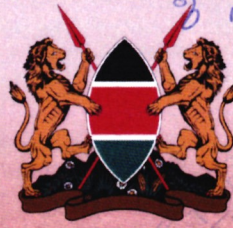


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**PERFORMANCE AUDIT REPORT ON
PROVISION OF SEWERAGE IN MAJOR TOWNS
IN KENYA:
A CASE STUDY OF KISUMU CITY**



LAKE VICTORIA SOUTH WATER SERVICES BOARD

APRIL 2018

Vision

Effective accountability in the management of public resources and service delivery

Mission

Audit and report to stakeholders on the fairness, effectiveness and lawfulness in the management of public resources for the benefit of the Kenyan People

Core Values

Independence

Integrity

Professionalism

Innovation

Team Spirit

Motto

Enhancing Accountability

Foreword by the Auditor – General

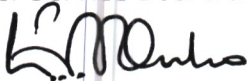
I have the honour to present this performance audit report on the provision of sewerage infrastructure in major towns in Kenya. My Office carried out the audit under the mandate conferred to me by the Public Audit Act, 2015 Section 36. The Act mandates the Office of the Auditor – General to examine the Economy, Efficiency and Effectiveness with which public money has been expended pursuant to Article 229 of the Constitution.

Performance, financial and continuous audits form the three pillar audit assurance framework that I have established to give focus to the varied and wide scope of the audit work done by my Office. The framework is intended to provide a high level of assurance to stakeholders that public resources are not only correctly disbursed, recorded and accounted for, but that the use of the resources results in positive impacts on the lives of all Kenyans. The main goal of our performance audits is to ensure effective use of public resources and promote services delivery to Kenyans.

The audit has an environmental management perspective on the importance of conserving of our water resources. Our performance audits examine compliance with policies, obligations, laws, regulations and standards, and whether the resources are managed in a sustainable manner. They also examine the economy, efficiency and effectiveness with which public resources have been expended.

I am hopeful that corrective action will be taken in line with our recommendations in the report. The recommendations will contribute towards the realisation of the provisions of Articles 42, 69, 70 and 71 of our Constitution, which calls for better management of the environment for the benefit of all Kenyans.

The report shall be tabled in Parliament in accordance with Article 229 (7) of the Constitution. I have as required in Section 39 (1) of the Public Audit Act, submitted the original copy of the report to Parliament. In addition, I have remitted copies of the report to the Cabinet Secretary Ministry of Water and Sanitation, Principal Secretary, National Treasury, Chief Executive Officer, Lake Victoria South Water Service Board and the Secretary, Presidential Delivery Unit.



FCPA Edward R.O. Ouko, CBS

AUDITOR – GENERAL

11 April 2018

LIST OF ABBREVIATIONS

AfDB	African Development Bank
BOD	Biological Oxygen Demand
CBOs	Community Based Organisations
COD	Chemical Oxygen Demand
EMCA	Environmental Management and Coordination Act
KeNHA	Kenya National Highways Authority
KIWASCO	Kisumu Water and Sewerage Company
LTAP-3	Long Term Action Plan, Package 3
LVSWSB	Lake Victoria South Water Services Board
MWI	Ministry of Water and Irrigation
NEMA	National Environment Management Authority
TSS	Total Suspended Solids
WAB	Water Appeal Board
WASREB	Water Services Regulatory Board
WRMA	Water Resources Management Authority
WSB	Water Services Boards
WSP	Water Services Providers
WSTF	Water Services Trust Fund

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GLOSSARY OF TERMS

The following definitions apply for purposes of this report:

Appropriate Technology: Technology that is suitable to the economic conditions of the area in which it is to be applied, is environmentally sound, and promotes self-reliance on the part of those using it.

Major town: A town whose population, according to the 2009 National Population and Housing Census report, is not less than 250, 000.

Riparian reserve: Land adjacent to and associated with a watercourse. Riverine riparian reserve refers to riparian reserve along rivers and streams

Sewage: Water-carried waste, in solution or suspension, that is intended to be removed from a community

Sewer: An underground carriage system specifically for transporting sewage from houses and commercial buildings to treatment plant

Sewerage: The infrastructure that conveys sewage and consist of sewers, manholes, pump stations and treatment plants

Wayleave: A right of way created on a public land for the purposes of laying of fuel pipe lines, water mains, sewer lines, power lines and communication lines

Executive Summary

Background to the Audit

1. Provision of sewerage services in Kenya dates back to the colonial period, the time during which most sewerage, currently in use were designed and developed. The provision of sewerage services has been, however, characterised by such challenges as lack of a legal framework, disjointed and overlapping policies, old and inadequate infrastructure, lack of connection networks and the poor performance of utilities. Further, the capacity of sewerage service provision has been stretched by rapid population growth and urbanisation. Consequently, concerns about sewage flooding, sewer bursts and the discharge of raw or semi-treated sewage into the environment have made news in the recent past. These concerns made the Auditor-General to assess the measures put in place to provide sewerage in Kisumu City.
2. According to the Water Act, 2002, provision of sewerage services is the responsibility of Water Service Boards (WSBs). The Act, however, allows the WSBs to subcontract Water Service Providers (WSPs) through Service Provision Agreements to do the actual service delivery, while the boards remain responsible for the development of the sewerage.

Objective, Scope and Methodology

3. The objective of the audit was to assess the measures put in place by WSBs to provide sewerage in Kisumu city.
4. The audit covered a period of five financial years, from July 2010 to June 2015, and assessed the activities of LVSWSB in providing sewerage in Kisumu city.
5. Data was collected through interviewing concerned actors, reviewing documents and direct observations.

Major Findings

Inadequate identification of sewerage needs

6. While investment in sewerage is expected to offer the best solution in meeting sewerage needs of the concerned towns, the audit revealed that sewerage needs identification, as conducted by LVSWSB, was faced with certain problems.
7. The LVSWSB did not avail the needs assessment documents for sewerage projects recently implemented in Kisumu. Interviews revealed that the board based the projects on the recommendations of previous studies, some of which were already overtaken by recent events. For example, LVSWSB informed the team that the sewerage project (LTAP-3) was based on the sewerage needs identified in the Kisumu Urban Development Plan of 2012 yet implementation of the project started in 2011.
8. Further, it would be expected that WSPs would be actively involved during planning for sewerage projects since as users of the infrastructure they are better placed to pinpoint the service gaps. The audit revealed that LVSWSB involved Kisumu Water and Sewerage Company (KIWASCO) in the planning stages of LTAP-3.
9. As a result of the inadequate needs identification, some of the sewerage developed by the board do not address the current sewerage service provision needs of Kisumu residents. For example, LVSWSB expanded the capacity of Kisat treatment works and its sewer network to 9000 m³/d up from 6800 m³/d, but failed to expand the plant's inlet point to correspond with the new capacity. As a result, the plant can only take in 6800 m³/d of sewage while the rest overflows back to the environment untreated.
10. The inadequate identification of sewerage needs was attributed to dependence on the implementation of recommendations of old studies to some extent and the apparent friction in the working relationship between

WSBs and WSPs following the devolution of water services. Staff of LVSWSB interviewed also blamed donor influence on the scope of projects in that the donors at times have a pre-determined scope hence no need for needs identification.

Delays in implementation of sewerage projects

11. Sewerage development usually takes the form of capital works project with specific start and end dates documented in the project document. WSBs are expected to follow project implementation dates closely since implementation delays can have serious implications on the project being implemented.
12. The audit revealed that sewerage rehabilitation and expansion projects undertaken by LVSWSB have taken longer than their planned completion dates. A review of project implementation report for the LTAP-3 revealed that the project was scheduled to take a period of 27 months from March, 2011 to June, 2013. However, the project Substantial Completion Report dated November, 2015 revealed that the contract was extended to December, 2013, with a reduced scope, but still the works were not completed within that time. The contract was again extended to August, 2014, but still the works were not completed within that period. LVSWSB was forced to terminate the contract for the main contractor and directed all outstanding works to a subcontractor. The project was substantially completed by November 2015 by which time the expected completion time had more than doubled to 56 months.
13. The delays led to escalation in costs and significant reductions in the project scope. For example, a review of the project Substantial Completion Report revealed that the scope of LTAP-3 was significantly reduced due to implementation delays. Besides, the delays meant that the environment continued to be polluted awaiting completion of the sewerage projects. The condition could even get worse, for example in a situation where raw sewage is

diverted into a river to allow for rehabilitation of the existing infrastructure.

14. The delays in implementation were attributed to several factors. The audit team was informed that most of the wayleaves in Kisumu had been encroached. While LVSWSB ought to have acquired wayleaves before commencing project implementation, this was left to run concurrently with implementation hence slowing down the projects. At times, LVSWSB was forced to redesign certain aspects of the projects when wayleave acquisition efforts proved futile. For example, a sewer line that was supposed to pass through Nyalenda Slums had to be redesigned after a year of futile negotiations for wayleave. Such revisions had to be subjected to a bureaucratic approval process, hence leading to implementation delays. Interviews and review of documents revealed that implementation delays were also caused by inadequate performance of contractors. For example, LTAP-3 was to a greater extent delayed by the slow progress of the main contractor.

Some of the sewerage facilities developed by LVSWSB are based on inappropriate technology, making them uneconomical to operate

15. While WSBs are expected to deliver sewerage which is economical to operate and maintain in accordance with Section 53 (1) of the Water Act (2002), the audit revealed that some of the sewerage facilities developed by LVSWSBs are based on technology that is not appropriate for Kenya. Though very efficient in treating waste water, electromechanical treatment plants are energy intensive and are often abandoned by WSPs due to high operation and maintenance costs.
16. Interviews, document reviews and field verifications revealed that LVSWSB recently rehabilitated the Kisat mechanized sewerage treatment facilities and plant. Due to the energy intensive nature of the facilities and the high maintenance costs and sometimes non-availability of spare parts in the local

market, KIWASCO had abandoned this plant leading to the extremely dilapidated state it was in before the recent rehabilitation works commenced. Although the rehabilitation has definitely improved its waste water treatment efficiency, this plant may still fail to achieve its intended purpose due to the high cost of operation and maintenance involved.

17. Further, LVSWSB had constructed two pump stations in addition to rehabilitating Kendu Lane pump station in Kisumu. However, our visit to the station revealed an abandoned facility with raw sewage flowing from the facility back to the environment.

18. In consequence, these facilities may become too expensive for KIWASCO to operate and maintain and may just be abandoned. As the facilities are abandoned, the environment will continue to be polluted with partially treated effluents from treatment plants or raw sewage from pump stations flowing to the environment.

19. The use of inappropriate technology may be attributed to the failure to take advantage of local opportunities for resources and materials during planning and design of sewerage projects. Again, since LVSWSB is only responsible for the development of sewerage while operation and maintenance lies with KIWASCO, LVSWSB might have overlooked the operation and maintenance cost implications of the facilities.

The existing sewerage has not been well maintained

20. According to section 53 (1) of the Water Act, 2002, WSBs are responsible for the efficient and economical provision of water within their area of jurisdiction. Arising from this mandate, WSBs are not only expected to plan, develop and expand sewerage in accordance with 53 (3) (a), but also ensure that the existing infrastructure is well maintained in accordance with Section 55 of the Water Act, 2002.

21. According to Service Provision Agreement (SPA), whenever there is a maintenance issue, the KIWASCO is expected to notify LVSWSB and make a financial quotation for the same. The KIWASCO is then expected to go ahead and repair then bill the LVSWSB. In cases where KIWASCO are unable to perform, they are expected to inform LVSWSB to take action. Although the SPA appears to fully delegate repairs and maintenance to the KIWASCO, it would be expected that as owners of the assets, LVSWSB must take action to save the situation where it has been shown that the KIWASCO is unable to carry out the repair or maintenance.

