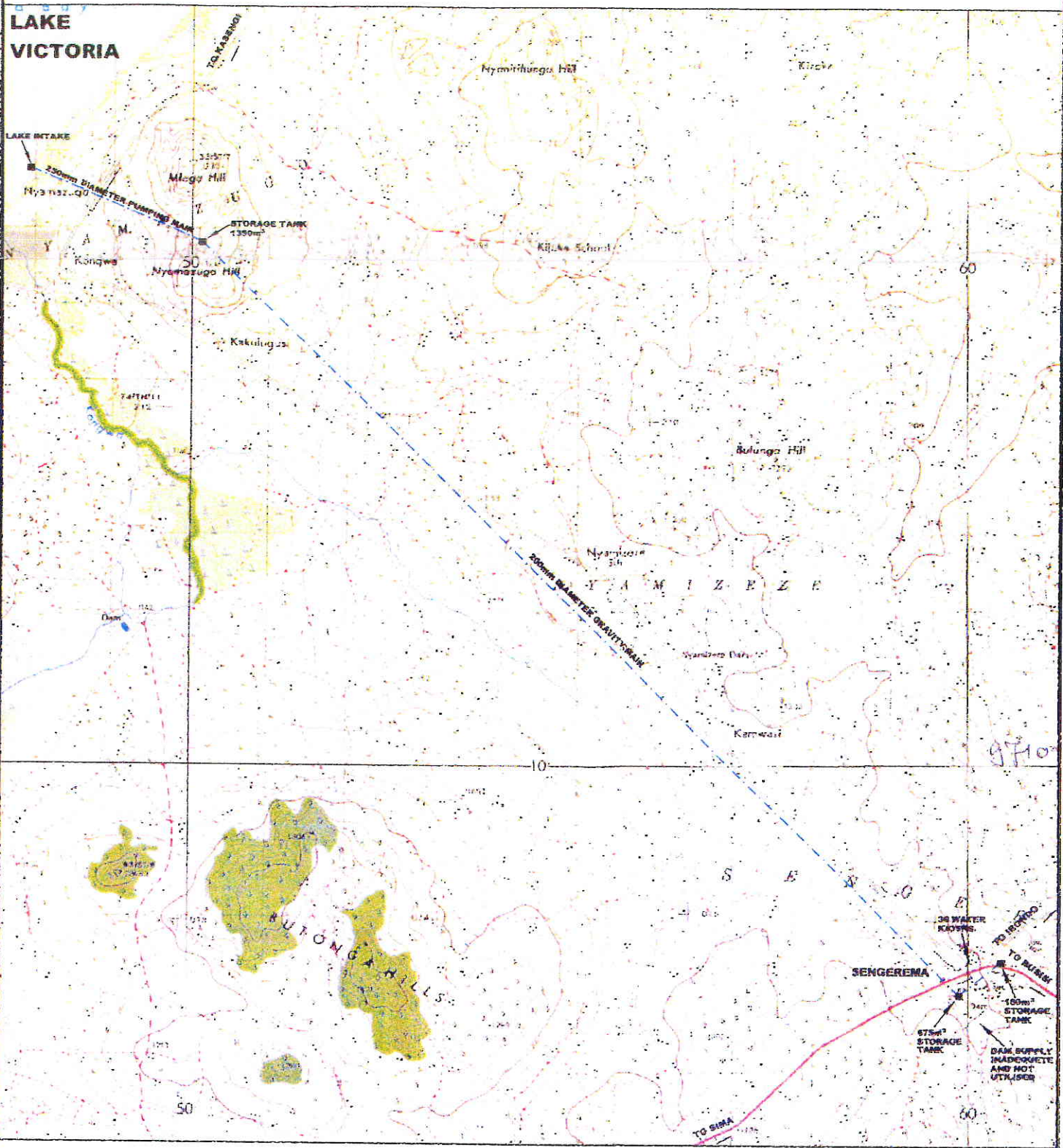
**TANZANIA**

August 2004

**SENGEREMA TOWN**  
**Sengerema, Tanzania**

Municipality Population	50,000 (2004)	Projected population by 2015 the is 54,450
Town Population	36, 938 (2002)	
Population growth rate	3.03%	
Municipality surface area:		
Water Undertaker: Sengerema Urban Water and Sewerage Authority (SUWASA)		
Sewerage, Sanitation and Solid Waste Operator:		
Sengerema town lies within the Lake Victoria zone, south of the Lake. It is accessible by ferry from Mwanza City. People in Sengerema Town are mainly engaged in agriculture, fishing, pastoralism and commercial activities as their economical activities.		
<b>Issues/problems:</b>	<ul style="list-style-type: none"> <li>The Water utility's capacity can only supply piped water to half the population</li> <li>The low income areas of; Mwabaluhi, Isungamoro and Iyogero do not have access to piped water.</li> <li>Water drawn from the Lake during rainy season is highly turbid. The only water treatment carried out is chlorination in clean water storage tank</li> </ul>	
• Water supply:		
• Sewerage and Sanitation	<ul style="list-style-type: none"> <li>No off-site sanitation, simple pit latrines are the main sanitation infrastructure</li> <li>SUWASA doesn't have a vacuum exhauster to empty latrines and septic tanks Sullage is generally discharged into storm water channels.</li> </ul>	
• Solid waste and drainage	<ul style="list-style-type: none"> <li>Waste collected by a private contractor, however the company doesn't have the capacity to provide a service to the whole town.</li> </ul>	
• Capacity building:	<ul style="list-style-type: none"> <li>No computer system for billing</li> <li>No facilities to properly monitor water treatment process</li> </ul>	
<b>Proposed interventions:</b>	<ul style="list-style-type: none"> <li>Increase number of metered consumers and reduce UFW</li> <li>Reinforce the raw water pumping capacity and improve the intake works;</li> <li>Construct a new conventional water treatment works and new pipeline</li> <li>Construct a storage reservoir</li> </ul>	
• Water supply:		
• Sewerage and Sanitation	<ul style="list-style-type: none"> <li>A sewage treatment works site to be identified and procured. Waste stabilisation ponds and sewer lines to be constructed;</li> <li>Construction of communal latrines where there is no water supply</li> <li>Acquire a vacuum tanker</li> </ul>	
• Solid waste and drainage	<ul style="list-style-type: none"> <li>Construct solid waste transfer stations and provide hand carts and tractors with trailers</li> <li>Identification and construction of landfill site</li> <li>Improvement in urban drainage network</li> </ul>	
• Capacity building	<ul style="list-style-type: none"> <li>Community training in hygiene and sanitation</li> <li>Training in engineering, O&amp;M, water demand management, water resource management and health and safety</li> <li>Training to improve waste collection and management.</li> </ul>	
<b>Expected Outcomes:</b>	<ul style="list-style-type: none"> <li>Adequate water provided to the low income population, improved health and living conditions in informal low income settlements</li> </ul>	
• Water Supply		
• Sewerage and Sanitation	<ul style="list-style-type: none"> <li>Increase sanitation coverage in the town including low-income settlements</li> </ul>	
• Solid waste & drainage	<ul style="list-style-type: none"> <li>Minimised erosion and washing of contaminants into the Lake Victoria</li> </ul>	
• Capacity building	<ul style="list-style-type: none"> <li>Efficient service provided by the Authority, public awareness raised on water and sanitation issues.</li> </ul>	
<b>Investment required:</b>	<ul style="list-style-type: none"> <li>Water Supply</li> <li>Sanitation</li> <li>Solid Waste and Drainage</li> <li>Capacity Building</li> </ul>	USD 4,024,080 USD 371,772 USD 673,992 USD 195,000 <b>USD 5,264,844</b>
<b>TOTAL</b>		
<b>Anticipated effect on MDGs</b>	Water and sanitation interventions would serve a population of 50,000.	
<b>Anticipated effect on Lake Victoria</b>	Proper drainage management will prevent erosion to roads and the environment and protect valuable soils washed into Lake	

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 <p><b>UN - HABITAT</b> United Nations Human Settlement Programme</p>	<p>Project Title <b>LAKE VICTORIA REGION WATER AND SANITATION INITIATIVE</b></p>	<p>Drawing Title <b>TANZANIA SENEREMA TOWN EXISTING WATER SUPPLY FACILITIES</b></p>		<p>Date: AUGUST 2004 Scale: As shown</p>
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## **1. INTRODUCTION**

### **1.1 General Location**

Sengerema town lies within the Lake Victoria zone, south of the Lake. The town is located within the latitudes 2°37'25''-2°40'00'' and longitudes 32°37'19''-32°40'00''. It is usually accessed from Mwanza City by a ferry connecting to the Sengerema-Geita area.

### **1.2 Population**

The 2002 population census shows that Sengerema urban had a population of 36 938 people with a growth rate of about 3.03% per annum. Based on the 3.03% growth rate per annum the population of Sengerema in 2015 would be 54,469 inhabitants.

### **1.3 Socio-economic Conditions**

People in Sengerema Town are mainly engaged in agriculture, fishing, pastoralism and commercial economic activities.

### **1.4 Water Demand**

With a population projection of 54,469 and an estimated daily consumption of 100 lpcd, the current estimated water demand for the town is 5,447 m<sup>3</sup>/day. While considering institutional, commercial and industrial demand, the total water requirements exceed 15,000 m<sup>3</sup>/day. Due to inadequate water supply, residents resort to unsafe water sources especially the peri-urban and low income areas of the town.

## **2. WATER SUPPLY**

### **2.1 Institutional Background**

Sengerema Urban Water and Sewerage Authority (SUWASA) is responsible for supply of water to the town. The water supply is mainly from an intake in Lake Victoria at Nyamazugu, some 22 km away, although small scale rainwater harvesting is also used to supply the TRC premises. The utility was designed to serve a population of originally 20,000 people. It therefore provides water to about 40% of the current population of Sengerema.

There is an old earth-fill dam with limited capacity (dried up in 1999) which is no longer in use. Some shallow wells fitted with hand pumps subsidise the water supply, but these do not contribute significantly to the total water demand of the town.

### **2.2 Water Supply System**

#### **2.2.1 General**

Nyamazugu intake on Lake Victoria is the primary source of water for Sengerema town. Water is pumped from the lake intake to a balancing tank on the adjacent hill over a distance of 3 km, from which the water gravitates to a storage tank in the town and is distributed.

The supply does not meet the current demand. It is therefore necessary to reduce the unaccounted for water (UFW) through universal metering and other measures that would effectively ensure pumped water reaches the consumers. In year 2002, out of a population of 20,000, 55% of the population had access to clean and safe water in urban Sengerema.

### **2.2.2 Existing Water Sources**

The Nyamazugu water supply produces on average 1,500 m<sup>3</sup>/day. The fenced intake is located about 22km from the treatment plant with no booster pumps in between. Although the source is prevented from direct pollution from the inhabitants, there is potential pollution from oils, grease and fuel spills from ships using the lake.

There are two operational pumps with an overall pumping capacity of 1000 m<sup>3</sup>/hr. However, from the total daily operating time of 15 hours, these pumps are using only 10% of their total capacity. From the intake, water is pumped 22 km to 300,000 litres storage tanks. Water from tanks is distributed to the consumers by gravity.

### **2.2.3 Existing Water Treatment Works**

The raw water from the lake intake is fairly clean. Only rudimentary chlorination is currently done at the storage tanks prior to transmission to the distribution mains. The chlorination is effected through addition of chlorine solution by drip method. However, the Authority indicated the need for a separate treatment and storage facilities because the existing ones are inadequate.

### **2.2.4 Transmission and Distribution**

The distribution system of Sengerema town was constructed (in phases) from 1974 to 1984, the year it started its operations. Diesel engines were replaced with electrical ones in 2003. The distribution system mainly suffers from low pressures during the dry seasons, and pipe bursts. Although there is no water rationing, there are temporary closures of the system at night to allow for pressure build up for the gravity supply system. This is practised mainly during the dry season. The pipe bursting usually occurs along the distribution lines at a frequency of 2-4 times a month.

Due to low proportion (17%) of metered customers, it was difficult to estimate the percentage of UFW but it is estimated about 40%. SUWASA aims at reducing the UFW so as to cut down operational cost on electricity which is currently about T Shs 1,800,000 (US\$ 1,730) per month, and reduce the cost of water to the consumers served.

Three parts of the town are not served since the piped distribution system and stand pipes have not been installed. They include Mwabaluhi, Isungamoro and Iyogero. Inhabitants of these areas obtain water from the local (traditional) wells as wells as buying from the street vendors.

### **2.2.5 Problems with the Water Supply**

Various problems related to water supply were identified during the field visit. The water demand far exceeds the capacity of the existing water supply system. A doubling in capacity only to satisfy current demand would be required. The water from this source is also untreated and therefore not safe to drink. Lake water has a turbidity of approximately 5 NTU which increases dramatically during the rainy seasons due to stormwater run-off into the lake. Algal blooms occur seasonally adding taste and colour, rendering it aesthetically unacceptable.

Despite the high pump capacity, the lake source and the pumps are underutilised. The water supply system is inefficient due to lack of booster pumping and intermediate storage facilities that would enhance the supply. The distribution system does not reach some parts of the town, making it incapable of supplying water to about half (50%) of the town's population.

Low pressure during dry seasons is a frequent problem which forces temporary closures to build the pressure for the gravity system. There is no treatment plant and treatment by chlorination is done in the storage tanks. Since the town is rapidly expanding there is need to construct new storage tanks in different parts of the town to boost both transmission and storage.

The meter coverage is very low, and there is need to increase the metered connections. Bulk metering should be instituted to detect the equivalent supply and losses and customer metering to determine the actual water consumption should be instituted.

### **2.3 Tariff and Metering**

Tariffs are necessary to ensure equity in distribution, and fairness to both the consumer and the provider. Too high tariffs, though generating more revenue can lead reduced number of consumers who choose to revert to unsafe traditional sources that are unsafe. Low tariffs invariably lead to water wastage, a clear issue addressed by the National Water Policy (NAWAPO, 2002).

Water tariffs in Sengerema are in accordance with Subsidiary Legislation Supplement No. 27 of July 2001. The tariff structure and tariff fixing is by the Board of Directors of SUWASA. Water tariffs in Sengerema are fixed by the Board of BUWA. Domestic customers are charged TSh 350/- (US\$ 0.3) per m<sup>3</sup>, institutional and commercial rates are TSh 500/- (US\$ 0.45) per m<sup>3</sup>.

Additionally there is the flat rate window which is fixed at a minimum rate of TShs. 5000/= (US\$ 5) per month for the un-metered domestic customers. There are also vendors selling water from the SUWASA-owned stand pipes who are paid 20% of the daily sales. The connection fee is currently set at TShs. 6,000/= (US\$ 6.20), excluding the cost of the pipeline to the customer's premises.

Interventions need to be undertaken to ensure that a satisfactory quality and sufficient quantity of treated water is maintained to meet the current and future demand, and to ensure that the water works can produce the design output.

### **2.4 Governance Structure**

The Sengerema Urban Water and Sewerage Authority is the one responsible for water services in the town. SUWASA follows the NAWAPO (2002) and the Subsidiary Legislation Supplement No. 27 of July 2001 guidelines. It commenced its operations recently and therefore not well established. Maintenance tools and transport facilities are not available. Also there are no spare pipes for attending to repairs. The office is not fenced.

## **3. SANITATION, SOLID WASTE MANAGEMENT AND DRAINAGE**

### **3.1 Institutional Background**

The Sengerema Urban Water and Sewerage Authority is responsible for provision and management of sanitation, solid waste and drainage within Sengerema town. SUWASA operates under the Town Council of Sengerema.

### **3.2 Sanitation**

#### **3.2.1 Off- Site Sanitation**

There is no waterborne sewerage or sewage treatment systems in Sengerema town. Residents mostly use pit latrines, and to some extent septic tanks (people with house connections). Sullage is generally been disposed of by discharging into storm water channels on the side of the streets. As the water supply will be increase, wastewater disposal will become a problem and therefore has to be catered for. Most of the people depend on on-site sanitation.

### **3.2.2 On -Site Sanitation**

The Sengerema Town Council and SUWASA has no vacuum tanker and does not have the means to empty septic tanks. On-site sanitation is the main mode of sanitation. Lack of sanitary systems may lead to contamination of natural habitats and form potential breeding sites for disease vectors such as mosquitoes, snails, cockroaches; and contamination of water courses such as rivers and streams by untreated wastewaters.

The sanitation problems identified from the field visit are summarised below:

- Most people have pit latrines but water closets are also in use in upmarket areas.
- There are no wastewater treatment facilities in Sengerema town. Raw sewage is disposed off crudely.
- There are no vacuum emptiers in the town.

Interventions that need to be taken should guarantee that all septic tanks are emptied as required and put in place sludge disposal ponds that will cater for septic tank emptier.

### **3.3 Solid Waste Management**

Collection and disposal of solid waste is done by a private contractor, hired by SUWASA. There is however inadequate capacity with the result that solid waste becomes a nuisance in town. There is no solid waste disposal site and dumping takes place at a site close to a nearby village causing complaints by the residents. It is therefore imperative that the Town Council takes responsibility for the waste collection and disposal, or provide institutional and technical guidance to the procedures of so doing. Lack of a disposal site leads to rubbish being dumped anywhere people find convenient leading to unsightly polluted areas. The following findings were made:

- The Town Council operates only one garbage collection truck, which is obviously inadequate.
- The crude surface dump site is unsightly and has been complained by the locals to causing health problems.

Interventions that need to be taken should ensure that all refuse generated is collected in time

### **3.4 Urban Drainage**

There are no surfaced roads in Sengerema town. The murrum roads have been constructed without taking into account drainage requirements. The end effect is that ponding of stormwater at road crossings causes problems with water running into properties and making access difficult. There is also a general lack of stormwater channels along the roads. The market area in particular is flooded after rains.

### **3.5 Sanitation in Low-Income Area**

On-site sanitation is most common in the low-income areas. Pit latrines have been dug at nearly all residential premises. However, they need improvement in construction design and siting. In some places, waste water and filled pit latrines are disposed off crudely, creating a potential risk of contamination of water courses such as rivers and streams.

### **3.6 Planning**

Sengerema town has no Physical Development Plan and therefore land-use is not implemented according to any definite rules or principles. This is leading to a situation where haphazard settlements are emerging in the town, leading to strain in the provision of infrastructural services as well as living conditions.

Without updated mapping (town population has increase tenfold over the last 15 to 20 years) infrastructure services cannot be planned properly. There is a need for 1:5,000 maps to be developed and proper planning on settlements and infrastructure to be done.



### **3.7 Market area and low cost housing area**

The market area is congested, suffers poor drainage and is in need of upgrading. Surface drainage of stormwater is not catered for and the ablution facilities are inadequate and in a poor state. It is also the main bus stop and therefore attracts many people en-route Geita and Biharamulo districts. The low cost housing areas do not have proper washing or ablution facilities with the effect that many people go to the dam to wash and do laundry.

### **3.8 Town abattoir**

The abattoir at Sengerema needs to be improved in order to properly manage its waste water and waste disposal requirements. Present these wastes are merely discharged the surrounding area.

## **4. INSTITUTIONAL CAPACITY**

From the observations made in the field, it is concluded that the capacity of the relevant institutions in Sengerema town is not to the required level and needs strengthening as recommended for the different personnel as detailed below:

- Policy makers: Policy formulation, environmental issues, institutional issues and water quality management.
- Senior and Middle management: Technical, legal, environmental, financial and administrative issues.
- Technical Staff: Capacity building is required in utility mapping, water quality and supply management and O&M. The skills that are lacking which negatively impact on provision of safe water and sanitation among this group include chemical handling, O&M of plants, rehabilitation, water quality and environmental impact assessment. There is need for leakage survey and monitoring skills in order to reduce the leakage water losses.
- Community groups: awareness creation, participatory approaches to water supply development environmental and sensitisation issues. Watsan issues and PRA are required .
- Complete metering of the whole Sengerema town is essential and a proper maintenance plan of these meters should be initiated together with a programme to inspect and test the meters regularly.
- Records need to be updated to include additional installations of mains and distribution pipes that are to be constructed in un-served areas. There is a need to gain skills on use of software for this purpose.
- Instrumentation and the Data Recording: Information technology within BUWA need to be strengthened by acquiring computers and training in proper use of the same for records, billing and tracing problems of non-compliance of the regulations or non-payment of water bills. Digital maps can be used to zero-in on fictitious customers.

## **5. FINDINGS AND PROPOSED INTERVENTIONS**

### **5.1 Water Supply**

#### **5.1.1 Nyamazugu intake**

It is proposed to undertake the following:

- Reinforce the raw water pumping capacity and improve the intake works;
- Construct a new conventional water treatment works of 6Ml/d capacity;
- Construct a new pipeline (21km) of diameter 300mm;
- Construct a storage reservoir of 6Ml capacity.

The above measures will ensure that treated and adequate water is supplied to Sengerema with an estimated population of about 50,000 people at 100 lpcd, which would improve health and living conditions to the predominantly low income residents.

## **5.2 Sanitation, Solid Waste Management and Drainage**

### **5.2.1 Sewerage Treatment Ponds and Sewer.**

The following findings, recommendations and proposed interventions are made:

- Identification and construction of a site for a sewage treatment works and waste stabilisation ponds constructed;
- A main collector sewer line draining the main water consumers and institutions should be laid and provision for future connections onto the sewer made;
- For areas where there is no water supply, especially in the low cost areas of the town, ablution and washing blocks should be provided and connected to the water supply system.

Attendance to septic tanks and pit latrines should be improved by carrying out the following:

- Supply one vacuum tanker of 9,000 litre capacity. This will enable emptying of septic tanks and pit latrines on regular basis considering that the town is not sewered;
- Make provision at the new waste stabilisation ponds for disposal and treatment of septic tank and pit latrine sludge.

Sewage treatment prevents the spread of water borne disease and also pollution of the environment

### **5.2.2 Solid Waste**

It is proposed to carry out the following:

- Supply two small tractors with 10 trailers for solid waste collection;
- Construct 8 properly designed collection points at strategic places around town where the trailers will be left for filling;
- Supply 30 no. handcarts and spades for collection and transportation of waste to designated collection points to ensure orderly collection and disposal of solid waste.
- Identification of an appropriately located landfill site;
- Construction of the landfill site to accepted standards.

Supply of collection and transport facilities will enable the Council to collect refuse on a daily basis to keep the town clean and create a pleasant living environment. In addition, a properly managed solid waste disposal site will also minimise the possibility of leachate finding its way to the watercourse draining to the lake.

### **5.2.3 Urban Drainage**

In order to improve the urban drainage the following proposed interventions are made:

- Conduct a drainage study of the urban area to define stormwater run-off routes and channels;
- Construct culvert crossings at strategic positions and provide stormwater channels to roads.