22. The audit revealed that the sewerage has not been well maintained in Kisumu. Field observations revealed various instances of burst sewers, open and overflowing manholes and blocked sewers. For instance, interviews and field verifications revealed that a major sewer manhole in Bishop Abiero Secondary School in Shaurimoyo estate, Kisumu was constantly overflowing, but KIWASCO did not address the situation, despite the complaints from the school and surrounding residents. As a result, the environment is polluted with raw sewage. The open manholes are at times used as dumping ground for solid waste by the public, hence causing blockages in the system. This poses a risk to the environment and health of the community at large.

23. Similarly, the team observed solid waste including plastics passing through Nyalenda ponds inlet screens/filters into the stabilization ponds. It was also noted that the main line taking sewage to the Nyalenda ponds was cracked and no evidence was provided that it has been documented for maintenance purposes. It was further observed that Kendu Lane pumping station has continuously failed to operate. On enquiry, KIWASCO staff claimed that the station was connected to a low power supply that has failed to run the system. As a result, raw sewage overflows at the station ending up in the storm drains adjacent to it

and eventually to the environment.

24. As a result of inadequate maintenance of sewerage, the treated sewage being discharged back to the environment do not meet NEMA recommended quality standards as measured by Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS).
25. The inadequate maintenance of sewerage was attributed to the confusion that exists with regard to the application of Item 10 of SPA that delegates repairs and maintenance to KIWASCO without clearly specifying the responsibilities with respect to the nature and extent of repairs required.
26. Further, the audit team was informed that WSPs no longer report to WSBs regularly about their operations following the devolution of water services as contained in Schedule 4 Part 2(11) of the Constitution of Kenya, 2010. As such, LVSWSB is not able to keep track of the maintenance activities being undertaken by KIWASCO. The problem is further compounded by the fact that WSBs do not undertake routine monitoring of the sewerage as the owners of the asset. As such LVSWSB failed to provide evidence that they do monitor or inspect the status of sewerage system as the custodians of the infrastructure. As a result, LVSWSB is not aware of maintenance needs of sewerage. Besides, lack of monitoring of sewerage has led to encroachment into sewerage facilities and wayleaves as well as land for sewerage further hampering maintenance of the infrastructure.

Conclusion

27. From the findings of the audit it is clear that LVSWSB has made considerable efforts in providing sewerage in Kisumu since its establishment following the enactment of Water Act, 2002. However, these efforts have not resulted in an adequate sewerage. The sewerage development projects implemented by the LVSWSB have shortcomings emanating from inadequate needs identification, use of inappropriate technology and delays

in project implementation. Besides, the already developed infrastructure has been inadequately maintained further contributing to inadequacy of the sewerage system. More specific conclusions are as follow:

- The LVSWSB failed to treat needs assessment as an integral component of sewerage development. The board instead relied on recommendations of an earlier feasibility study report and Kisumu Urban Development Plan which led to the implementation of projects that do not address the current sewerage needs of Kisumu city.
- The appropriateness of technology is key to sustainability of sewerage. While the mechanised treatment plant and pump stations, recently developed in Kisumu, look very efficient, the high operation and maintenance costs involved in such facilities pose a risk to their economical sustainability under the operation of KIWASCO.
- Due to wayleave acquisition challenges and inadequate performance of contractors, the implementation of sewerage projects in Kisumu recorded significant delays. This led to significant reduction in project scope for the case of LTAP-3. This, notwithstanding the pollution caused to the environment as completion of the projects are awaited.
- Due to the failure of LVSWSB to monitor the condition of sewerage infrastructure handed over to KIWASCO, the existing sewerage has not been well maintained.

Recommendations

28. The Auditor-General made the following recommendations to improve on the provision of sewerage in Kisumu city:
 - To ensure that sewerage projects meet the current needs of the users: -
 - LVSWSB may consider putting

more emphasis on identification of current sewerage needs when planning for sewerage projects. The boards should consider undertaking baseline studies when planning for sewerage projects to bring the current situation on board in addition to relying on recommendations from the previous studies. The KIWASCO and users of the sewerage would also be expected to be actively involved during needs assessment and their input considered when making the final decision.

- To address delays during implementation of sewerage projects: -
 - LVSWSB may consider acquiring wayleaves before commencing actual implementation of sewerage projects
 - LVSWSB may need to ensure that contractors are suitably evaluated and strictly adhere to contract terms of references including project implementation timelines.
- To ensure that the resultant sewerage facilities are cost effective: -
 - LVSWSB may need to consider

utilising mechanised systems that are based on appropriate technologies by putting local opportunities for resources and materials into consideration when designing, developing and implementing the systems.

- To ensure that the existing sewerage is well maintained: -
 - LVSWSB in consultation with WASREB may need to clearly define the nature and extent of repair and maintenance responsibilities and be proactive in taking responsibility for the same
 - LVSWSB may need to consider developing mechanisms to ensure regular reporting of KIWASCO operations as provided for in the Service Provision Agreements
 - LVSWSB should regularly monitor the status of sewerage assets as owners

Chapter 1

1.0 Background of the Audit

Introduction

- 1.1 Appropriate sanitation is fundamental not only in promoting public health, but also in ensuring environmental sustainability. Consequently, sewerage services play an important role of protecting public health through proper sanitation standards that prevent the transmission and spread of water borne diseases such as diarrhea and cholera. It also protects the environment through nutrient recycling as well as preventing surface and underground water contamination.
- 1.2 According to WASREB's Model Water Services Regulations, sewerage consists of structures, pipes, valves, meters, sewers or other accessories used in the conveyance through the sewer reticulation system and treatment at the treatment plant.
- 1.3 Provision of sewerage services in Kenya dates back to the colonial period, the time during which most sewerage, currently in use, were designed and developed. The provision of sewerage services has been, however, characterised by challenges such as lack of a legal framework, disjointed and overlapping policies, old and inadequate infrastructure, lack of connection networks and the poor performance of utilities. Further, the capacity of sewerage service provision has been stretched by rapid population growth and urbanisation. The most affected are in major towns where rapid population growth has complicated the situation.
- 1.4 According to the Water Act, 2002, provision of sewerage services is the responsibility of Water Service Boards (WSBs). The Act, however, allows the WSBs to subcontract Water Service Providers (WSPs) through Service Provision Agreements to do the actual service delivery, while the boards remain responsible for the development of

the sewerage used by WSPs.

- 1.5 The audit was conducted as case study of Kisumu under the Lake Victoria South Water Services Board.

Motivation for the Audit

- 1.6 There have been public concerns about the poor state of sewerage services in most towns across the country. Concerns of sewage flooding, sewer bursts and the discharge of raw or semi-treated sewage into the environment have made news in the recent past. The Auditor-General therefore, finds it necessary to assess the provision of sewerage in major towns in Kenya.
- 1.7 In a bid to address sewerage problems in urban areas in Kenya, the government has undertaken a number of capital sewerage projects in some of the major towns. For example, the Long Term Action Plan Package 3 (LTAP-3) implemented by LVSWB in Kisumu has an estimated cost of Ksh. 1.2 billion. It is therefore necessary to assess the effectiveness of these projects in ensuring an adequate sewerage.
- 1.8 According to a report published by UNEP and UN-Habitat in 2010 titled "Sick Water?", up to 90% of the waste water generated worldwide flows untreated into the densely populated coastal zones contributing to marine dead zones. The report further states that at least 1.8 million children, under the age of five, worldwide die annually due to water related diseases. The sanitation situation is worse in developing countries. In Sub-Saharan Africa, for instance, only 30% of the population have access to improved sanitation, according to the 2015 Millennium Development Goals (MDG) Report for Africa.
- 1.9 In Kenya, only 16% of Kenyans have access to sewerage services, down from 17%, according to the WASREB 2013-14 Impact Report. The remaining population either use septic tanks, pit latrines or just discharge raw sewage into the environment. The poor, or lack of, management of waste water leads to pollution

of the already scarce water resources further complicating the challenge of providing safe drinking water to the world's population with either no or constrained access to the same. There is therefore the need to undertake a performance audit to assess the measures in place to expand sewerage systems to cover the majority of Kenyans living in major towns.

Chapter 2

2.0 Design of the Audit

Objective of the Audit

- 2.1 To assess the adequacy of measures put in place by LVSWBS to provide sewerage in Kisumu City.

Audit Questions

- 2.2 The following were the questions that we answered so as to achieve the objectives of the audit:

Overall question: Are the measures put in place by LVSWBS effective in providing sewerage services?

Sub-questions:

1. Does the planning for sewerage focus on addressing the adequacy of sewerage needs of Kisumu?
2. How does LVSWBS ensure the timely implementation of planned development and execution of sewerage projects?
3. How does LVSWBS ensure that projects infrastructure developed are appropriate and economical to implement?
4. How does LVSWBS ensure maintenance of the existing sewerage infrastructure?

Scope of the Audit

- 2.3 The audit focused on the provision of sewerage in Kisumu city by LVSWBS. The operations of LVSWBS were examined with respect to development of new and the rehabilitation and maintenance of the existing infrastructure. Kisumu was considered appropriate in this study since it had major sewerage development projects being implemented. The audit focused on the period of five years, from July 2010 to June 2015

Methods Used to Gather Evidence

- 2.4 The audit was conducted in accordance with Performance Auditing Guidelines as set out by the International Organisation of Supreme Audit Institutions (INTOSAI) and audit policies and procedures established by the Office of the Auditor-General (OAG).

Sampling and Sample Size

- 2.5 The team used a case study approach in the audit. Purposive sampling was used in two out of the five identified major towns to form case studies for the audits. Major towns as used in this audit included the three cities and any other town whose population, according to the 2009 census, qualifies it for the status of a municipality. According to the Urban Areas and Cities Act, 2011, a town is eligible for conferment of municipal status if it has “a population of at least 250,000 residents, according to the final gazetted results of the last population census carried out by an institution authorised under any written law, preceding the grant.” As such, only Nakuru and Eldoret with population of 286,411 and 252,061 respectively according to the 2009 Population and Housing Census report qualified to be considered as major towns giving a sample population of five major towns, namely; Nairobi, Mombasa, Kisumu, Nakuru and Eldoret¹.

- 2.6 The criteria used to purposively sample the two cases was that the town must have at least a major sewerage development project, either ongoing or completed, but started not earlier than June, 2010. As such Nairobi and Kisumu were selected to form case studies for the audit

- 2.7 To understand the operations of LVSWBS with regard to development of sewerage, the team interviewed the people listed in **Appendix 1(a)**. To understand the mandate, strategy, funding, regulations and procedures in providing sewerage and the status of sewerage projects implemented, the team reviewed documents listed in **Appendix 1(b)**. Observation was carried out to verify the status of sewerage development projects on the ground and the existing sewerage. The places visited are as shown in **Appendix 1(c)**.

Sources of Assessment Criteria

- 2.8 The audit criteria agreed with the auditee in assessing LVSWBS was obtained from the Water Act, 2002, Environmental

1. The 2009 Kenya Population and Housing data was obtained from the government's Open Data website (<https://www.opendata.go.ke/Population/Population-Distribution-by-Sex-in-Urban-Centres-an/yc6j-ekrh>). Accessed on 11th February 2016.

Management and Coordination Act (Water Quality) Regulations, National Water Services Strategy 2007-2015, License documents for the Water Service Boards, 2012, Current Strategic Plan, Contract documents, Financial reports/budgets and WASREB performance review reports and other leading practices.