Proper drainage management will prevent erosion to roads and the environment and protect valuable soils washed into the lake.

## **5.3 Planning**

The recommended interventions are described below.

- Prepare a physical development plan through a consultancy study;

- Commission an aerial mapping company to prepare 1:5000 ortho maps from new aerial photographs.

A proper physical development plan will lead to an orderly and planned town development.

### **5.3.1 Market area and low cost housing area**

- Re-plan and re-organise the market area;
- Improve waste collection and ablution facilities;
- Provide communal washing, laundry and ablution facilities to low cost areas.

Proper waste collection, stormwater drainage and ablution facilities will lessen the pollution impact on the town.

### **5.3.2 Town abattoir**

- Improve the waste treatment facilities at the abattoir;
- Upgrade the abattoir to conform to normal acceptable abattoir standards.

Proper abattoir waste management will prevent the spread of diseases and ensure hygienic meat products.

## **5.4 Capacity Building**

It was observed that the capacity for both personnel and community is inadequate for proper running of the water supply hence there is need for further capacity building.

- Water supply and sanitation management personnel need to be empowered and capacitated for proper service provision.
- The financial, billing and legal skills need to be improved.
- The technical group lacks skills in O & M of plants, rehabilitation, water quality and environmental issues.
- The community group needs strengthening in PR and awareness creation techniques.
- Community organizations need to be formed to manage water and sanitation services in informal settlements.
- Community development and mobilization is required to sensitize the people to the benefits of services, and campaigns undertaken for health and hygiene.
- Recruitment and training of community trainers in low income areas is necessary.
- Formulation and updating of the Physical Plan and technical co-ordination of all services within the municipality i.e. roads, drainage and physical planning.

## **5.5 Proposed Interventions**

The interventions proposed in respect of the rehabilitation and expansion of the water supply, sewerage and sanitation, solid waste disposal, urban drainage and other requirements to meet the MDGs are summarized in the *Matrix of Proposed Interventions* overleaf. This matrix also describes the anticipated impact of the proposed interventions and assigns a priority ranking, as well as the estimated costs.

In addition to the identified physical interventions, the recommended inputs with respect to training and capacity building necessary to ensure the viability and sustainability of the water and sanitation infrastructure in Sengerema town have also been incorporated in the matrix.

The training and capacity building activities proposed are described separately in the introductory chapter.

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

MATRIX OF PROPOSED INTERVENTIONS

COUNTRY: TANZANIA	TOWN: SENGEREMA	REGION SENGEREMA	2004 MUNICIPALITY POPULATION (ESTIMATED) 50,000	1999 MUNICIPALITY POPULATION	1999 CORE URBAN POPULATION	MUNICIPALITY AREA (km <sup>2</sup> )	WATER AND SEWERAGE UNDERTAKER Sengerema Urban Water and Sanitation Authority (SUWASA)	DRAINAGE AND SOLID WASTE OPERATOR, District Council
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NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
1.0	WATER SUPPLY					
1.1	Nyamazugu intake on lake Victoria	The demand for water far exceeds the capacity of this water supply system. A doubling in capacity only to satisfy current demand would be required. The water from this source is also untreated and therefore not safe to drink.	<ul style="list-style-type: none"> <li>Reinforce the raw water pumping capacity and improve the intake works;</li> <li>Construct a new conventional water treatment works</li> <li>Construct a new pipeline (21km)</li> <li>Construct a storage reservoir of 6Ml capacity.</li> </ul>	The above measures will ensure that treated and adequate water is supplied to Sengerema with an estimated population of about 50,000 people at 70lpcd, which would improve health and living conditions to the predominantly low income residents.	A	2,430,000
2.0	SEWERAGE AND SANITATION					
2.1	Sewage treatment works and main sewer	There is no waterborne sewerage or sewage treatment systems in Sengerema town. Residents mostly use pit latrines, and to some extent septic tanks (people with house connections). Sullage is generally disposed of by discharging into stormwater channels on the side of the streets. As the water supply will be increase, wastewater disposal will become a problem and therefore has to be catered for.	<ul style="list-style-type: none"> <li>A sewage treatment works site is to be identified and procured and waste stabilisation ponds are to be constructed;</li> <li>A main collector sewer line draining the main water consumers and institutions is to be laid. Provision for future connections onto the sewer are to be made;</li> <li>For areas where there is no water supply, especially in the low cost areas of the town, abluent and washing blocks are to be provided and connected to the water supply system.</li> <li>Supply one vacuum tanker of 9,000 litre capacity. This will enable emptying of septic tanks and pit latrines on regular basis considering that the town is not sewerred;</li> <li>Make provision at the new waste stabilisation ponds for disposal and treatment of septic tank and pit latrine sludge.</li> </ul>	Sewage treatment prevents the spread of water borne disease and also pollution of the environment	A	180,000
2.2	Sanitation – Attendance to septic tanks and pit latrines	The Sengerema Town Council has no vacuum tanker and does not have the means to empty septic tanks.	<ul style="list-style-type: none"> <li>Supply one vacuum tanker of 9,000 litre capacity. This will enable emptying of septic tanks and pit latrines on regular basis considering that the town is not sewerred;</li> <li>Make provision at the new waste stabilisation ponds for disposal and treatment of septic tank and pit latrine sludge.</li> </ul>	Treating sewage sludge properly will prevent contamination and spread of disease as well as pollution of the environment.	B	44,500
3.0	SOLID WASTE					
3.1	Collection and transport	Collection and disposal of solid waste is done by a private contractor. There is however inadequate capacity with the result that solid waste becomes a nuisance in town. There is no solid waste disposal site and dumping takes place at a site close to a nearby village causing complaints by the villagers. It is therefore imperative that the situation be improved by the Council taking responsibility for the waste collection and disposal.	<ul style="list-style-type: none"> <li>Supply two small tractors with 10 trailers for solid waste collection;</li> <li>Construct 8 properly designed collection points at strategic places around town where the trailers will be left for filling.</li> <li>Supply 30 no. handcards and spades for collection and transportation of waste to designated collection points to ensure orderly collection and disposal of solid waste.</li> <li>Identification of an appropriately located landfill site.</li> <li>Construction of the landfill site to accepted standards.</li> </ul>	Supply of collection and transport facilities will enable the Council to collect refuse on a daily basis to keep the town clean and create a pleasant living environment.	B	152,000
3.2	Waste disposal site	Collecting solid wastes but not having a disposal site leads to rubbish being dumped anywhere people may find convenient leading to unsightly areas with pollution potential.	<ul style="list-style-type: none"> <li>Identification of an appropriately located landfill site.</li> <li>Construction of the landfill site to accepted standards.</li> </ul>	A properly constructed and managed solid waste disposal site will prevent leachate filtering out and polluting the environment.	B	100,000
4.0	URBAN DRAINAGE					
4.1	Storm water drains	There are no surfaced roads in Sengerema town. The murrum roads have been constructed without taking into account drainage requirements. The end effect is that ponding of stormwater at road crossings causes problems with water running into properties and making access difficult. There is also a general lack of stormwater channels along the roads. The market area in particular is flooded after rains.	<ul style="list-style-type: none"> <li>Conduct a drainage study of the urban area in order to define stormwater run-off routes and channels;</li> <li>Construct culvert crossings at strategic positions and provide stormwater channels to roads.</li> </ul>	Proper drainage management will prevent erosion to roads and the environment and protect valuable soils washed into the lake.	C	40,000
5.0	OTHER					

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

MATRIX OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY	SECTOR	PROPOSED ACTION	IMPACT	PRIORITY RANKING	ESTIMATED COST USD(\$)
6.0	PHYSICAL WORKS CAPACITY BUILDING			COST OF PROPOSED INTERVENTIONS BIF		5,069,844
6.1		Water Demand Management	Reduction of unaccounted for water/leakage detection	Reduction of UFW by 50%		
6.2		Health and hygiene education	Campaigns and advocacy	Increased awareness on water usage	B	25,000
6.3		Water resources management	Health and hygiene awareness campaigns	Reduced incidence of water related disease	B	20,000
6.4		Solid waste management	Water quality assessment and monitoring	Improved utilisation of available water resources	A	20,000
			Development of management strategy*	Improved capacity at city level for waste management	C	30,000
6.5		Training and Capacity Building	Community level waste management initiative	Improved livelihoods of those involved in waste collection	B	20,000
			IT Training and hardware installation	Data base management	B	15,000
			Training of billing and revenue staff**	Improved billing and revenue collection	B	30,000
			Training for water treatment plant operators**	Efficient information gathering and retrieval	A	15,000
			Training for wastewater treatment plant operators**	Improved operation of water and wastewater treatment facilities	B	10,000
				Improved treatment plant and improved effluent quality into Lake Victoria	B	10,000
				<b>Total Capacity Building and training</b>		<b>195,000</b>
				<b>GRAND TOTAL</b>		<b>5,264,844</b>

NOTES ON PRIORITY RANKING:

A VERY URGENT

B

ESSENTIAL

C

NECESSARY

\* assumes development of strategies on a regional scale

\*\*assumes training will be carried out on a regional scale/

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

MATRIX OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY REQUIREMENTS	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
5.1	Physical Development Plan and mapping	Sengerema town has no Physical Development Plan and therefore land-use is not implemented according to any definite rules or principles. This is leading to a situation where the town is developing into an unmanaging situation with regards to the provision of infrastructural services as well as living conditions. Due to the lack of capacity at the Town Council the proposed interventions are unlikely to be adequately addressed without outside engineering services.	<ul style="list-style-type: none"> <li>Commission an aerial mapping company to prepare 1:5000 ortho maps from new aerial photographs.</li> </ul>	An updated development plan make for more realistic town planning.	A	25,000
5.2	Engineering consultancy services		<ul style="list-style-type: none"> <li>Procure external engineering services to assist in the detailed assessment, design and supervision of the required interventions. Ensures appropriate expertise in the implementation of the proposals.</li> <li>Water source development and optimisation study</li> </ul>	Well planned and designed infrastructure is essential for improvement and maintaining proper living conditions and standards.	A	30,000
5.3	Market area and low cost housing area	The market area is congested, suffers poor drainage and is in need of upgrading. Surface drainage of stormwater is not catered for and the ablation facilities are inadequate and in a poor state. It is also the main bus stop and therefore attracts many people. The low cost housing areas do not have proper washing or ablation facilities with the effect that many people go to the dam to wash and do laundry.	<ul style="list-style-type: none"> <li>Replan and re-organise the market area;</li> <li>Improve waste collection and ablation facilities;</li> <li>Provide communal washing, laundry and ablation facilities to low cost areas.</li> </ul>	Proper waste collection, stormwater drainage and ablation facilities will lessen the pollution impact on the town.	C	30,000
5.4	Town abattoir	The abattoir at Sengerema needs to be improved in order to properly manage it's waste water and waste disposal requirements. Present these wastes are merely discharged the surrounding area.	<ul style="list-style-type: none"> <li>Improve the waste treatment facilities at the abattoir;</li> <li>Upgrade the abattoir to conform to normal acceptable abattoir standards.</li> </ul>	Proper abattoir waste management will prevent the spread of disease and ensure hygienic meat products.	C	30,000

<b>TOTAL</b>	<b>3,061,500</b>
Add 20% for preliminary and general items	
<b>Subtotal A</b>	<b>3,673,800</b>
Add 15% for physical contingencies	
<b>Subtotal B</b>	<b>4,224,870</b>
Add 20% for consultancy services for design and construction	
<b>TOTAL COST OF THE PROPOSED INTERVENTION</b>	<b>5,069,844</b>

UNITED NATIONS HUMAN SETTLEMENTS  
PROGRAMME (UN-HABITAT)

Water for African Cities Programme

*Lake Victoria Region Water and  
Sanitation Initiative*

*Supporting Secondary Urban Centres in the Lake Victoria Region to  
Achieve the Millennium Development Goals*

**GGABA PARISH**  
(Kampala City)

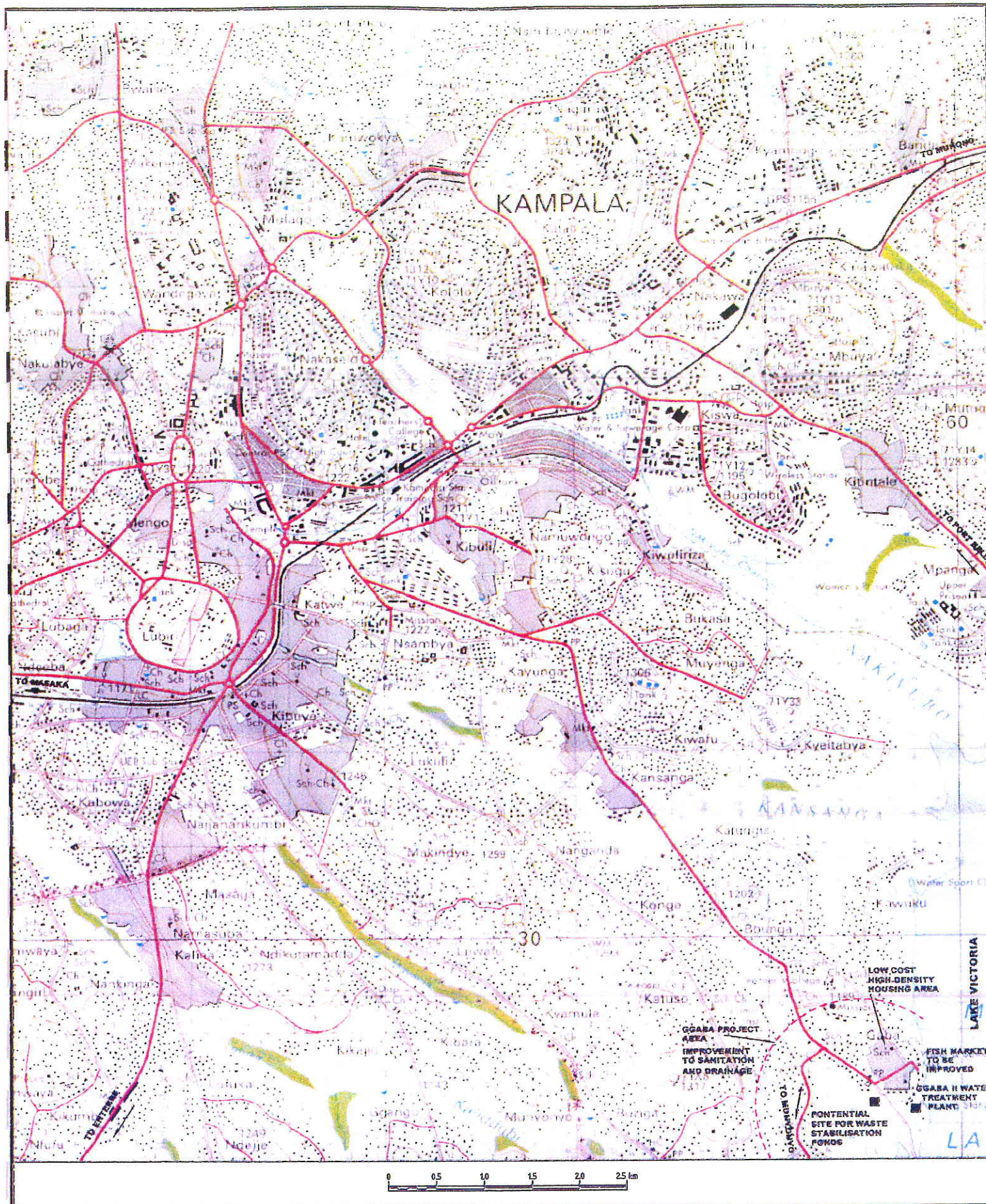
**UGANDA**



August 2004

**GGABA PARISH**  
**Kampala Municipality, Uganda**

Municipality Population Parish Population Population growth rate Municipality surface area:	10,000 (2004)	
Water Undertaker: National Water and Sewerage Corporation		
Sewerage, Sanitation and Solid Waste Operator: Kampala City Council		
Ggaba Parish is part of Kampala Municipality, but rather detached as it is located on a peninsula in the Inner Murchison Bay of Lake Victoria. It is the site where the Ggaba water intake and treatment works for the supply of Kampala City are situated. The parish is located upstream of the intake works of the Kampala water treatment works.		
<b>Issues/problems:</b>	<ul style="list-style-type: none"> <li>Only 25% of the residents are connected to Kampala's Water supply</li> <li>Nearly half of the residents draw their water from the lake</li> <li>Low income households pay twice as much for water than a piped connection</li> </ul>	
<ul style="list-style-type: none"> <li>Water supply:</li> </ul>		
<ul style="list-style-type: none"> <li>Sewerage and Sanitation</li> </ul>	<ul style="list-style-type: none"> <li>Only one communal water-borne toilet</li> <li>Poor condition of pit latrines</li> <li>70% of the residents do not have access to a pit latrine</li> </ul>	
<ul style="list-style-type: none"> <li>Solid waste and drainage</li> </ul>	<ul style="list-style-type: none"> <li>Parish is located upstream of the intake works of the Kampala water treatment works.</li> <li>There is no provision of adequate waste collection facilities; consequently, there is an open dumpsite by the lakeshore.</li> </ul>	
<ul style="list-style-type: none"> <li>Capacity building:</li> </ul>	<ul style="list-style-type: none"> <li>Bye-laws on solid waste management need to be revised</li> </ul>	
<b>Proposed interventions:</b>	<ul style="list-style-type: none"> <li>Increase number of public stand pipes</li> <li>Extend water distribution network to those areas that inhabitants currently draw water from the Lake</li> <li>Relocate fish market</li> </ul>	
<ul style="list-style-type: none"> <li>Water supply:</li> </ul>		
<ul style="list-style-type: none"> <li>Sewerage and Sanitation</li> </ul>	<ul style="list-style-type: none"> <li>Increase number of communal toilets</li> <li>Construct septic tank to receive waste water from Market</li> <li>Construct waste stabilisation pond</li> <li>Lay nominal bore sewers to drain wastewater from the parish to waste ponds</li> </ul>	
<ul style="list-style-type: none"> <li>Solid waste and drainage</li> </ul>	<ul style="list-style-type: none"> <li>Improve community waste collection particularly during market day</li> <li>Construct landfill and procurement of collection vehicles and storage skips.</li> </ul>	
<ul style="list-style-type: none"> <li>Capacity building</li> </ul>	<ul style="list-style-type: none"> <li>Community sanitation and hygiene education programmes</li> </ul>	
<b>Expected Outcomes:</b>	<ul style="list-style-type: none"> <li>Protection of water inlet of Kampala waterworks</li> </ul>	
<ul style="list-style-type: none"> <li>Water Supply</li> </ul>		
<ul style="list-style-type: none"> <li>Sewerage and Sanitation</li> </ul>	<ul style="list-style-type: none"> <li>Provide adequate sanitation to those currently without access</li> </ul>	
<ul style="list-style-type: none"> <li>Solid waste &amp; drainage</li> </ul>	<ul style="list-style-type: none"> <li>Reduce pollution of decaying solid waste, including fish debris, into the lake</li> </ul>	
<ul style="list-style-type: none"> <li>Capacity building</li> </ul>	<ul style="list-style-type: none"> <li>Improve the capacity within the council and NWSC to provide better sanitation services</li> </ul>	
<b>Investment Required:</b>	<ul style="list-style-type: none"> <li>Water Supply</li> <li>Sewerage and Sanitation</li> <li>Solid Waste and Drainage</li> <li>Capacity Building</li> </ul>	<p style="text-align: right;">USD 149,040</p> <p style="text-align: right;">USD 894,240</p> <p style="text-align: right;">USD 946,404</p> <p style="text-align: right;">USD 85,000</p>
	<b>TOTAL</b>	<b>USD 2,074,684</b>
<b>Anticipated effect on MDGs</b>	Provide adequate and secure sanitation infrastructure to least 70% of the targeted population	
<b>Anticipated effect on Lake Victoria</b>	Reduced decaying matter in the lake.	





 <p><b>UN - HABITAT</b> United Nations Human Settlement Programme</p>	<p>Project Title <b>LAKE VICTORIA REGION WATER AND SANITATION INITIATIVE</b></p>	<p>Drawing Title <b>UGANDA GGABA PARISH LOCATION MAP</b></p>	 <p>Scale: AUGUST 2001 Scale: As shown</p>
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## **1. INTRODUCTION**

### **1.1 General Introduction**

Ggaba Parish is part of Kampala Municipality, but rather detached as it is located on a peninsula in the Inner Murchison Bay of Lake Victoria. It is the site where the Ggaba water intake and treatment works for the supply of Kampala City are situated. The Parish is located upstream of the intake works of the Kampala water treatment works.

### **1.2 Population**

The resident population of Ggaba town is estimated to be 10,000, the day-time figure is usually much higher, particularly on market days. The majority of the population is low income having migrated to Ggaba to look for work in the City.

### **1.3 Socio-economic Conditions**

The main economic activities constitute fisheries and trading. Ggaba is the main fish landing site in Kampala where fish is brought daily ashore to be cleaned, filleted, smoked and then sold. There are two weekly markets attracting residents from the neighbouring islands who sell their agricultural produce and fish, and goods from the city are sold. Residents from the neighbouring islands also export their fish products to the Democratic Republic of Congo and the European Union.

### **1.4 Water Demand and Supply**

The current estimated demand of the 10,000 inhabitants is 1,000 m<sup>3</sup>/day, given a per capita rate of 100 l/day and is projected to increase to approximately 2,000 m<sup>3</sup>/day by 2015. Although situated next to the major treatment works for Kampala, the Ggaba Township has a very low rate of house connections. Only about 25% of the households in the area are connected to the network. Other members of the community largely depend on a few communal standpipes and privately owned yard taps and the majority (>60%) of the resident population and traders however depend entirely on water fetched from the lake.

### **1.5 Sanitation**

There is no waterborne sewerage system in Gaba Town; residents depend on on-site sanitation facilities like simple pit latrines and one communal waterborne toilet.

## **2. WATER SUPPLY**

### **2.1 Institutional Background**

National Water and Sewerage Corporation is the only organisation mandated to produce and distribute piped water services in Kampala City. All other actors are either secondary providers who must obtain supplies from NWSC or permission from the same corporation to develop alternative sources. In Ggaba Parish it is therefore the NWSC responsible for supplying water to the area. The operation and management of a supply depends on who requests for a connection to the mains. If the Local Council requests for connection to serve the residents, a committee or water users association is formed to operate and manage the facility. If a private connection is requested then this is paid for and managed by the individual.