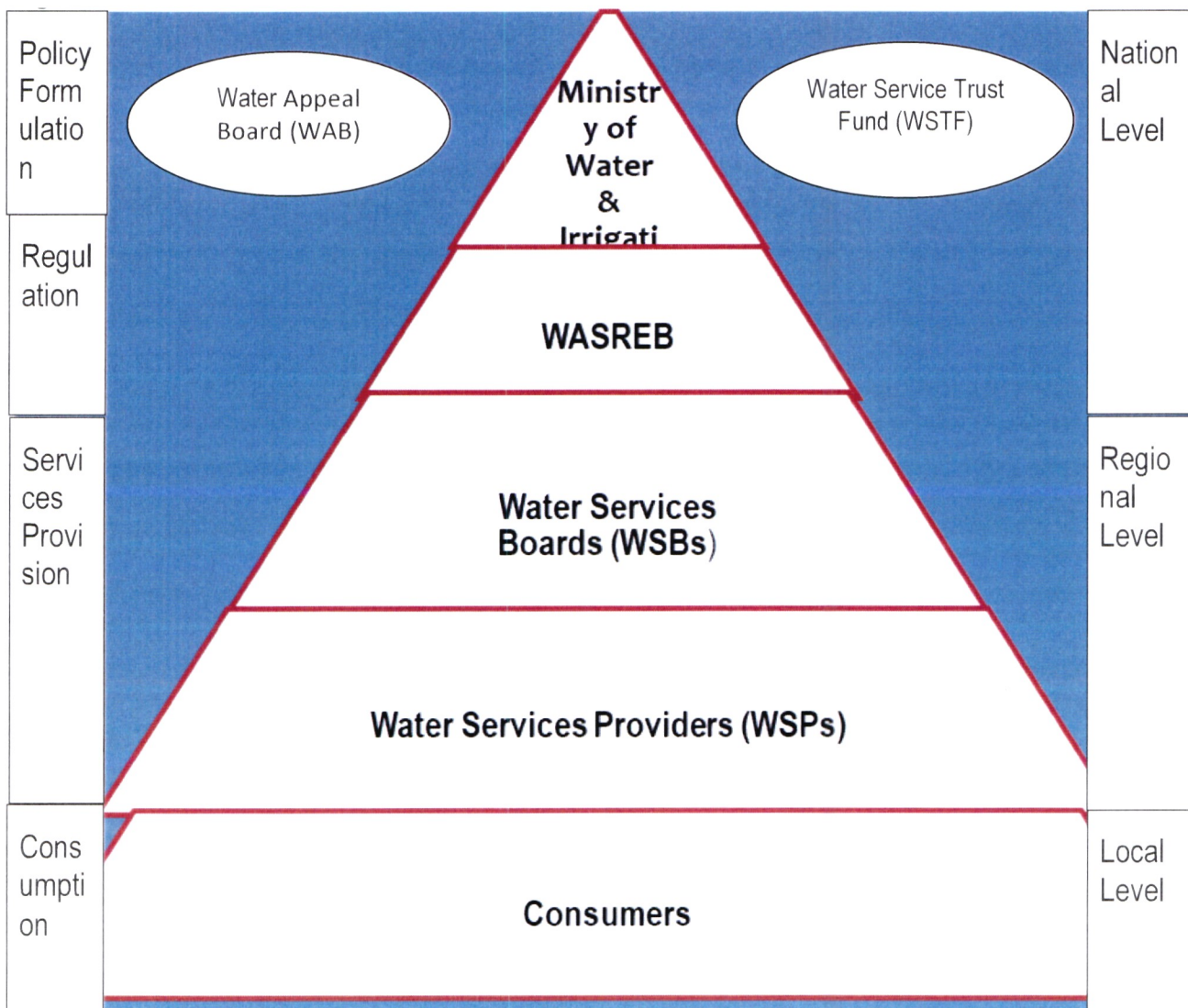
Chapter 3

3.0 Description of the Audit Area

Institutional Framework for the Provision of Sewerage in Kenya

3.1 The enactment of the Water Act, 2002 set the stage for far reaching reforms in the provision of water and sanitation services in Kenya. The Act introduced new water institutions to govern water and sanitation services in a commercialised and devolved approach. A schematic illustration of the institutional framework for water and sanitation services in Kenya is depicted in the Water Act, 2002 as shown in **Figure 1**.

Figure 1: Institutional Framework under the Water Act 2002



Source: National Water Services Strategy (2007-2015)

3.2 At the national level, the Ministry of Water and Irrigation (MWI) is responsible for policy formulation while the Water Services Regulatory Board (WASREB) is mandated with the regulation of water and sanitation services throughout the country. The Water Appeal Board (WAB) solves water services disputes while Water Service Trust Fund is responsible for funding water services in

marginalised areas.

3.3 WASREB licenses regional water service boards to provide water services within their jurisdictions. The boards in turn license water service providers to do actual water service delivery to consumers.

Key Actors in the Provision of Water and Sewerage Services

3.4 Provision of sewerage involves a number of stakeholders key of which are as follows:

a) **Water Services Regulatory Board (WASREB)**

3.5 WASREB is established under Section 46 of Water Act, 2002. WASREB provides and enforces regulatory guidelines and quality standards for the water service provision and licensing of the water services boards.

b) **Water Services Boards (WSB)**

3.6 The responsibility for provision of sewerage services is vested on the various regional WSBs established under Section 51 of the Water Act, 2002. WSBs are state corporations under the MWI responsible for the efficient and economical provision of water and sewerage services as stated in section 53(1) of the Act. In Kenya, there are eight regional Water Services Boards, namely: Athi Water Services Board; Tana Water Services Board; Tanathi Water Services Board; Coast Water Services Board; Rift Valley Water Services Board; Lake Victoria North Water Services Board; Lake Victoria South Water Services Board; and Northern Water Services Board. Lake Victoria South Water Services Board is responsible for provision of sewerage in Kisumu.

c) **Water Service Providers (WSP)**

3.7 The WSBs do not provide services directly, but through contracted agents, known as the WSPs, established under Section 55 of the Water Act, 2002. The contract is in the form of a Service Provision Agreement issued to one or several water service providers in respect to the board's area of supply. The WSPs are commercial based institutions registered under the Companies Act Cap 486. The WSPs operate and maintain the water and sewerage facilities at the local level on behalf of the WSBs who remain the asset owners and are responsible for infrastructural development.

d) **Water Services Trust Fund (WSTF)**

3.8 Water Services Trust Fund is established under Section 83(1) of the Water Act, 2002. The objective of WSTF is to assist in financing the provision of water and sanitation services to areas without adequate services in Kenya.

e) **Water Appeal Board (WAB)**

3.9 Established under Section 84 of the Water Act, 2002, WAB is mandated with the settlement of disputes arising from suit of any person having a right or proprietary interest which is directly affected by a decision or order of the Authority, the Minister or the Regulatory Board concerning a permit or licence under the Water Act, 2002.

f) **Water Resources Management Authority (WRMA)**

3.10 WRMA is an authority established under Section 7(1) of the Water Act, 2002 and mandated with management of water resources in Kenya under Section 8 of the Act. WRMA enforces regulations and standards relating to water issues. One of the functions of WRMA is to regulate water infrastructure, use and effluent discharge.

g) **Ministry of Water and Irrigation (MWI)**

3.11 The MWI is responsible for policy formulation, resource mobilization, coordination and provision of technical standards for the provision of water services (water supply and sanitation services).

h) **National Environment Management Authority (NEMA)**

3.12 NEMA is a statutory body under the Ministry of Environment, Natural Resources and Regional Development Authorities. NEMA is supposed to supervise and coordinate other stakeholders in the provision of sewerage services by ensuring that every county government or person operating a sewage system or owner or operator of any trade or industrial undertaking is issued with an effluent discharge licence, and/or shall be guided by the monitoring guide for discharge into the environment and maintain the standards set out by the Authority.

i) **County Governments**

3.13 The Constitution of Kenya provides for a devolved system of governance and creates county governments in Article 176 to bring services closer to the people. Functions such as water and sanitation services are devolved under the Fourth Schedule of the constitution.

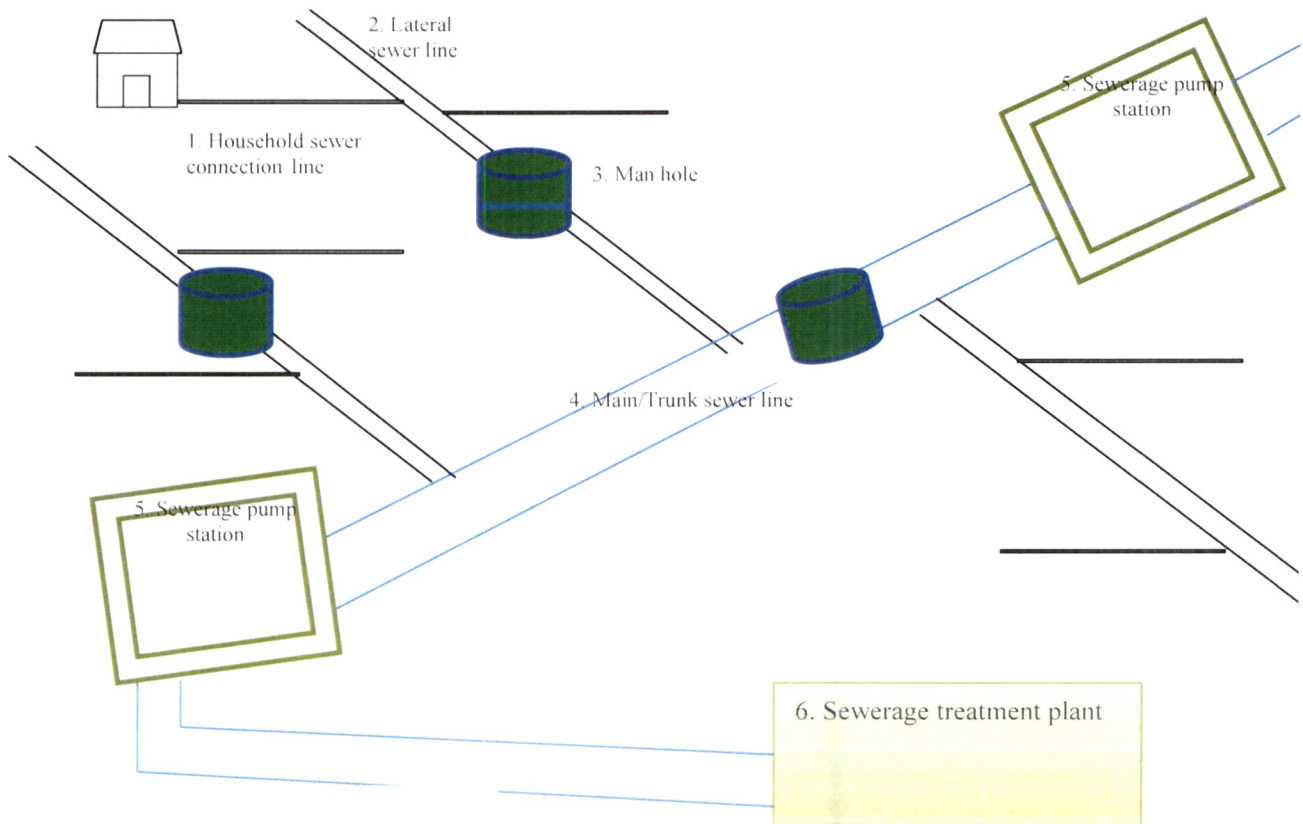
Organisational Structure

3.14 The LVSWSB is headed by a Chief Executive Officer (CEO), who leads the management team in implementing the board’s mandate. Under the CEO there are various departments as shown in the organisational Structure in **Appendix 2**. The responsibility for development of sewerage lies with the technical services department of LVSWSB.

Process Description

3.15 Sewerage system involves a network of sewerage connecting individual households to the treatment plant. Households are connected through household lines to reticulation/lateral sewers which then connect to trunk/main sewers. The trunk sewers deliver the collected sewage to treatment plant which then treat and discharge the treated effluent back to the environment. Along the laterals and trunk lines, manholes are strategically placed for inspection purposes. In areas where it is not possible to achieve gravity flow, pump stations are constructed to pump the sewage along the trunk sewers. A graphical illustration of the sewer system is provided in **Figure 2**.