## **2.2 Water Supply Systems**

### **2.2.1 General**

Water is supplied from the NWSC water treatment works at Ggaba. The piped water supply is regular and rarely interrupted. However, in unplanned areas, such as the market area, there are very few adequate provisions for water and sanitation

### **2.2.2 Existing water sources**

The major sources of water is water piped from NWSC and Lake Victoria. The Lake? water is of poor quality but most residents continue to use for washing and cleaning or washing of agricultural produce.

### **2.2.3 Existing water treatment works**

Water supplied to Kampala City is treated at two water treatment plants, namely Ggaba I and Ggaba II, located about 11 Km SE of Kampala, at the shores of the Inner Murchison Bay (IMB) of Lake Victoria from which the raw water is abstracted. On average, Ggaba I treats 35,000 m<sup>3</sup> per day while Ggaba II treats 62,000 m<sup>3</sup> per day. However, despite the fact that Ggaba Township is close to the treatment works, only 25% of the inhabitants are connected to the piped water supply. The raw water undergoes treatment by conventional means, involving coagulation, rapid gravity sand filtration and chlorination.

### **2.2.4 Transmission and distribution main**

The NWSC continues with its drive to expand its network primarily through the use of its internally generated funds. The total network length increased during the year 2003 from 1,846 km to 2,200 km or an increase of 354 km. Apart from the 80 km carried out with the assistance from development partners, all mains extensions were financed from the internally generated funds. Significant extensions were made to the peri-urban areas in Kampala including areas such as Bunamwaya, Seguku, Lubowa and along Gayaza Road.

### **2.2.5 Problems with water supply**

Ggaba Parish is located near the Kampala water treatment works, but the level of water coverage is still poor. Most of the community members (approx. 60%) still depend on lake water for domestic and commercial use, despite the fact that the water from the Lake is heavily contaminated. In particular micro-biological contamination is very high with resulting high risk of water-borne diseases such as cholera, typhoid, dysentery, and bilharzia. Malaria is considered the most serious health threat.

## **2.3 Tariffs and Metering**

Billing is regular and the rates are considered fair. Selling price at the public standpipes and private taps is UGX 50/- for a 20 litre can. Rate for piped water supply is UGX 700/- per cum. The monthly amount billed by NWSC for the public standpipes varies between UGX 30,000 - 50,000. The current cost of water supply connection is UGX 58,000 (= US\$ 30) which is prohibitive to many who, while they can afford to pay water bills, cannot pay the connection cost.

## **2.4 Governance Structure**

The governance for the public water and sanitation in the township is under the responsibility of the L.C.1. It appears to be well organised and taken good care of, but evidently is underfunded. The piped water supply is under the mandate of NWSC, which stops at the water meter. There are opportunities for some changes in the bylaws of the Local Council of Ggaba to reflect disposal of wastewater and solid waste.

### **3. SANITATION, SOLID WASTE MANAGEMENT AND DRAINAGE**

#### **3.1 Institutional Background**

Sanitation and excreta management in the peri-urban areas of Kampala is a 3-tier activity. The key players are Ministry of Health (MOH), Kampala City Council (KCC) and NWSC at institutional level, NGOs, CBOs, as well as Local councils and individual households at the local level. The public health department of KCC is responsible for installing public water and sanitation facilities that are handed over to the communities to operate. In Ggaba, however, the services provided by the above-mentioned institutions have not reached the area. Provision and management of water, sanitation, solid waste and drainage have been left to the local council.

#### **3.2 Sanitation**

##### **3.2.1 Off-site sanitation**

No piped sewerage system exists in Ggaba, sanitation is provided mainly by pit latrines, and a very small number of septic tanks; an unknown number also use the lake shore as site for defecation.

##### **3.2.2 On-site sanitation**

The proper disposal of human excreta is a serious environmental health problem in the parish: it is apparent that a significant proportion (70%) of the households do not have access to pit latrines. However, even of those that have pit latrines, the facilities were filthy and in many cases unusable. The pit latrines are mostly of the traditional unimproved type that are mostly raised above-ground because of the high water table in the low-lying areas. This has encouraged indiscriminate disposal of human excreta, especially by children, resulting in a health hazard. Five communal pit latrines are found in Ggaba, two of them are in the market place, the others elsewhere in the township. Payment is UGX 100/- per usage. They look well kept and clean. Toilets close at 10 pm at night and open early morning. Usage during the night is therefore not possible and people have to resort to other less desirable options.

The area around the market place is very crowded; there is hardly space to provide for individual pit latrines at household level. Communal pit latrines are constructed on small plots which are bought by the Local Council. This seems to be a better solution and the L.C. 1 proposes to build 10 additional communal sanitary facilities. One demonstration Enviro loo toilet has been constructed at the fish landing site, but is not being used as people reject the sitting arrangement on cultural grounds

#### **3.3 Solid waste management**

The township suffers serious problems with drainage and solid waste disposal. The lake water at the shore line is visibly contaminated with decayed organic materials. Due to the high influx of traders and frequent twice-weekly markets, the problem of solid waste collection and disposal is very evident. This needs to be addressed. Garbage is supposed to be collected by the Kampala City Council. However, there is a serious shortage of garbage trucks and collection is irregular and inadequate. Until recently a large amount of garbage was dumped at the lakeshore, just next to the fish landing site. Fortunately this has been stopped, but the mountain of garbage is still there right on the beach.

The fish cleaning area is very inadequate and poses a serious health risk. It needs to be investigated as a point source of pollution. Offal and effluent is discharged directly into the

Lake. There exists a privately operated domestic waste collection system; customers pay a weekly charge of UGX 200/- to 500/- depending on the amount of garbage.

### **3.4 Drainage**

In the lower parts of Ggaba near the lakeshore (around the fish landing site) the drainage is clogged with stagnant water, because of solid waste (mainly polythene bags) and severe erosion of the pathways. Most of the storm water and domestic waste water ends up directly into the lake. Far better would be to lead the waste water into the adjoining papyrus swamp.

## **4. PLANNING**

No physical planning has been done for Ggaba, which hinders severely provision of infrastructural development. The Council gives physical planning a high priority.

## **5. CAPACITY BUILDING & TRAINING**

A need is felt for training and education with regards to health and hygiene. Also capacity building could be provided for community members who are interested in running communal water points and sanitation facilities.

## **6. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Findings and Conclusions**

#### **6.1.1 Water supply**

- Although situated next to the major treatment works for Kampala, the Ggaba Parish has a very low rate of house connections (approx. 25%). with majority (>60%) of the resident population and traders depending entirely on water fetched from the lake.
- The piped water supply to the customers is very regular and rarely interrupted and the local authorities are of the view that the billing is regular and the rates are considerably fair.
- Rate for piped water supply is UGX 700/- per cum and the monthly amount billed by NWSC for the public standpipes varies between UGX 30,000 - 50,000. Selling price at the public standpipes and private taps is UGX 50/- for a 20 litre can.
- The water from the Lake is heavily contaminated; in particular micro-biological contamination is very high with resulting high risk of water-borne diseases such as cholera, typhoid, dysentery, and bilharzias.
- The current cost of water supply connection is UGX 58,000 (= US\$ 30) which is prohibitive to many who, while they can afford to pay water bills, cannot pay the connection cost.

### **6.1.2 Sanitation, solid waste management and drainage**

- No piped sewerage system exists in Ggaba, on-site sanitation is provided mainly by pit latrines (estimated 30%), and a very small number of septic tanks; an unknown number also uses the lake shore.
- Five communal pit latrines are found in Ggaba and payment is UGX 100/- per usage. They look well kept and clean. Toilets close at 10 pm at night and open early morning. Usage after 10 pm at night is therefore not possible and people have to resort to other less desirable options.
- There is hardly space to provide for individual pit latrines at household level. Communal pit latrines are constructed on small plots which are bought by the Local Council. This seems to be a better solution and the L.C. 1 proposes to build 10 additional communal sanitary facilities.
- One demonstration Enviroloo toilet was constructed at the fish landing site, but is not being used as in particular the Muslim people reject the sitting arrangement on cultural grounds.
- In the lower parts of Ggaba near the lakeshore (around the fish landing) the drainage system becomes worse and worse with clogged drains and stagnant water, because of solid waste (mainly polythene bags) and severe erosion of the pathways.
- Most of the storm water with its erosional washings and domestic waste water end up directly into the lake.
- The lake water at the shore line is visibly contaminated with decayed organic materials.
- There is a serious shortage of garbage trucks and collection is irregular and inadequate. Residents and traders continue to dump garbage at the lakeshore, just next to the fish landing site despite efforts by the local council to stop them.
- There exists a privately operated domestic waste collection system; customers pay a weekly charge of UGX 200/- to 500/- depending on the amount of garbage.
- The fish handling area is very inadequate and poses a serious health risk. The offal and effluents discharge directly into the Lake.
- The governance for the public water and sanitation in the township is under the responsibility of the L.C.1. It appears to be well organised and taken good care off, but evidently is under-funded.
- There are opportunities for some changes in the bylaws of the Local Council of Ggaba to reflect disposal of wastewater and solid waste.

### **6.1.3 Planning**

The township lacks a comprehensive physical development plan and as a result there are difficulties in the provision of community services.

### **6.1.4 Capacity building**

There is lack of awareness on water usage, health and hygiene practices, and solid waste management in the community. The absence of safe water for domestic use and the weak unstructured hygiene advocacy have hampered behavioural changes at the town.

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

SUMMARY OF PROPOSED INTERVENTIONS

TOWN:	ESTIMATED POPULATION	CORE URBAN POPULATION	MUNICIPAL AREA (km <sup>2</sup> )	WATER AND WASTEWATER UNDERTAKER	SOLID WASTE OPERATOR
GGABA PARISH, KAMPALA	10,000			NATIONAL WATER AND SEWERAGE CORPORATION	KAMPALA CITY COUNCIL

NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
1.0	<b>WATER SUPPLIES</b>					
1.1	Water supply to new fish market	The fish market is located on the lake shore and consists of temporary timber structures where fish is cleaned in unhygienic conditions.	Provide water supply to the purpose built structure for fish handling	Improved food hygiene	B	40,000
1.2	Communal facilities	Households without individual connections have limited access to potable water.	Construct ten communal water points, with squats acceptable to the Moslem community.	Improved access to potable water and sanitation.	A	50,000
2.0	<b>SEWERAGE AND SANITATION</b>					
2.1	Site for waste stabilisation ponds	There are no waste stabilisation ponds serving Ggaba.	A potential site has been identified next to a wetland. Construct anaerobic, facultative and maturation ponds at the identified site.	Improved sanitation.	A	250,000
2.2	Sewers	The parish is not sewered.	Lay 150mm nominal bore sewers to drain wastewater from the town to the identified site for waste stabilisation ponds.	Improved sanitation.	A	200,000
2.3	Communal facilities	There is insufficient space in the unplanned housing area for individual households to construct latrines.	Construct ten communal facilities with water supplies, flush toilets with squats acceptable to the Moslem community, bathing and laundry facilities.	Improved sanitation and reduction of the volume of sillage disposed of in drains or on open ground.	A	50,000
2.4	Wastewater collection at the market area	The "Envirloc" recently erected next to the market is unacceptable to the Moslem community. The market area is on the opposite side of the peninsula from the identified site for waste stabilisation ponds.	Construct a septic tank to receive wastewater from the market area.	Improved sanitation. Reduction in the BOD loading on Lake Victoria.		40,000
3.0	<b>SOLID WASTE</b>					
3.1	Refuse collection	Kampala City Council cannot cope with the volume of waste generated, particularly at the fish market.	Construct ten concrete slabs with perimeter walls for siting skips or trailers for the collection of solid waste.	Reduced environmental pollution, including leachate reaching Lake Victoria.	A	126,500
3.2	Solid waste disposal	There is no sanitary landfill close to Ggaba.	Supply vehicles for the collection of solid waste twice weekly. Identify a site for a sanitary landfill. Construct an engineered sanitary landfill.	Breaking the fly breeding cycle. Reduced environmental pollution.	A	100,000
4.0	<b>URBAN DRAINAGE</b>					
4.1	Stormwater runoff	There no engineered drains at the market area and in the adjacent unplanned settlement, allowing water to pond.	Construct stormwater drains in the market and unplanned settlement, directing runoff towards the papyrus swamp rather than directly into the lake.	Avoid erosion and washing of contaminants into the lake.	A	150,000
5.0	<b>OTHER REQUIREMENTS</b>					
5.1	Physical development plan	There is no physical development plan for Ggaba parish, which has led to the growth of unplanned settlements with no provision for basic infrastructure.	Engage a town planner to prepare a physical development plan making adequate provision for service corridors, access, etc.	Ensures growth will occur in an orderly manner.	A	50,000
5.2	Base mapping	The base mapping held by Ggaba parish council is obsolete.	Produce new base mapping.	Enable the physical development plan to be prepared.	B	25,000
5.3	Engineering services	Due to the lack of capacity at the Municipal Council the	Procure external engineering services to assist in the	Ensures hiring of appropriate expertise in	A	Refer to summary

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

SUMMARY OF PROPOSED INTERVENTIONS

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
5.4	Improvements to the market area	Proposed interventions are unlikely to be adequately addressed without outside engineering services. The market area, particularly the fish market are unhygienic.	detailed assessment, design and supervision of the required interventions. Relocate the fish market to a purpose-built building with concrete fish cleaning benches, a water supply for hosing down and drainage to a septic tank. Provide public toilets acceptable to the Moslem community at the market site.	the implementation of the proposals. Improved food hygiene and public health. Reduced contamination of Lake Victoria. Improved sanitation.	B	120,000

<b>TOTAL</b>	<b>1,201,500</b>
Add 20% for preliminary and general items	240,300
<b>Subtotal A</b>	<b>1,441,800</b>
Add 15% for physical contingencies	216,270
<b>Subtotal B</b>	<b>1,658,070</b>
Add 20% for consultancy services for design and construction supervision	331,614
<b>TOTAL COST OF THE PROPOSED INTERVENTION</b>	<b>1,989,684</b>

ITEM NO.	FACILITY	SECTOR	PROPOSED ACTION	IMPACT	PRIORITY RANKING	ESTIMATED COST USD(\$)
<b>COST OF PROPOSED PHYSICAL INTERVENTIONS B/F</b>						
6.0	PHYSICAL WORKS					1,989,684
6.1	CAPACITY BUILDING	Water Demand Management	Reduction of unaccounted for water/leakage detection	Reduction of UFW by 50%		
			Campaigns and advocacy	Increased awareness on water usage	B	10,000
6.2		Health and hygiene education	Health and hygiene awareness campaigns	Reduced incidence of water related disease	A	20,000
6.3		Water resources management	Water quality assessment and monitoring	Improved utilisation of available water resources	C	20,000
6.4		Solid waste management	Development of management strategy*	Improved capacity at city level for waste management	B	10,000
			Community level waste management initiative	Improved livelihoods of those involved in waste collection	B	15,000
6.5		Training and Capacity Building	IT Training and hardware installation	Data base management		n/a
			Training of billing and revenue staff**	Improved billing and revenue collection		n/a
			Training for water treatment plant operators**	Efficient information gathering and retrieval		n/a
			Training for wastewater treatment plant operators**	Improved operation of water and wastewater treatment facilities		n/a
			Training for wastewater treatment plant operators**	Improved treatment plant and improved effluent quality into Lake Victoria	B	10,000
<b>Total Capacity Building and training</b>						<b>85,000</b>
<b>GRAND TOTAL</b>						<b>2,074,684</b>

NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY

\* assumes development of strategies on a regional scale

\*\*assumes training will be carried out on a regional scale/



UNITED NATIONS HUMAN SETTLEMENTS  
PROGRAMME (UN-HABITAT)

Water for African Cities Programme

*Lake Victoria Region Water and  
Sanitation Initiative*

*Supporting Secondary Urban Centres in the Lake Victoria Region to  
Achieve the Millennium Development Goals*

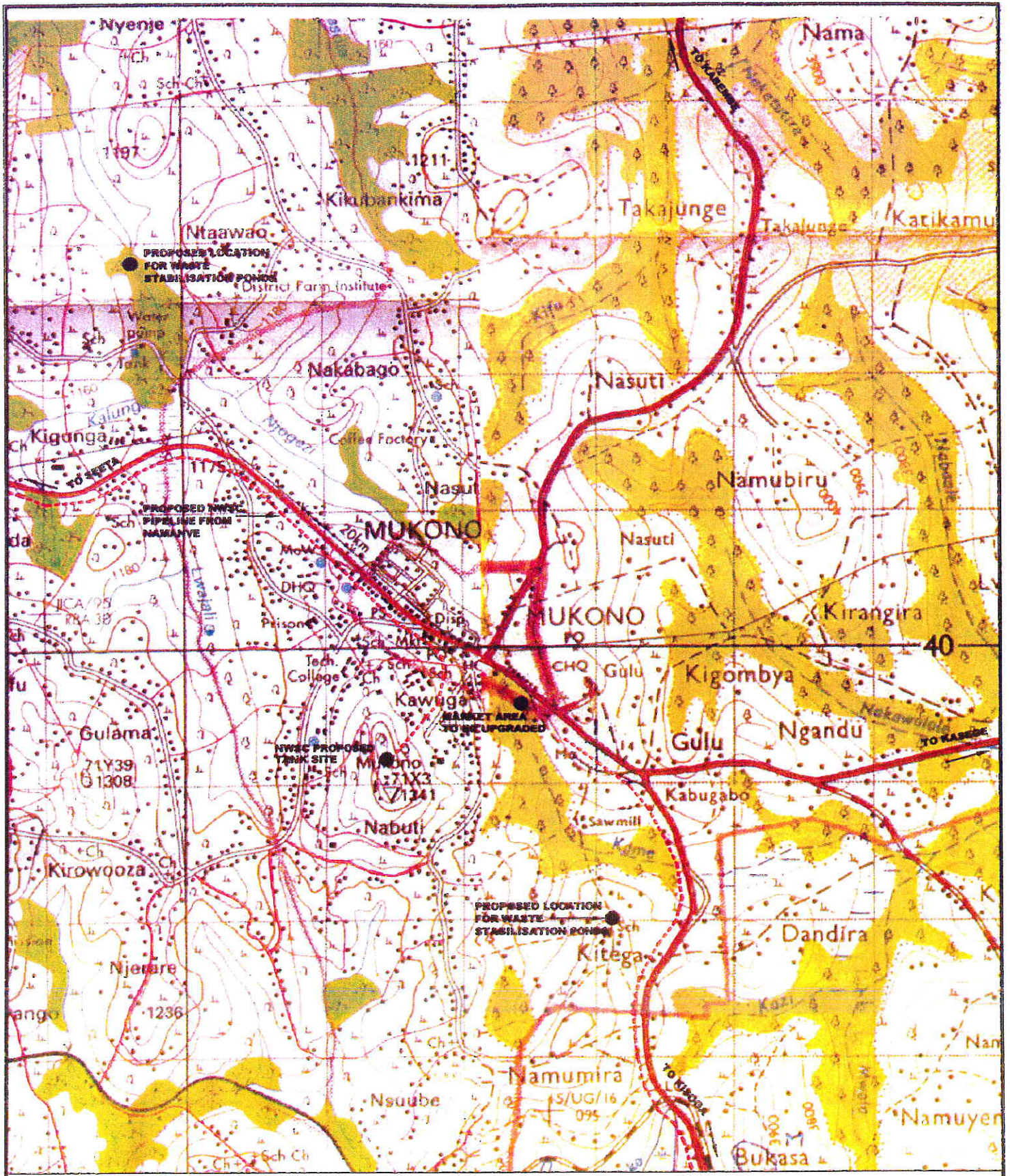
**MUKONO TOWN**

**UGANDA**

August 2004

**MUKONO TOWN**  
**Mukono District, Uganda**

Municipality Population Town Population Population growth rate Municipality surface area:	50,000 6%	Projected population for 2015 is 94,915
Water Undertaker: Department of Public Health, Municipal Council		
Sewerage, Sanitation and Solid Waste Operator: Mukono Town Council		
Mukono town houses the district headquarters of Mukono District. It is located 22 Km east of Kampala, the capital city of Uganda along the Kampala-Nairobi highway. The town has grown from a small trading centre to a modern town of about 31.4 sq. km. There are no large informal settlements in the town.		
<b>Issues/problems:</b>	<ul style="list-style-type: none"> <li>• No piped water system and ground water accounts for 85% of the town's supply which is heavily contaminated</li> <li>• 90% of the population living in informal settlements get their water from water vendors</li> </ul>	
• Water supply:		
• Sewerage and Sanitation	<ul style="list-style-type: none"> <li>• No off-site sanitation system</li> <li>• Pit latrines most common form of sanitation infrastructure</li> <li>• Low income settlements use simple pit latrines</li> <li>• Only one public waterborne toilet in the town</li> </ul>	
• Solid waste and drainage	<ul style="list-style-type: none"> <li>• Serious solid waste problem, waste is dumped on road side.</li> <li>• there are no drains extending to roads and residential areas. When it rains some of the low-lying areas experience water logging.</li> </ul>	
• Capacity building:	<ul style="list-style-type: none"> <li>• Lack of qualified personnel in Town Council</li> <li>• Sanitation and health awareness is very low</li> </ul>	
<b>Proposed interventions:</b>	<ul style="list-style-type: none"> <li>• Extend pipe network from Namanve to Mukono</li> <li>• Construction of public water points in low income areas</li> </ul>	
• Water supply:		
• Sewerage and Sanitation	<ul style="list-style-type: none"> <li>• Construction of communal toilet facilities equipped with washing facilities</li> <li>• Construction of waste stabilization ponds</li> </ul>	
• Solid waste and drainage	<ul style="list-style-type: none"> <li>• Construction of sanitary landfill</li> <li>• Construction of concrete slabs and perimeter wall for siting of waste collection equipment</li> <li>• Improve frequency of collection</li> <li>• Construct a box culvert near market to prevent flooding</li> </ul>	
• Capacity building	<ul style="list-style-type: none"> <li>• Community training in hygiene and sanitation</li> <li>• Training in engineering, O&amp;M, Water Demand Management and health and safety.</li> <li>• Training to improve waste collection and management.</li> </ul>	
<b>Expected Outcomes:</b>	<ul style="list-style-type: none"> <li>• Improved water coverage in informal areas by 50%</li> </ul>	
• Water Supply		
• Sewerage and Sanitation	<ul style="list-style-type: none"> <li>• Improve sanitation and reduction of the volume of sullage disposed in drains and open ground</li> </ul>	
• Solid waste & drainage	<ul style="list-style-type: none"> <li>• Reduced pollution into lake</li> </ul>	
• Capacity building	<ul style="list-style-type: none"> <li>• Improved capacity within Mukono Town Council and Public Health Department</li> </ul>	
	<ul style="list-style-type: none"> <li>• Water Supply</li> <li>• Sewerage and Sanitation</li> <li>• Solid Waste and Drainage</li> <li>• Capacity Building</li> </ul>	USD 124,200 USD 3,411,360 USD 764,244 USD 80,000
	<b>TOTAL</b>	<b>USD 4,379,804</b>
<b>Anticipated effect on MDGs</b>	Construction of water supply already in progress, waterborne sewerage and treatment system to increase service from 0% to 50%	
<b>Anticipated effect on Lake Victoria</b>	Reduced pollution at point sources of pollution through an improved solid waste management.	