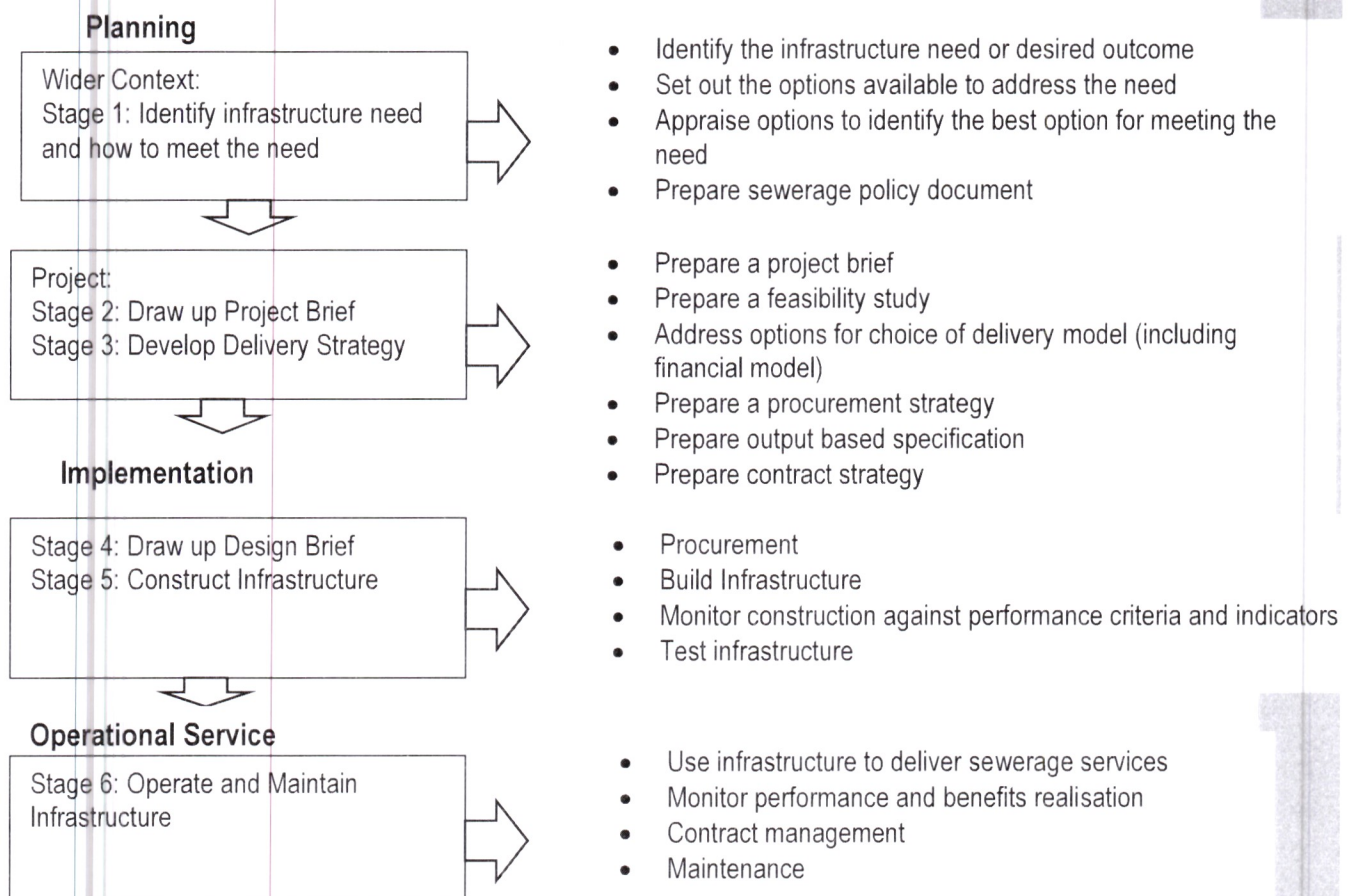
Figure 2 : Sewerage System



Source: OAG Conceptualization, 2016

Generally, undertakings to develop sewerage system take the form of infrastructure development projects. Invariably sewerage development goes through six stages, which can be categorised into three steps, i.e. planning, implementation and operational service as shown in **Figure 3**.

Figure 3: Description of the Process for Developing Sewerage



Source: Adopted from INTOSAI-WGEA: *Environmental Issues Associated with Infrastructure*, 2013

a) Planning

3.16 The first step in sewerage development is to identify service needs. This is achieved through: clarifying the current situation, including the current service level and demand met with the existing infrastructure; identifying current service gaps; and assessing future service demands. Identification of service need is in a wider context and leads into sewerage policy statement. A policy need for sewerage development can arise where the current infrastructure lacks the capacity to meet current or future needs; a low service level; and risk of infrastructure failing in the future.

3.17 Once the need for improvement in sewerage is identified, the various options to fulfil the need are then identified. The options may include: do nothing; improve output from existing

infrastructure; upgrade existing infrastructure; and develop new infrastructure. The options are then appraised so that the best option is considered.

3.18 These two steps culminate into a sewerage policy that guides the focus for development of sewerage. In Kenya sewerage needs identification has been undertaken both at the national and local level. National sewerage development policy needs are documented both in the National Water Services Strategy (2007-2015) and the National Water Master Plan. Individual towns have also developed their own water services policy documents (action plans or master plans) highlighting sewerage development needs.

3.19 Guided by such policy documents, WSBs in consultation with WSPs develop a capital works

plan, which is a ten-year plan for capital works required to address the identified sewerage need. The capital works plan is accompanied by a business plan explaining how the identified capital works will be delivered.

- 3.20 Once the sewerage needs are identified, the next step is to plan for specific projects. At this stage WSBs develop a project brief, which provides the basis for assessing whether the proposed project is viable and achievable. The project brief is accompanied by a feasibility study of the project, which addresses the practicability of the project evaluated against alternative options based on expertise, costs and technological requirements.
- 3.21 Once WSBs are convinced that the proposed project is the most viable, they then decide on a delivery model covering both financial and implementation strategies. Most sewerage projects in Kenya are donor funded, but options such as public-private partnership as well as entire government funding can also be explored. Potential donors are identified at this stage. Implementation strategy is also developed. Equally important to develop at this stage are; the procurement strategy, contract strategy and output-based specifications.
- 3.22 The project planning stage culminates into a detailed project document that discusses among other issues such as background to sewerage need, preferred option, key stakeholders, expected outcomes and how they will be measured, budget and scope of the sewerage project, site analysis, likely impacts and how they will be mitigated, estimate of overall effort and who will do it, outline of required activities and key milestones.

b) Implementation

- 3.23 Once the project planning phase is complete and funds availed for the proposed infrastructure project, the project proceeds to the implementation stage. Just like with any other infrastructure development project, the implementation stage is initiated by drawing up the design brief. The design brief is a preliminary design, which defines all design requirements for

the infrastructure and is also the foundation on which the final design will be developed. It may include schematic drawings of the proposed infrastructure, general specifications of the infrastructure and the performance criteria once complete, site information and any technical details, which may affect the infrastructure development.

- 3.24 Once a contractor is identified, WSBs can then work together with the contractor to make any necessary adjustments on the design brief and develop detailed (final) design drawings, which contains all information necessary to build a particular type of infrastructure. It shows what the finished infrastructure will look like, how materials and components will be integrated together and the dimensions and layout of the sewerage.
- 3.25 WSBs then proceed to construct the sewerage. Procurement of the necessary tools, machinery and services is done at this stage. Construction of the sewerage in Kenya is often carried out by contractors, but WSBs are expected to supervise and monitor their delivery against design brief and contract. The supervision is often subcontracted to consultant engineers who are responsible for active supervision while WSBs only do minimal supervision. Before commissioning the completed infrastructure, WSBs in conjunction with the consultant engineer and contractor test the sewerage to assess the delivery and operation of features in the design, controls and residual impacts.

c) Operational Service

- 3.26 Once the construction of the sewerage is complete, WSBs hand it over to WSPs who then use it to deliver sewerage services. WSBs work hand in hand with WSPs who handle operations and minor maintenance of developed sewerage. In case of a major break down in the infrastructure, WSBs are expected to undertake maintenance works.
- 3.27 According to AFROSAI-E Guidelines on Maintenance of Assets (2010), there are three main types of maintenance, namely; routine,

periodic and emergency. Routine maintenance includes a range of normally small scale activities to ensure the asset's continuous operation. Periodic maintenance occurs less frequently and is carried out at predetermined intervals or according to predetermined criteria. It is normally large scale and often requires specialist equipment and skilled labour. Finally, emergency maintenance is occasionally urgent, unplanned actions that are required, for example, because of unexpected deterioration or damage of an asset or accidents by, for example severe weather conditions such as floods, or collisions.

Funding for Lake Victoria South Water Service Board

3.28 LVSWSB is funded by the government through the Treasury and receives agency fees from Water Service Providers it license. LVSWSB also receives funds from bilateral and multilateral donor agencies particularly for capital projects either in the form of grants or loans. During the period under review, LVSWSB was undertaking major capital projects to rehabilitate and improve the sewerage infrastructure. **Table I** shows expenditure on one of the capital projects on sewerage infrastructure undertaken by LVSWSB during the period covered by the audit:

Table 1: Expenditure on sewerage by LVSWSB under LTAP 3

Project Name	Activities	Start	End	Cost (KSh.)	Status
Kisumu Water Supply and Sanitation Project Long Term Action Plan (LTAP-3)	-Construction of trunk and reticulation sewers -Rehabilitation of KISAT waste water treatment works -Rehabilitation of pumping stations and construction of a new pumping station at Tom Mboya Labour College -Rehabilitation of Nyalenda waste water stabilization ponds	March 2011	Nov. 2015	1,225,000,000	Substantially completed

Source: Analysis of LVSWSB records

3.29 The audit revealed that LVSWSB does not incur any expenditure on monitoring of sewerage infrastructure. However, the monitoring and evaluation is done for water quality only. Physical infrastructure is not monitored or evaluated by LVSWSB. Expenditures for monitoring and evaluation of water quality by LVSWSB during the period under review remained fairly the same as shown in **Table 2**.

Table 2: LVSWSB expenditure on monitoring and evaluation

2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
16,405,000	25,751,000	23,594,000	27,963,000	xxxx*

*Expenditure for the year 2014/15 was not provided

Source: Analysis of LVSWSB records

Chapter 4

4.0 Audit Findings

4.1 Lake Victoria South Water Service Board has made effort to provide sewerage since its establishment in 2005 following the enactment of Water Act, 2002. Data obtained during the audit revealed that LVSWSB had implemented a major project aimed at rehabilitating and expanding sewerage in Kisumu city. The scope of sewerage works implemented by the board between July, 2010 and June, 2015 is as outlined **Table 3**:

Table 3: Sewerage project implemented in Kisumu during the period 2010/11-2014/15

Board	Project title	Project Scope	Completion status as at time of audit
LVSWSB	Kisumu water supply and sanitation project- LTAP package 3	-Construction of trunk and reticulation sewers -Rehabilitation of KISAT waste water treatment works -Rehabilitation of pumping stations and construction of a new pumping station at Tom Mboya Labour College -Rehabilitation of Nyalenda waste water stabilization ponds	Substantially completed

Source: OAG review of LVSWSB project documents

4.2 However, this project has not resulted in adequate sewerage in Kisumu, due to a number of issues as discussed below. **Appendix 3** contains a summary of LVSWSB management’s comments on the issues raised in this section.

Inadequate Identification of Sewerage Needs

4.3 Water Service Boards’ (WSBs) mandate under Section 53(1) of the Water Act (2002) is to ensure the provision of efficient and economical water services. Investments in sewerage should thus offer the best solution in meeting the sewerage needs of the concerned town. In this regard, WSBs are expected to develop sewerage capital works plan based on the prevailing sewerage service needs, which should be identified in consultation with WSPs according to Section 21(e) of WASREB’s Model Water Services Regulations and Clauses 6.3 and 9.1 of WASREB’s license conditions.

4.4 The audit, however, revealed that sewerage needs identification as conducted by LVSWSB was inadequate, leading to implementation of projects that do not fully address the current sewerage service delivery needs of Kisumu city.

4.5 The audit revealed that LVSWSB has implemented

a sewerage improvement project under LTAP-3. The audit team requested for the needs assessment document for this project, but LVSWSB only availed the feasibility study report. However, our understanding is that a feasibility study comes later in project planning after needs identification since it endeavours to evaluate the economic, environmental and technical feasibility of the various identified solutions. On inquiring further, the team was informed that the project is based on the needs identified in the Kisumu Urban Development Plan of 2012. However, according to available records, the implementation of LTAP-3 started in March, 2011 hence planning must have been done earlier than March, 2011.

4.6 The audit further revealed that LVSWSB did not have a capital works plan as required by Clauses 6.3 and 9.1 of WASREB’s license conditions. The board availed a report showing the implementation progress for projects in the period 2010-2015 instead as the capital works plan.

4.7 Interviews and document review, however, revealed that KIWASCO was actively involved during the planning and implementation of LTAP-3. The staff of KIWASCO interviewed confirmed

that LVSWSB actively involved the company right from the planning stage and they were key stakeholders during feasibility studies for the project. A review of the site meeting minutes also confirmed that KIWASCO was involved in the project. KIWASCO was only absent in one out of the 11 meetings whose copies of the minutes were shared with the audit team.

4.8 The sewerage developed under LTAP-3 has not adequately addressed sewerage needs for Kisumu City mainly due to the shortcomings during needs identification. Our visit to Kisat waste water treatment plant revealed that the capacity of the plant and its sewerage network was expanded from the initial 6800 m³/day to 9000 m³/day under LTAP-3, but the inlet was left at the initial capacity of 6800 m³/day. As such the plant can only take in a maximum of 6800 m³/day yet it has a higher capacity. The excess raw sewage overflows into

a trench, meant for emergency overflow, which directs the sewage to a stream and eventually to Lake Victoria.

4.9 The audit also revealed that LTAP-3 left out the most pressing sewerage needs. Interactions with KIWASCO revealed that LTAP-3 should have included Lower Migosi in its scope since the situation of the sewer system in this estate is bad compared to other middle income estates in the city. This was confirmed through our visit to Lower Migosi estate, which also revealed that the estate is in need of sewerage services yet it was never considered by this project. The residents of the estate have resorted to illegal discharge of raw sewage into the environment since the once functioning sewers are now dead after abandonment by LVSWSB. The case of Lower Migosi is outlined in **Text Box 1**.

Text Box 1: The State of Sanitation in Lower Migosi Estate, Kisumu City

Lower Migosi is a middle class estate in Kisumu city. The estate once had a sewer system, but poor planning and abandonment by the LVSWSB had seen houses constructed on top of sewer lines while other lines are totally blocked to pave way for construction of residential houses. As at the time of the audit, the sewer network in this estate was considered dead. The residents had resorted to use of soak pits, which are illegally discharged into storm drains forming streams of raw sewage. This not only poses a serious health hazard to Lower Migosi residents, but is also a major source of pollution to the environment.

The team was informed by staff of KIWASCO that the estate had been in this state for a long time even before the implementation of LTAP-3. We were also informed that the LVSWSB is currently planning for another major sewerage expansion project in Kisumu, but Lower Migosi is still not considered in its scope. Further enquiries revealed that the case of Lower Migosi had always been avoided by LVSWSB since it is considered political as rehabilitation of the sewer network would require demolition of several buildings currently constructed on the sewer line.



Notice the discharge of raw sewage from the residential units forming a stream of sewage in storm drains hence posing a serious health hazard to residents of Lower Migosi and the neighbouring estates.

Delays in implementation of sewerage projects

- 4.10 Sewerage development usually takes the form of capital works project with specific start and end dates documented in the project document. Hence, WSBs are expected to follow project implementation dates closely since implementation delays can have serious implications on the project being implemented.
- 4.11 The audit, however, revealed that sewerage rehabilitation and expansion project undertaken by LVSWSB took longer than its planned completion dates. The project recorded significant delays of up to two (2) years.
- 4.12 The LTAP- 3 was scheduled to start in March, 2011 and end by June, 2013 after a period of 27 months. A review of Substantial Completion Report dated November, 2015 revealed that the contract was extended to December, 2013, with a reduced scope, but still the works were not completed within that time. The contract was again extended to August, 2014, but still the works were not completed within that period. LVSWSB was forced to terminate main contractor's contract and directed all outstanding works to a subcontractor. The project was substantially completed in November 2015 by which time the expected completion time had more than doubled to 56 months. The delays recorded in various components of this project are as outlined in **Table 4**.
- 4.13 According to the Substantial Completion Report, the delays were mainly attributed to the slow progress of the main contractor. There were also challenges with acquisition of wayleaves, slowing down the implementation of the project as indicated in **Table 4**.
- 4.14 **Text Box 2** also enumerates some of the challenges of wayleaves in development of sewer lines.

Table 4: Captured Delays during Implementation of Various Components of LTAP- 3

Component	Planned Start Date	Actual Start Date	Planned Completion Date	Actual Completion Date	Delays in Months	Reasons for delays
Sewerage System 1 (Manyatta and Central area)	Aug., 2011	Oct., 2011	June, 2013	July, 2015	24	Wayleave challenges Contractor's poor progress
Sewerage System 2 (Milimani and Eastern Area)	Aug., 2011	Jan., 2012	June, 2013	Nov., 2015	29	Wayleave challenge Resurveying work
Juvenile-Kisumu polytechnic Sewer line	Sept., 2014	Sept., 2014	June, 2013	Jan., 2015	18	Not stated
Joyland Sewer line	Nov., 2014	Oct., 2014	June, 2013	Jan., 2015	18	Not stated
Patel, Sewer line	Nov., 2014	Nov., 2014	June, 2013	Jan., 2015	18	Encroachment of sewer line
Mumias pumping main	Oct., 2014	Sept., 2014	June, 2013	Oct., 2014	15	Not stated
Nyalenda pumping main	Sept., 2014	March, 2015	June, 2013	July, 2015	24	Wayleave challenges
Nyalenda Ponds clearing and dislodging	Jan., 2012	March, 2012	June, 2013	Nov., 2015	29	Heavy rains
Anaerobic and maturation ponds	Jan., 2012	May, 2012	June, 2013	Aug., 2015	25	Not stated
Mumias Pump station	June, 2012	May, 2012	June, 2013	May, 2015	22	Not stated
Kendu lane and sunset pump station	Sept., 2013	July, 2012	June, 2013	Aug., 2015	25	Contractor's slow progress
Tom Mboya Pump station	Oct., 2011	March, 2015	June, 2013	Sept., 2015	26	Contractor's slow progress Delay in land acquisition
KISAT STP- Pipework	Oct., 2011	Sept., 2011	June, 2013	Nov., 2011	0	-
KISAT-STP- Civil works	April, 2011	May, 2011	June, 2013	Dec., 2012	0	-
KISAT STP- Electrical plant (Wiring)	Dec., 2011	Nov., 2012	June, 2013	Aug., 2015	25	Not stated
KISAT-STP- E and M works	Dec., 2011	Nov., 2012	June, 2013	Sept., 2014	14	Not stated

Source: OAG review of LTAP-3 Substantial Completion Report

Text Box 2: The Challenge of Wayleaves in Development of Sewer Lines

A wayleave is a public right of way created for the purposes of laying of fuel pipe lines, water mains, sewer lines, power lines and communication lines. More often than not, sewer lines tend to utilise riverine riparian wayleaves in order to take advantage of natural gradients in their flow. While sewer wayleaves were originally provided for in every town's physical plans, increased urban population and weak enforcement of laws have led to their encroachment posing a great challenge to the development of sewer lines.

In Kisumu, it was noted that most of the wayleaves had been encroached. The audit team was informed that the implementation of LTAP-3 was to some extent delayed by challenges in acquiring wayleaves. For instance, LVSWB fruitlessly negotiated with wayleave encroachers in Nyalenda estate for a whole year after which the board decided to redesign the sewer line. Some private land owners, for example in Milimani estate also refused to grant right of way, despite the board's willingness to pay. In estates such as Lower Migosi, buildings had been constructed on wayleaves hence posing a challenge to maintenance works.



Notice the sewer manhole within the pavement of the building on the left. On the right, the space between the two buildings is for the main sewer line

The problem of wayleaves had been caused to a greater extent by conflicting sections of different sectoral laws. Scrutiny of documents revealed that the concept of riverine riparian reserve has been defined differently by various laws. For example, Section 116(2) of the Water Resources Management Rules, 2006 and Section 6(c) of EMCA (Water Quality) Regulations, 2006 provide for a minimum of six (6) metres to a maximum of 30 meters on either side of the river bank. On the other hand, Section 15(c) and (d) of the Physical Planning Act, Chapter 286 provides for not less than 10 metres in width on each bank, except in areas where there is an established flooding of a river or stream. This matter is further compounded by weak enforcement of existing laws by relevant authorities and laxity on the part of LVSWB to monitor existing sewer lines leading to buildings being constructed on wayleaves including those with existing sewer lines.

- 4.15 The delays might lead to project cost escalations or reduction in scope of works to fit within the budget. Review of the implementation of LTAP- 3, as presented in the Substantial Completion Report, revealed that the initial scope of works was significantly reduced as outlined in **Table 5**. The estimated value at final completion of Ksh. 1,225,152,470.71 is for the reduced scope while the contract price of Ksh. 1,419,578,925.55 is for the initial scope before reductions.

Table 5: Reduction in Scope of Works for LTAP-3

Contract Provision	Reduced Scope of Works	% of Reduction in Scope
1. Gravity Sewers Lines and Manholes		
a) Manyatta Area 25,052m of sewer lines from DN 225 to DN 375, and 304 No manholes	2,370m of sewer lines from DN 300 to DN 375, and 49 No manholes	90%
b) Central Area 2,266m of sewer lines from DN 225 to DN 450, and 71 No manholes	0m of sewer lines from DN 225 to DN 450, and 0 No manholes	100%
c) Milimani Area 11,640m of sewer lines from DN 225 to DN 600, and 196 No manholes	14,805m of sewer lines from DN 225 to DN 600, and 336 No manholes	27%*
d) Eastern Area 15,077m of sewer lines from DN 450 to DN 600, and 213 No manholes	3,835m of sewer lines from DN 450 to DN 600, and 72 No manholes	75%
2. Nyalenda Ponds		
b) Desludging of 3 No facultative ponds and 6 No maturation ponds (Total volume=261,000m³)	Desludging of 2 No facultative ponds and 6 No maturation ponds (Total volume=174,000m³)	33%
d) Excavation of maturation ponds (Total volume=165,000m³)	Excavation of maturation ponds (Total volume=82,500m³)	50%

*The scope of works in Milimani Area was increased by 27%. The scope of works in all the remaining components was reduced by at least 30%.

Source: LTAP-3 Substantial Completion Report

Some of the Sewerage facilities developed by WSBs are based on inappropriate technology, making them uneconomical to operate

4.16 According to Section 53 (1) of the Water Act, 2002, WSBs should not only endeavour to make water services, which include both water supply and sewerage, efficient but also economical. To achieve this, WSBs should use appropriate technology to deliver sewerage which is economical to operate and maintain.