 <p><b>UN - HABITAT</b> United Nations Human Settlement Programme</p>	<p>Client: <b>UN - HABITAT</b></p> <p>Project Title: <b>LAKE VICTORIA REGION WATER AND SANITATION INITIATIVE</b></p>	<p>Drawing Title: <b>UGANDA MUKONO TOWN LOCATION MAP</b></p>	 <p>Date: <b>AUGUST 2004</b>      Scale: <b>As shown</b></p>
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## **1. INTRODUCTION**

### **1.1 General Location**

Mukono town houses the district headquarters of Mukono District. It is located 22 Km east of Kampala, the capital city of Uganda along the Kampala-Nairobi highway. The town has grown from a small trading centre to a modern town of about 31.4 km<sup>2</sup>.

### **1.2 Population**

The population of Mukono Municipality is estimated at 50,000 with an estimated population growth rate of 6% per annum. A significant part of the population lives in Mukono but works in Kampala. The lower land prices in Mukono compared with those in Kampala have made it an attractive place to live and commute to the capital, Kampala.

### **1.3 Socio-economic Conditions**

The economy of the town is dependant on that of Kampala, and its growth is driven by the growth in Kampala. It is among the fastest growing towns in Uganda being a transit point for many travellers. The major economic activities include coffee, tea, vanilla and sugar production, fishing and livestock production. The majority of businesses are wholesale/ retail trade, bars and restaurants, lodges and several fuel stations. It is used as a centre from which business people from the interior access supplies of essential commodities. There are no significant informal settlements in the town.

It has one university, the Uganda Christian University, a District Farm Institute, nine (9) secondary schools, and several primary schools. There is one Health Centre with a maternity wing, a dispensary and 13 private clinics.

### **1.4 Water Demand**

The town does not have a public water supply system, but there are four privately operated schemes where water is supplied to institutions and at a fee of UGX 50 per 20-litre jerry can to residents or UGX 100 from water vendors in the town. At an average per capita water demand of 100lpcd, the current estimated water demand by the town population is 5,000m<sup>3</sup>/day.

### **1.5 Sanitation**

There is no waterborne sewerage system in Mukono Town; residents depend on on-site sanitation facilities like simple pit latrines in the informal settlements and septic tanks in formal settlements.

## **2. WATER SUPPLY**

### **2.1 Institutional Background**

Water and sanitation services are the responsibility of the municipal authorities. These facilities are managed directly by the municipal water department or through water users' associations. The Directorate of Water Development (DWD) is the lead technical water sector agency of the Ministry of Water, Lands and Environment and coordinates and regulates all water sector activities and provides support services to the municipality. In Mukono, the private operators currently play a major role in providing water to the town. The town council

appoints a water body which manages or owns the assets, sets the tariff, and oversees the operation of the services of the private operators.

## **2.2 Water Supply Systems**

### **2.2.1 General**

Currently the principle sources of drinking water are protected springs, hand dug wells and boreholes. The groundwater sources account for 85% and rainwater harvesting 15% of the water supply. Mukono communities principally draw their water for domestic use from springs and wells. 90% of the people in informal areas get their water from water vendors. All major institutions use private piped water sources. The other smaller institutions largely depend on springs, wells, and rainwater harvesting. The majority of commercial consumers use vendors as their primary supply source.

The Government of Uganda represented by the Ministry of Water, Lands and Environment, through the National Water and Sewerage Corporation, has committed funds towards the cost of improving of Water supply in Mukono Town.

### **2.2.2 Existing Water Sources**

There are four piped water systems which abstract water from boreholes and are all privately operated. These include: the Uganda Christian University, KALEBU Ltd system, Colline Hotel system abstracting water from a borehole and pumping to a 30 m<sup>3</sup> reservoir and Mukono District Farming Institute water supply system where water is pumped to an elevated 8 m<sup>3</sup> steel tank to serve the nearby institute staff houses and residents' quarters.

The KALEBU system is also a groundwater based system abstracting water from a borehole at a rate of about 3.5 m<sup>3</sup>/hr to an elevated steel tank of 20m<sup>3</sup> capacity from where it gravitates into a public water supply and distribution system. The system was constructed and is managed privately through a Public – Private – Partnership between Mukono Town Council and KALEBU Ltd. It has over 30 private connections including Colline Hotel, Mukono Health Centre, some Commercial buildings, yard taps and a water kiosk. Only about 10% of the Mukono households directly access piped water. The rest of the communities that cannot access the private systems collect water from protected springs and deep wells constructed by the town authority.

### **2.2.3 Existing Water Treatment Works**

There exists no public water treatment works in Mukono Town. The private water treatment works, operated by Uganda Christian University, treats and supplies water only to the university. The water is abstracted from River Lwajjali and is subjected to coagulation/flocculation, sedimentation, rapid gravity sand filtration and finally chlorination. However, the system is virtually obsolete because the components being used are not well operated and are very old.

### **2.2.4 Transmission and Distribution**

At government level, it was agreed that NWSC strengthens the line from Kampala to Namanve, while DWD takes the responsibility of extending the line from Namanve to Ggaba. DWD is currently laying a water supply system for Mukono Town. The system is based on the concept of bulk supply obtained from the water abstracted from Lake Victoria and treated at Ggaba Water Treatment Works. At the point of connection to the existing system, a bulk meter is proposed to be installed. The system will involve a bulk water main with adequate capacity to supply the full demand of Mukono Town. The bulk water main will be drawn from an existing DN 250 uPVC line that serves the Coca Cola factory at Namanve,

transmitted by gravity to a service reservoir on Gulama Hill from where a bulk main will supply a service reservoir on Tucker Hill. The two reservoirs will then supply the distribution systems of the project area.

The main components of the project will be implemented in three phases. The first phase of the project, which has already started involves laying of 10km of 400mm/300mm diameter transmission main and 35km of distribution pipeline. The transmission main will run entirely along the Jinja/ Kampala highway and to the South of the highway through Seeta to Mukono Town. Of the 35km of distribution pipeline about 26km of water mains, ranging from 40mm to 250mm diameter will be laid in Mukono.

The second phase of the project will involve the construction of the two reservoirs i.e. at Gulama Hill and Tucker Hill and a booster pump station at Seeta. The Gulama Hill reservoir will be a balancing ground tank with a capacity of 500m<sup>3</sup> The Tucker Hill Reservoir on the slopes of Mukono Hill will be a ground tank of reinforced concrete with two interconnecting chambers. Its purpose will be to provide a buffer for the excessive day demands in the distribution system of Mukono and the twin chambers will offer flexibility in Operations and Maintenance.

The third phase of the project will concentrate on the intensification of the distribution network covering the core and peripheral areas of Mukono and Ggoma. The project is being funded by the Government but due to financial limitations, it is being implemented in three phases and the approximate cost of each phase is as indicated in Table 1 below.

**Table 1: Summary Costs per phase**

PHASE	AMOUNT (UGX MILLION)
Phase I (Water Supply)	7,296
Phase II (Water Supply)	3,672
Phase III (Sewerage)	5,071
<b>Total</b>	<b>16,039</b>

### 2.2.5 *Problems with the Water Supply*

The water from the ground water sources is heavily contaminated. Microbiological contamination is very high resulting in a high risk of water-borne diseases such as cholera, typhoid and dysentery. Malaria is considered the most serious health threat.

Water from the private operators is not sufficient to meet the demand and is rationed. Some parts of the town get water in the morning hours while others in the afternoon hours.

## 2.3 **Tariffs and Metering**

There is no defined official tariff structure, however, the selling price at public standpipes and private taps is UGX 50 for a 20 litre can. The water vendors sell the same quantity at UGX 100. The tariffs currently charged by NWSC and that will most likely apply in Mukono is as follows:

Standpipe Supply	UGX 428/ m <sup>3</sup>
Domestic Supply	UGX 654/ m <sup>3</sup>
Commercial Supply	UGX 1200/ m <sup>3</sup>
Sewerage services	75% of water bill

The estimated costs for coming onto supply for a new customer are as given in the Table 2 below.

**Table 2: The estimated costs for coming onto supply for a new customer**

<b>Length of Service Pipe: DN 15</b>	<b>Connection Fees (UGX)</b>	<b>Constant Cost Fixtures (UGX)</b>	<b>Pipe Costs (UGX)</b>	<b>Total (UGX)</b>
50	50,000	173,000	75,000	<b>298,000</b>
75	50,000	173,000	112,000	<b>335,000</b>
100	50,000	173,000	150,000	<b>373,000</b>
150	50,000	173,000	225,000	<b>448,000</b>
250	50,000	173,000	300,000	<b>523,000</b>

**Source:** DWD and NWSC tariffs and Project estimates

## **2.4 Governance Structure**

The governance of the public water and sanitation in the township is under the responsibility of the Municipal Council. Headed by the department of Public Health, areas of concern include: work place safety and health, food safety, infectious disease control, proper waste disposal, pest and malaria control and monitoring water supplies. However, the private operators manage the existing piped water supply systems. The management of the completed piped water supply scheme is the responsibility of NWSC Kampala Water Supply Area.

## **3. SANITATION, SOLID WASTE MANAGEMENT AND DRAINAGE**

### **3.1 Institutional Background**

The management of the public sanitation facilities, solid waste and drainage is under the administration of the Town Council which is both financially and technically autonomous. Under the framework for public-private partnerships, the Ministry of Water, Lands and Environment appoints the town council as urban and sanitation authority, through three-year performance contracts. Local private operators are appointed by the town council through management contracts.

### **3.2 Sanitation**

#### **3.2.1 Off-site Sanitation**

There is no sewerage system in Mukono. The Town Council has identified two potential sites for waste stabilisation ponds, one to the northwest of the town centre and one to the southwest. And as part of Phase 3 of the project, National Water and Sewerage Corporation has carried out surveys and completed designs for a sewerage system in Mukono.

#### **3.2.2 On-site Sanitation**

Residents largely depend on on-site sanitation in the form of pit latrines and septic tanks. The town has one public toilet located at the taxi park, and one public latrine located elsewhere in the township. Payment is UGX 100/- per usage. They look well kept and clean. Toilets close at 10 pm at night and open early morning. A new public waterborne toilet facility is being constructed near the district headquarters. In the informal areas, the traditional simple pit latrine is most common form of sanitation facility being used.

### **3.3 Drainage**

The town lacks a properly engineered drainage system. The drains along the main roads are properly established and seem to be well maintained. However, there are no drains extending to roads and residential areas and as result when it rains some of the low-lying areas

experience water logging. In particular, there is a large open drain running through the market area that reportedly floods.

### **3.4 Solid Waste Management**

The township suffers serious problems with solid waste disposal. The Town Council are currently dumping solid waste at the side of the road to the south of the town centre, but have recently purchased a site about 16 km from the centre as a landfill. It owns fifteen skips that are positioned at strategic locations around the town. The skips are emptied weekly by a contractor at a charge of UGX 2,000,000 per month. The Council also owns two tractors with trailer units that are used for refuse collection. However, due to shortage of trucks, collection is irregular and inadequate.