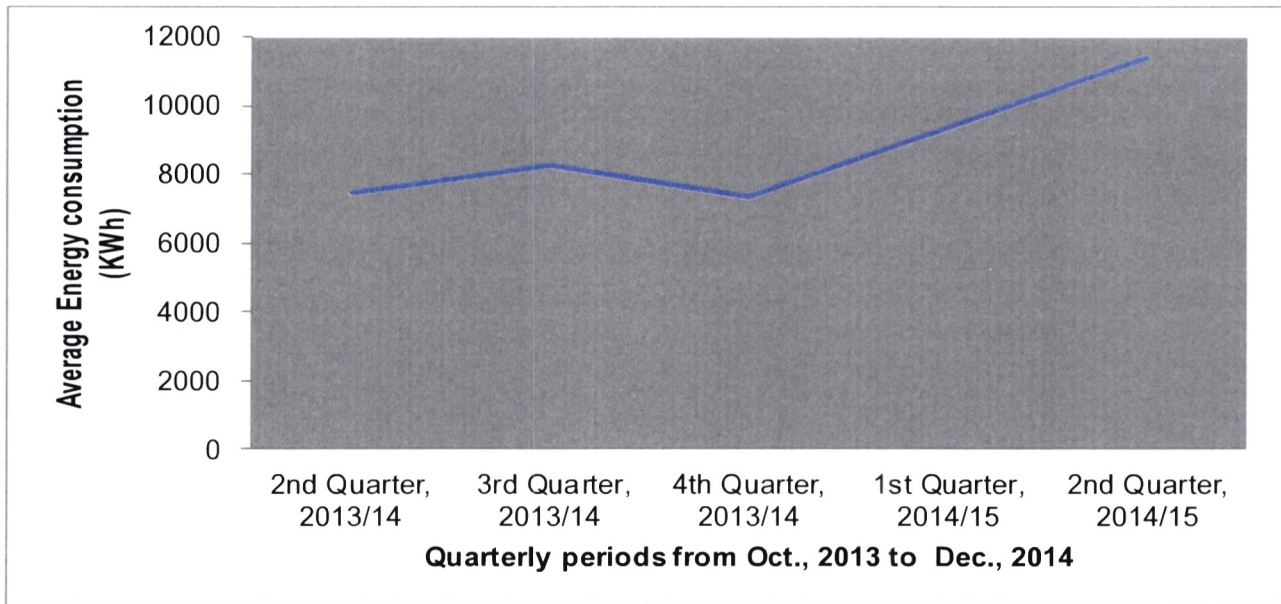
4.17 The audit revealed that some of the sewerage facilities developed by WSBs are based on technology that is not appropriate for Kenya. Though very efficient in treating sewage, the mechanised treatment plants are energy intensive and have previously been abandoned by the WSPs

due to high operation and maintenance costs.

4.18 Under LTAP-3, LVSWB has rehabilitated Kisat Sewerage Treatment Works, which is a fully mechanised conventional plant with 10 pumps out of which seven (7) are operational and three (3) are on standby. Our interaction with KIWASCO, however, revealed that while the rehabilitation of the pump has improved its waste water treatment efficiency, it has significantly increased the operation and maintenance costs of the plant. Documents availed to the audit team revealed that the energy consumption of the plant increased by 52.82% from an average of 7447.67 KWh during the period October-December, 2013 to 11382 KWh during the period October-December, 2014 as illustrated in **Figure 4**. The team was informed that KIWASCO is considering harnessing biogas

from the plant to partially take care of the plant's energy needs.

Figure 4: Energy Consumption for Kisat Treatment Plant, October 2013 to December 2014



Source: OAG's analysis of KIWASCO records

- 4.19 Further, LVSWSB has rehabilitated one pump station (Kendu Lane Pump Station) and constructed three new pump stations (Mumias, Sunset and Tom Mboya pump stations) under LTAP-3. The pump stations are equally based on electromechanical technology and are thus expensive to operate. Besides, the maintenance of such facilities is usually hampered by the high cost of spare parts on one hand and non-availability of the same on the other.
- 4.20 KIWASCO is, therefore, likely to incur high costs in operating and maintaining these facilities, which might even lead to their abandonment. During our field work in December, 2015, the team observed Kendu Lane pump station was poorly maintained, despite recent rehabilitation works. The pump station looked neglected with sewage flowing through a trench back to the environment as illustrated in **Plate 1**. The situation was the same during our earlier visit in April, 2015, but the pump operator blamed it on electrical power blackout during the time of our visit. It therefore appeared like KIWASCO is intentionally minimising the operation of this pump station because of the high costs involved.

Plate 1: Waste water flowing into the environment from Kendu Lane pump Station



Notice the waste water flowing from the pump station into a storm drain nearby

4.21 The use of inappropriate technology may be attributed to the fact that LVSWSB failed to consider local opportunities for technology and materials access while designing, developing and implementing the infrastructure projects.

The existing sewerage has not been well maintained

4.22 According to section 53 (1) of the Water Act, 2002, WSBs are responsible for the efficient and economical provision of water services within their area of jurisdiction. Arising from this mandate, WSBs are not only expected to plan, develop and expand sewerage in accordance with Section 53 (3) (a), but also ensure that the existing infrastructure is well maintained in accordance with Section 55 of the Water Act, 2002.

4.23 According to Service Provision Agreement, when there is a maintenance issue the KIWASCO is required to notify LVSWSB, cost it and make a quotation for the same which is submitted to LVSWSB. The KIWASCO is then expected to go ahead and repair then bill the LVSWSB. In cases where KIWASCO are unable to perform, they are expected to inform LVSWSB to take action.

4.24 Although the SPA appears to fully delegate repairs and maintenance to the KIWASCO, it would ordinarily be expected that as owners of the assets, LVSWSB must take action to save the situation where it has been shown that the KIWASCO may be unable to carry out the repair or maintenance.

4.25 Further, interviews revealed that LVSWSB has classified maintenance activities into two: major maintenance done by the board; and minor maintenance done by the service providers (KIWASCO). The audit, however, revealed that the sewerage has not been well maintained.

4.26 The team observed instances of inadequate maintenance of sewerage in Kisumu. It was observed that solid waste including plastics pass through Nyalenda ponds inlet screens/filters into the stabilization ponds. It was also noted that the main sewer line taking sewage to the Nyalenda ponds was cracked and no evidence was provided that it has been documented for maintenance purposes.

4.27 Further, observations revealed that a major sewer manhole in Bishop Abiero Secondary School in Shaurimoyo estate was constantly overflowing, but KIWASCO did not address the situation, despite the school's complaints. This poses a risk to the environment and health of the school community.

4.28 It was further observed that Kendu Lane pump station has continuously failed to operate. On enquiry, KIWASCO staff claimed that the station was connected to a low power supply that has continuously failed to run the system. As a result, waste water overflows at the station, ending up in the storm drains adjacent to it and eventually to Lake Victoria.

4.29 As a result of inadequate maintenance, the treated sewage being discharged back to the environment from the treatment plant do not meet NEMA recommended quality standards as measured by Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS). The team was only provided with quality analysis reports covering only July, 2014 to March 2015 for both Nyalenda and Kisat treatment works. It was, however, revealed from the analysis that the quality of effluents for Kisat during the reported period was within NEMA effluent standards. This was attributed to the recent rehabilitation of the plant.

Figure 5: Compliance of Waste Water treatment plants with NEMA quality standards (July, 2014 - March, 2015)

Parameter	NEMA Standards	Average parameter concentration in effluent from the plant during the reporting period		Remarks
		Kisat	Nyalenda	
BOD (mg/l)	30	31.83	65.93	Not complying
COD (mg/l)	50	45.92	89.78	Only Kisat complying
TSS (mg/l)	30	21.63	25.78	Complying

Source: Quality Analysis Reports of Treatment Plants

4.30 The inadequate maintenance of sewerage was attributed to the confusion that exists with regard to the application of Item 10 of SPA that delegates repairs and maintenance to KIWASCO without clearly specifying the responsibilities with respect to the nature and extent of repairs required.

4.31 Again, LVSWBS as owners of the assets has failed to monitor their condition and take action where KIWASCO has been unable to do so. For example, the team observed LVSWBS and KIWASCO play a blame game on who should take responsibility for repairing the overflowing manhole at Bishop Abiero Secondary School.

4.32 Further, the team was informed that KIWASCO no longer reports to LVSWBS regularly about its operations following devolution of water services in Schedule 4 Part 2(11) of the Constitution of Kenya, 2010. Further, LVSWBS did not provide any evidence to prove that they do monitor or

inspect the status of sewerage system as the custodians of the infrastructure. As such, LVSWBS is not able to keep track of the status of sewerage and maintenance activities being undertaken by KIWASCO. Besides, the sewerage system was noted to be encroached further hampering maintenance works as was observed in Lower Migosi Estate and Nyalenda Ponds. LVSWBS did not also provide evidence of ownership of land on which both Kisat and Nyalenda waste water treatment plants are constructed.

Chapter 5

5.0 Conclusion

5.1 From the findings of the audit it is clear that LVSWSB has made significant effort to provide sewerage in Kisumu since its establishment following the enactment of Water Act, 2002. However, these efforts have not resulted in an adequate sewerage. The sewerage development projects implemented by the LVSWSB have shortcomings emanating from inadequate needs identification, use of inappropriate technology and delays in project implementation. Besides, the already developed infrastructure has been inadequately maintained further contributing to inadequacy of the sewerage system. More specific conclusions were made as follows:

- LVSWSB failed to treat needs assessment as an integral component of sewerage development. The board instead relied on recommendations of an earlier feasibility study report and Kisumu Urban Development Plan which led to the implementation of projects that do not address the current sewerage needs of Kisumu city.
- The appropriateness of technology is key to sustainability of sewerage. While the mechanised treatment plant and pump stations, recently developed in Kisumu, look very efficient, the high operation and maintenance costs involved in such facilities pose a risk to their economical sustainability under the operation of KIWASCO.
- Due to wayleave acquisition challenges and inadequate performance of contractors, the implementation of sewerage projects in Kisumu recorded significant delays. This led to significant reduction in project scope for the case of LTAP-3. This, notwithstanding the pollution caused to the environment as completion of the projects are awaited.
- Due to the failure of LVSWSB to monitor the condition of sewerage infrastructure handed over to KIWASCO, the existing sewerage has not been well maintained as was evidenced by an inadequately maintained sewerage system in Kisumu.

Chapter 6

6.0 Recommendations

6.1 The following are the recommendations made by the Auditor-General to improve on the provision of sewerage in Kisumu City:

- To ensure that sewerage projects meet the current needs: -
 - LVSWSB may consider putting more emphasis on identification of current sewerage needs when planning for sewerage projects. The board should consider undertaking baseline studies when planning for sewerage projects to bring the current situation on board in addition to relying on recommendations from the previous studies. The WSPs and users of the sewerage would also be actively involved during needs assessment and their input considered when making the final decision.
- To address delays during implementation of sewerage projects: -
 - LVSWSBs may consider acquiring wayleaves before commencing actual implementation of sewerage projects
 - LVSWSB may need to ensure that contractors strictly adhere to contract terms of references including project implementation timelines
- To ensure that the resultant sewerage facilities are cost effective: -
 - LVSWSB may need to ensure that the mechanised treatment plants and other facilities are based on technologies and materials that are locally accessible and less energy intensive to encourage self-reliance
- To ensure that the existing sewerage is well maintained: -
 - LVSWSB in consultation with WASREB should clearly define the nature and extent of repair and maintenance responsibilities and be proactive in taking responsibility for the same
 - LVSWSB should consider developing mechanisms to ensure regular reporting of WSPs operations as provided for in the Service Provision Agreements
 - LVSWSB should consider regularly monitoring and securing the sewerage infrastructure

Appendices

Appendix 1: Methods of gathering evidence

a) List of People Interviewed

- Director Technical Services, WASREB- to obtain understanding of regulation of sewerage services in Kenya.
- Senior management of the selected Water Service Boards- to obtain understanding of the operations of the boards including their role in the provision of sewerage services in their jurisdictional areas.
- Key staff in charge of sewerage services (both at the LVSWSB and KIWASCO)- to obtain understanding of the sewerage activities including the achievements and challenges.

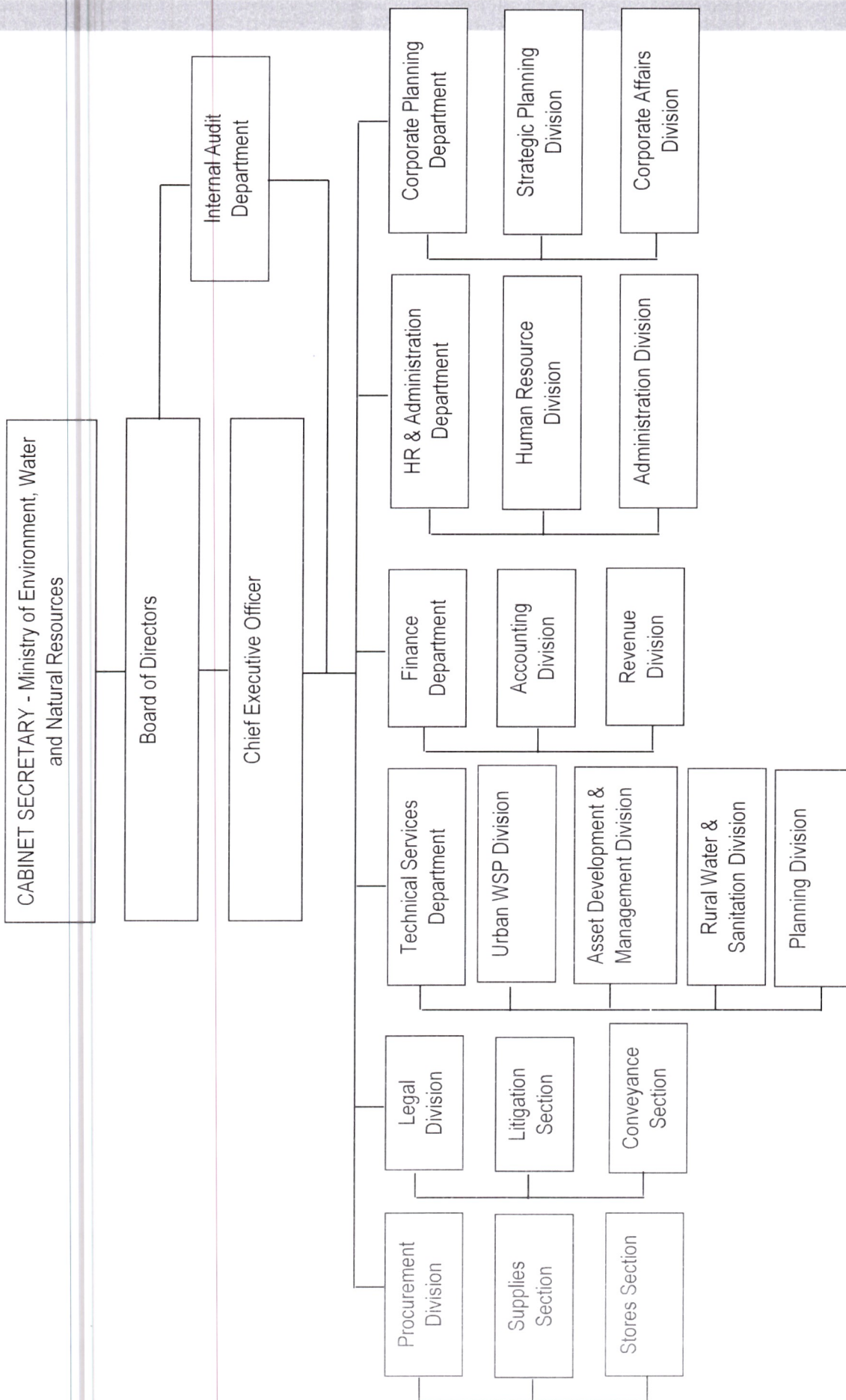
b) Documents Reviewed

Constitution of Kenya		To obtain information on the constitutional provisions on environmental and social rights, especially the right to sanitation
Water Act, 2002		To obtain information on the mandate for the provision of sewerage services
EMCA (Water Quality) Regulations		To obtain information on the environmental compliance requirements for sewerage service providers
National Water Services Strategy 2007-2015		To obtain information on short-term policy statements concerning provision of sewerage services
License documents for the LVSWSB		To obtain information on licensing conditions.
Current strategic plans of the LVSWSB		To obtain background information, strategies, structures, SWOT analysis, and key stakeholders
Contract documents		To obtain information on details on sewerage projects
Activity reports		To understand the progress of projects being implemented
Financial reports/ budgets		To obtain information on the funding of activities
WASREB performance review reports		To obtain information on the status of sewerage services in the selected towns.

c) List of Sites Visited

Town		Facility	Activity
Kisumu	1	Kisat Waste Water Treatment Plant	Waste water treatment
	2	Nyalenda Ponds	Waste water treatment
	3	Kendu lane Pump Station	Waste water pumping
	4	Pump Station (Nyalenda Estate)	Contraction of new pump station
	5	Manhole in Bishop Abiero Secondary School	Overflowing manhole
	6	Millimani Estate	Status of trunk line Wayleave acquisition challenge
	7	Lower Migosi Estate	Wayleave encroachment Status of existing sewer lines

Appendix 2: LVSWB Organisational Structure



Appendix 3: LVSWSB Chief Executive Officer's Comments on Audit Findings

Audit Observation	Chief Executive Officer's Response	OAG's Response on Chief Executive Officer's Response
<p>I. Inadequate Identification of Sewerage Needs</p>		
<p>Water Service Boards' (WSBs) mandate under Section 53(1) of the Water Act (2002) is to ensure the provision of efficient and economical water services. Investments in sewerage should thus offer the best solution in meeting the sewerage needs of the concerned towns.</p>	<p>Agreed: Investments in sewerage should offer the best solution in meeting the sewerage needs of the concerned towns. Investment in the sewerage infrastructure was guided by the following 3 factors:</p> <ul style="list-style-type: none"> • Sewerage capital works in the 2005-2010 strategic plan extended to 2012 and strategic plan for 2013-2017. All developed through stakeholder participation in which KIWASCO participated. • Key principles of the Kisumu Water Supply and sanitation Project. This included the promotion of well-designed investments that would have optimum impact. • Available investment funds for the implementation of sewerage facilities. 	<p>Noted and agreed with the response.</p>
<p>Sewerage needs identification as conducted by LVSWSB was inadequate, leading to implementation of projects that do not fully address the current sewerage service delivery needs of Kisumu city.</p>	<p>Not agreed. In June 2003, LVSWSB was funded by the French Development Agency and conducted a detailed and comprehensive feasibility study "Water Supply and Sanitation programme for Kisumu City (Kenya) Feasibility Study- Preliminary Report". Therefore, the sewerage needs identification conducted by LVSWSB was professional resulting into continuous improvement of the sewerage infrastructure.</p>	<p>The issue is that the sewerage system does not fully address the needs of Kisumu City.</p>

<p>LVSWSB did not present a needs assessment document for LTAP-3. Instead, the board tabled a feasibility study report and informed the team that the project was based on the needs identified in the Kisumu Urban Development Plan of 2012. Our understanding is that a feasibility study comes later in project planning after needs identification. Besides implementation of LTAP-3 started in March 2011.</p>	<p>Agreed. It is true that LVSWSB did not present a separate needs assessment report at the time of the audit. The needs assessment for sewerage investments are captured in various documents which are available for the auditors as follows:</p> <ul style="list-style-type: none"> • Kisumu Water and Sanitation Project-identification of Implementation and management arrangements for improved water and sanitation services to informal settlements (slum areas) in Kisumu situational assessment final report July 2005 • STAP and LTAP feasibility study report dated May 2005. Section 1.3 “scope of the Report” includes assessment of the existing sewerage disposal facilities. Section 3.3 of the report contains detailed assessment of the existing facilities and gaps/need for rehabilitation or replacement or expansion. 	<p>Noted and agreed with the response.</p>
<p>The team was not provided with a capital works plan detailing the planned sewerage interventions as required by Clauses 6.3 and 9.1 of WASREB’s license conditions.</p>	<p>Not Agreed: The board has a capital works plan as per clauses 6.3 and 9.1 of the Wasreb’s license conditions. The capital works plan is included as an appendix of the Strategic Plan 2005-2010 extended to 2012 and 2013-2017.</p>	<p>Noted and agreed with the response.</p>
<p>LVSWSB, however, involved KIWASCO as a key stakeholder during planning and implementation of sewerage works done under LTAP-3. Interviews with KIWASC staff as well as review of minutes revealed that KIWASCO was actively involved during planning and implementation of LTAP-3</p>	<p>Agreed.</p>	<p>The Office agrees with the comments.</p>
<p>The sewerage developed under LTAP-3 has not been able to adequately address sewerage needs for Kisumu City mainly due to the shortcomings during needs identification. Our visit to Kisat waste water treatment plant revealed that the capacity of the plant and its sewerage network was expanded from the initial 6800 m³/day to 9000 m³/day under LTAP-3, but the inlet was left at the initial capacity of 6800 m³/day. As such the plant can only take in a maximum of 6800 m³/day yet it has a higher capacity.</p>	<p>Not Agreed. Kisat conventional sewerage plant is comprised of two inlets:</p> <ul style="list-style-type: none"> • The gravity flow inlet pipe of diameter DN 600mm designed to deliver 6800m³/d of waste water • The pumping inlet diameter DN 250mm designed to deliver 3000m³/d of waste water <p>Therefore, the plant can handle up to 9800m³/d of waste water</p>	<p>Our finding remains as reported. However, the Office will do a follow-up to establish the effectiveness and sustainability of the inlets works.</p>