## **4. PLANNING**

There is no physical development plan for Mukono, although the Town Council does have a 1:12,500 base map. However, the base map is not sufficiently detailed for preparing a physical development plan.

## **5. CAPACITY BUILDING**

Need to provide technical support in designing and implementing sound monitoring and evaluation systems that facilitate accurate analysis of the project's performance and impact was evident. There is lack of appropriate mobilization strategies and the communities thus have no sense of ownership of the water and sanitation facilities put in place. Some community members expressed dissatisfaction concerning water usage, health and hygiene practices particularly in the informal settlements.

## **6. FINDINGS AND PROPOSED INTERVENTIONS**

### **6.1. Water Supply**

- The principle sources of drinking water in the town are protected springs, hand-dug wells and boreholes. The groundwater sources account for 85% and rainwater harvesting 15% of the water supply.
- The piped water to the town is provided through the services of a private water supply scheme and serves only the major institutions and some homes within the town. The rest of the town is served by protected springs and deep wells constructed by the town authority.
- Selling price at the public standpipes and private taps is UGX 50 for a 20-litre can. Water from some of these sources is rationed with some parts of the town getting water in the morning hours while others get in the afternoon.
- 90% of the people in informal areas are served by water vendors because the piped water systems and the other sources like springs are located far away from them.
- The water from the ground water sources is heavily contaminated with faecal material posing a high risk of water-borne diseases such as cholera, typhoid and dysentery to consumers. Malaria is considered the most serious health threat.
- National Water and Sewerage Corporation has extended the water transmission line to Namanve, from which DWD is constructing a water transmission and distribution system



to serve Mukono town. However, it is anticipated that the poorer residents may not be able to afford individual piped water connections once the new system is completed.

- The water supply project is being funded by NWSC using internally generated funds and the project will be implemented in three phases due to a limitation in the availability of funds to carry out the project in one phase.

## **6.2 Sanitation, Solid Waste Management and Drainage**

- There is currently no sewerage system in the town and residents depend largely on on-site sanitation facilities
- The town has one public waterborne toilet located at the taxi park, and one pit latrine located strategically in the township. Payment is UGX 100/- per usage.
- The town council collects solid waste but there is a serious shortage of garbage trucks and collection is irregular and inadequate.
- There exists no dumping site and, if the waste is collected, it is dumped indiscriminately in areas along the roads away from the town.
- Plans are underway to provide waste stabilisation ponds and the town council has already identified the possible sites
- As part of Phase 3 of the project, an assessment will be carried out on the most appropriate sanitation technologies that provide the most socially and environmentally acceptable level of service at the least economic cost. NWSC has already carried out surveys and completed the design the sewerage system.

## **6.3 Planning**

- Lack of physical planning strategy has hindered a well structured provision of water supply, sanitation and drainage infrastructure.

## **6.4 Capacity building**

- There is lack of awareness among the communities regarding proper usage of the existing water supply and sanitation facilities most of which have been misused. The town has only one qualified engineer and one qualified health inspector. The low-level staff lack adequate technical knowledge to handle water and sanitation issues including solid waste management and drainage.

## **6.5 Proposed Interventions**

### ***Water Supply***

- The National Water and Sewerage Corporation are planning to extend the pipeline from Namanve and to construct a water distribution system. Poorer residents may not be able to afford individual piped water connections once the system is constructed. Consideration should therefore be given to constructing communal water points, possibly combined with public toilets and laundry and shower facilities.

### ***Sanitation***

- The National Water and Sewerage Corporation has carried out surveys for a sewerage system in Mukono. A full design of sewer network should be and construction done for the entire town and its environs.

### ***Solid Waste***

- Ensures timely collection and disposal of solid waste instead of piling up in town causing environmental pollution. Additional collection and transport facilities will enable the Council to collect refuse on a daily basis thus covering more premises.
- Hard standings should be provided for the skips and the number increased. The collection frequency should be increased to twice weekly to break the fly breeding cycle.

- The economics of this decision should be examined and consideration given to reducing the haul distance.
- The Town Council has identified two potential sites for waste stabilisation ponds, one to the northwest of the town centre and one to the southeast. The landfill site should be engineered to prevent leachate contaminating groundwater.

#### ***Drainage***

- Construct a drainage routed through a box culvert over a length of some 100m, which would prevent flooding the market and make space available for more stalls. The space above the culvert can then be used to expand the market.

#### ***Physical development plan***

- A proper physical development plan should be prepared for the area, to allow adequate provision for service corridors, wastewater treatment, solid waste collection and disposal.

#### ***Base mapping***

- Detailed base mapping, from aerial photography or satellite imagery, will be required for the physical development plan.

#### ***Engineering consultancy services***

- Procure external engineering services to assist in the detailed assessment, design and supervision of the required interventions. Ensure appropriate expertise in the implementation of the proposal.

# LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

## SUMMARY OF PROPOSED INTERVENTIONS

<b>TOWN:</b> <b>MUKONO</b>	<b>ESTIMATED POPULATION</b> 50,000	<b>CORE URBAN POPULATION</b>	<b>MUNICIPAL AREA (km<sup>2</sup>)</b>	<b>WATER AND WASTEWATER UNDERTAKER</b> NONE AT PRESENT	<b>SOLID WASTE OPERATOR</b> MUKONO TOWN COUNCIL
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NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY

ITEM NO.	FACILITY	PROBLEM	PROPOSED INTERVENTION	IMPACT OF INTERVENTION	PRIORITY RANKING	ESTIMATED COST (USD)
1.0	<b>WATER SUPPLIES</b>					
1.1	Water supply	No public water supply in the town.	National Water and Sewerage Corporation is in the process of extending the pipeline from Namanve to Mukono.	Improved access to potable water.	n/a	0
1.2	Water storage	No public water supply in the town.	National Water and Sewerage Corporation plans to construct storage at Mukono Hill	Improved access to potable water.	n/a	0
1.3	Water distribution	No public water supply in the town.	National Water and Sewerage Corporation plans to lay 35km of distribution pipework in Mukono.	Improved access to potable water.	n/a	0
1.4	Communal water points	Once the public water supply has been constructed, poorer households may not be able to afford individual connections.	Construct 50 communal water points	Improved access to potable water and sanitation for poorer households.	B	75,000
2.0	<b>SEWERAGE AND SANITATION</b>					
2.1	Site for waste stabilisation ponds	There are no waste stabilisation ponds serving Mukono.	Two sites have been identified, one to the southeast of the town centre and one to the northwest. Construct anaerobic facultative and maturation ponds at the identified sites.	Improved sanitation.	B	1,400,000
2.2	Sewers	The area is not sewered.	Lay sewers to drain wastewater to the identified sites for waste stabilisation ponds.	Improved sanitation.	B	600,000
2.3	Communal facilities	There is insufficient space in densely settled areas for individual households to construct latrines.	Construct 30 communal sanitation facilities, either on sewerage network or on septic tanks	Improved sanitation and reduction of the volume of sullage disposed of in drains or on open ground.	A	60,000
3.0	<b>SOLID WASTE</b>					
3.1	Refuse collection	Solid waste is not being collected efficiently, particularly from unplanned settlements.	Construct concrete slabs with perimeter walls for siting skips or trailers for the collection of solid waste.	Reduced environmental pollution.	A	126,500
3.2	Solid waste disposal	There is no sanitary landfill for Mukono.	Supply vehicles for the collection of solid waste twice weekly. The Town Council has recently acquired a site some 16km from the town centre, but this has not yet been developed. Examine feasibility of this site in terms of travel times and if necessary, acquire an alternative site. Construct an engineered sanitary landfill.	Breaking the fly breeding cycle. Reduced environmental pollution.	A	100,000
4.0	<b>URBAN DRAINAGE</b>					
4.1	Stormwater drainage at the market place.	The drain at the market reportedly floods.	Construct a box culvert some 100m long through the market. The space above the culvert can then be used to expand the market.	Avoid erosion and washing of contaminants into the lake.	A	80,000
5.0	<b>OTHER REQUIREMENTS</b>					
5.1	Physical development plan	There is no physical development plan for Mukono, which has led to the growth of unplanned settlements with no provision for basic infrastructure.	Engage a town planner to prepare a physical development plan making adequate provision for service corridors, access, etc.	Ensures growth will occur in an orderly manner.	A	50,000
5.2	Base mapping	The base mapping held by Mukono Town Council is not sufficiently detailed to prepare a physical development plan.	Produce new base mapping.	Enable the physical development plan to be prepared.	B	25,000
5.3	Engineering services	Due to the lack of capacity at the Municipal Council the proposed interventions are unlikely to be adequately addressed without outside engineering services.	Procure external engineering services to assist in the detailed assessment, design and supervision of the required interventions.	Ensures hiring of appropriate expertise in the implementation of the proposals.	A	Refer to summary
5.4	Relocation of abattoir.	The existing abattoir is unhygienic and is located in the market place.	Relocate the abattoir to a purpose-designed facility on the outskirts of the town.	Improved food hygiene.	A	80,000

LAKE VICTORIA REGION WATER AND SANITATION INFRASTRUCTURE REHABILITATION PROGRAMME

SUMMARY OF PROPOSED INTERVENTIONS

<b>TOTAL</b>	<b>2,596,500</b>
Add 20% for preliminary and general items	519,300
<b>Subtotal A</b>	<b>3,115,800</b>
Add 15% for physical contingencies	467,370
<b>Subtotal B</b>	<b>3,583,170</b>
Add 20% for consultancy services for design and construction	716,634
<b>TOTAL COST OF THE PROPOSED INTERVENTION</b>	<b>4,299,804</b>

ITEM NO.	FACILITY	SECTOR	PROPOSED ACTION	IMPACT	PRIORITY RANKING	ESTIMATED COST USD(\$)
	<b>PHYSICAL WORKS</b>			<b>COST OF PROPOSED PHYSICAL INTERVENTIONS B/F</b>		<b>4,299,804</b>
6.0	<b>CAPACITY BUILDING</b>					
6.1		Water Demand Management	Reduction of unaccounted for water/leakage detection	Reduction of UFW by 50%	n/a	
			Campaigns and advocacy	Increased awareness on water usage	B	10,000
6.2		Health and hygiene education	Health and hygiene awareness campaigns	Reduced incidence of water related disease	A	20,000
6.3		Water resources management	Water quality assessment and monitoring	Improved utilisation of available water resources	C	20,000
6.4		Solid waste management	Development of management strategy*	Improved capacity at city level for waste management	B	15,000
			Community level waste management initiative	Improved livelihoods of those involved in waste collection	B	15,000
6.5		Training and Capacity Building	IT Training and hardware installation	Data base management		
			Training of billing and revenue staff**	Improved billing and revenue collection		
			Training for water treatment plant operators**	Efficient information gathering and retrieval		
			Training for wastewater treatment plant operators**	Improved operation of water and wastewater treatment facilities		
				Improved treatment plant and improved effluent quality into Lake Victoria		
				<b>Total Capacity Building and training</b>		<b>80,000</b>
				<b>GRAND TOTAL</b>		<b>4,379,804</b>

NOTES ON PRIORITY RANKING: A VERY URGENT B ESSENTIAL C NECESSARY

\* assumes development of strategies on a regional scale

\*\*assumes training will be carried out on a regional scale/