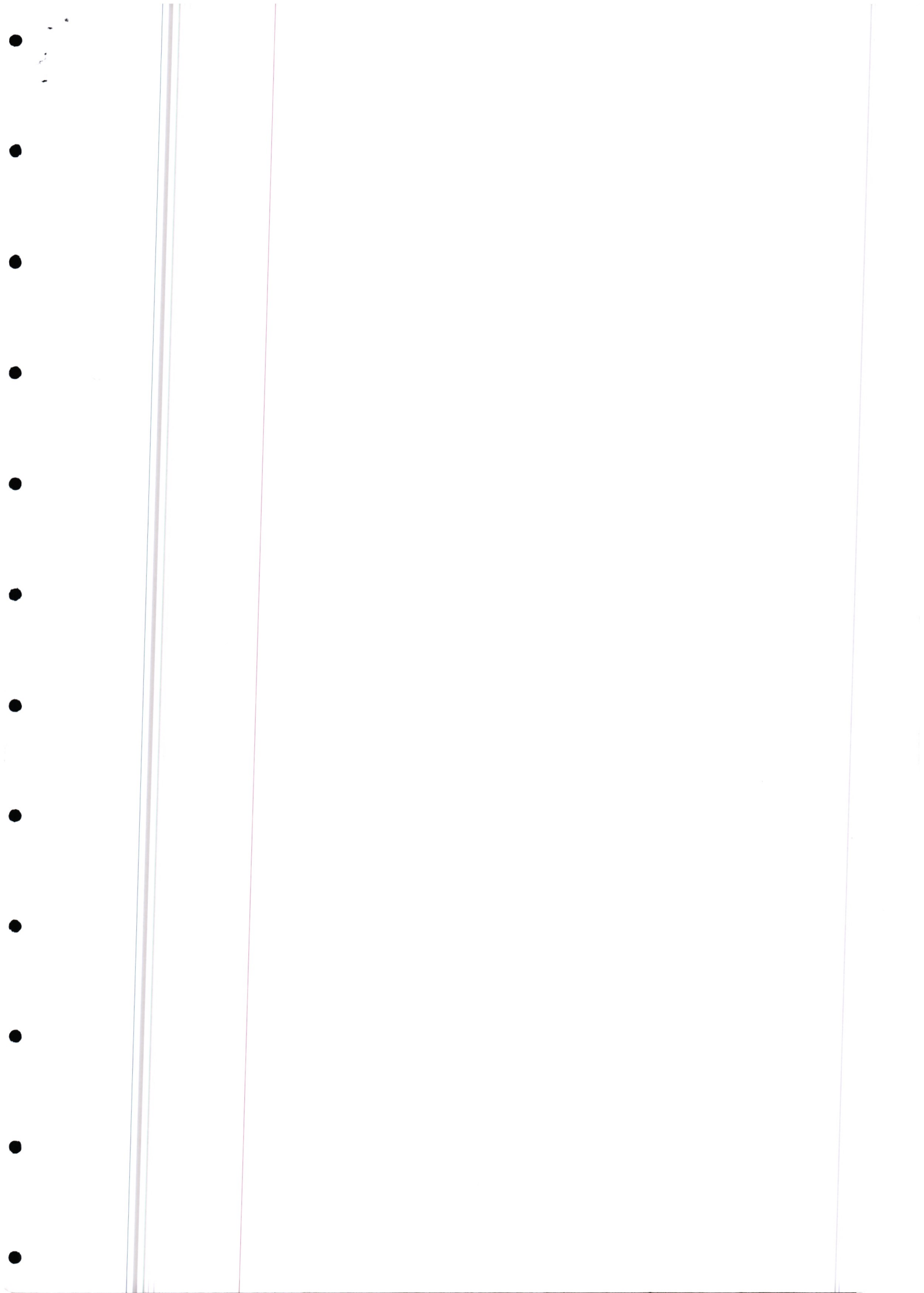
<p>Interactions with KIWASCO revealed that LTAP-3 should have included Lower Migosi in its scope since the situation of the sewer system in this estate is bad compared to other middle income estates in the city. This was confirmed through our visit to Lower Migosi estate.</p>	<p>Lower Migosi had pressing need for sewerage rehabilitation as reported by KIWASCO just like Upper Migosi and most areas in Kisumu city. Lower Migosi was not included in scope of LTAP 3 because of budget constraints. It will be given due consideration under the LVWATSAN programme intended to expand sewer networks in Kisumu city which include the construction of a new sewerage plant at Otonglo.</p>	<p>Our finding remains as reported. However, the Office acknowledges the efforts being made by LVSWSB to expand network coverage in the future.</p>
<p>Poor planning and abandonment by the LVSWSB has seen houses constructed on top of sewer lines while other lines are totally blocked to pave way for construction of residential houses. As at the time of the audit, the sewer network in this estate was considered dead.</p>	<p>Not Agreed. Town planning is not a prerogative of LVSWSB neither the approvals for any constructions of residential houses. The operation and maintenance of any existing sewer lines (including unblocking sewer lines) is the responsibility of KIWASCO. In the event any resident of Kisumu blocked a sewer line to pave way for the construction of residential houses, then KIWASCO should have instituted the necessary legal measures as provided in the SPA article 4.1b(v).</p>	<p>The office agrees that town planning and approvals of constructions is not within LVSWSB's mandate. However, as 'owners' of the asset, LVSWSB would be expected to take action to save the situation where KIWASCO is unable to perform.</p>
<p>II. Delays in implementation of sewerage projects</p>		
<p>Sewerage rehabilitation and expansion works undertaken by LVSWSB under LTAP-3 took longer than its planned completion dates. The project recorded significant delays of up to two (2) years. Implementation delays was mainly attributed to contractor's inadequate performance and wayleave challenges as outlined in Table 4 of this report.</p>	<p>Agreed. The project recorded significant delays that were beyond the control of LVSWSB. The delays were for the following reasons:</p> <ul style="list-style-type: none"> • Wayleave challenges: It was not envisaged that the Municipal Council of Kisumu will demand payment for every meter of pipeline to be laid by the contractor since sewer is a public facility required by all residents of Kisumu. The Council also delayed to grant authority even after paying for wayleave • Contractor's performance: The contractor failed to maintain the desired progress as planned, even though he was also bogged hindered by other factors such as delay in approval of wayleaves • Land acquisition: The acquisition of land for Tom Mboya Pump Station delayed due to long time required to amicably negotiate a reasonable settlement 	<p>It is the opinion of the Office that LVSWSB needs to consider acquiring the way leaves before commencing projects, to avoid delays by starting the processes early.</p> <p>Further, LVSWSB needs to engage other stakeholders like the Ministry of Interior and Coordination and County Government to handle wayleave issues</p>

<p>The delays might lead to project cost escalations or reductions in scope of works to fit within the budget. While, LVSWSB claimed to have made savings of up to 13.9% in the implementation of LTAP- 3 as presented in the Substantial Completion Report, a review of the same report revealed that the initial scope of works was significantly reduced. Therefore, the savings reported may be misleading since the estimated value at final completion of Ksh. 1,225,152,470.71 is for the reduced scope while the contract price of Ksh. 1,419,578,925.55 is for the initial scope before reductions.</p>	<p>Not Agreed. The reduction in scope of work was not due to the slow progress of the contractor but overall budgetary constraints within the project. The difference between the original contract price (KES 1,419,578,925.55) and the final contract price (KES 1,225,152,470.71) is KES 194,426,454.84 representing 13.90% of the contract price is equivalent to value of the works which were deferred in package 3 in order to finance the increased scope of works (variations) encountered in packages 1 and 2. The correct position is that there was no savings made on LTAP-3.</p>	<p>Our finding remains as reported. However, some causes of unsatisfactory performance are operational and require system reform and not necessarily additional funds for improvement to be realized.</p>
<p>III. Some of the Sewerage facilities developed by AWSB are based on inappropriate technology, making them uneconomical to operate</p>		
<p>According to Section 53 (1) of the Water Act, 2002, WSBs should not only endeavour to make water services, which include both water supply and sewerage, efficient but also economical. To achieve this, WSBs should use appropriate technology to deliver sewerage which is economical to operate and maintain.</p> <p>The audit revealed that some of the sewerage facilities developed by LVSWSB were based on inappropriate technology for Kenya. Though very efficient in treating sewage, the mechanized treatment plants are energy intensive and have previously been abandoned by the KIWASCO due to high operation and maintenance costs.</p>	<p>Not Agreed. LVSWSB only rehabilitated the Kisat conventional sewerage plant and the sewer network to optimise its operations while Nyalenda ponds was rehabilitated and expanded to optimise its operations and increase its capacity. There was no change of technology as these were the most cost effective/feasible solutions. LVSWSB consulted two internationally experienced and competent firms to carry out feasibility study for improvement of waste water management in Kisumu. Both consultants recommended rehabilitation and not modification of the technology. It was confirmed that the reason why the two systems had collapsed was due to 'neglect' by the management under the municipal council of Kisumu.</p>	<p>Our finding remains as reported.</p> <p>However, to ensure that the resultant sewerage facilities are cost effective, LVSWSB should consider ensuring that the mechanised treatment plants and pump stations are based on technologies and materials that are locally accessible and less energy intensive to encourage self reliance and avoid 'neglect'.</p>

<p>Under LTAP-3, LVSWSB has rehabilitated Kisat Sewerage Treatment Works, which is a fully mechanised conventional plant with 10 pumps out of which seven (7) are operational and three (3) are on standby. Documents availed to the audit team revealed that the energy consumption of the plant increased by 52.82% from an average of 7447.67 KWh during the period October-December, 2013 to 11382 KWh during the period October-December, 2014 as illustrated in Fig. 4 of the main report. The team was informed that KIWASCO is considering harnessing biogas from the plant to partially take care of the plant's energy needs.</p>	<p>Agreed. The apparent increase in energy cost is explained by the fact that before rehabilitation the plant was stalled hence did not use much energy. After rehabilitation, the system required energy in order to efficiently treat the waste water to the required standards.</p> <p>The harnessing of biogas from the plant by KIWASCO is welcomed and should proceed to provide alternative energy source to run the facility.</p>	<p>The audit finding remain as reported.</p> <p>However, the office will do a follow-up to establish the sustainability of harnessing methane gas for production of energy for KIsat treatment works to be used during operations of the plants so as to cut down the cost on energy consumption.</p>
<p>LVSWSB has rehabilitated one pump station (Kendu Lane Pump Station) and constructed three new pump stations (Mumias, Sunset and Tom Mboya pump stations) under LTAP-3. The pump stations are equally based on electromechanical technology and are thus expensive to operate. Besides, the maintenance of such facilities is usually hampered by the high cost of spare parts on one hand and non-availability of the same on the other.</p>	<p>Not Agreed. Due to the topography the only method available to deliver waste water from low lying areas is through pumping (electromechanical technology). The concerns on high cost of spare parts and non-availability of spare parts is unsubstantiated.</p> <p>Kendu Lane pump station had not been rehabilitated during the audit but was part of the ongoing works as per the programme of works. At the completion of the works the pump station was fully operational. Since the completion of works Kendu Lane Pump station is still operational and has not been abandoned.</p>	<p>Our finding remains as reported. However, some causes of unsatisfactory performance of the pumping stations are operational and require system reform and not necessarily additional funds for improvement to be realised.</p>
<p>KIWASCO is likely to incur high costs in operating and maintaining these facilities, which might lead to their abandonment. During our field work in December, 2015, the team observed Kendu Lane pump station was in poor state of maintenance, despite recent rehabilitation works. The pump station looked neglected with sewage flowing through a trench back to the environment. The situation was the same during our earlier visit in April 2015, but the pump operator blamed it on electrical power blackout during the time of our visit.</p>	<p>Not Agreed. LVSWSB has a SPA in force with KIWASCO that is binding. Under article 4.2b (iii), KIWASCO is obliged "To maintain the assets in good working order and to dispose of any asset without the authorisation of the licensee"</p> <p>KIWASCO has proposed to generate biogas as an energy source to run the pumps)</p>	<p>Although the SPA appears to fully delegate repairs and maintenance to the KIWASCO, it would ordinarily be expected that as 'owners' of the assets, AWBSB must take action to save the situation where it has been shown that the KIWASCO is unable to carry out the repair or maintenance.</p> <p>The 'owners' of the assets should therefore provide the necessary correspondence for repairs as required by Article 10 of the SPA.</p>
<p>The use of inappropriate technology may be attributed to the fact that LVSWSB failed to consider local opportunities for technology and materials access while designing, developing and implementing the infrastructure projects.</p>	<p>Not Agreed. The use of electromechanical technology was supported by the feasibility studies already undertaken. LVSWSB never failed to consider local opportunities for technology and material access.</p>	<p>LVSWSB did not avail evidence to show they considered local opportunities for materials and technology while designing, developing and implementing the projects</p>

<p>IV. The existing sewerage has not been well maintained</p>		
<p>LVSWSB has classified maintenance activities into two: major maintenance done by the board; and minor maintenance done by the service providers. The audit, however, revealed that the sewerage has not been well maintained.</p>	<p>Not agreed. WASREB has classified maintenance activities as outlined in article 16 of the Service Provision Agreement. The operation and maintenance of the sewerage is the responsibility of the water service provider. The role of the Board is to ensure that the water service providers maintain the water and sewerage infrastructure.</p>	<p>The Office agrees with the comments.</p>
<p>The team observed instances of inadequate maintenance of sewerage in Kisumu. It was observed that solid waste including plastics pass through Nyalenda ponds inlet screens/filters into the stabilization ponds. It was also noted that the main sewer line taking sewage to the Nyalenda ponds was cracked and no evidence was provided that it has been documented for maintenance purposes</p>	<p>Agreed. It is possible that instances of inadequate maintenance of the sewerage infrastructure could have occurred. However, the instances mentioned are not absolutely due to inadequate maintenance: -The screen at the inlet of Nyalenda stabilization ponds is developed such that it can allow small objects including plastics into the pond. If the screen filters everything, then no sewage will pass into the pond due to constant blockage -The cracked sewer main leading to Nyalenda ponds is a concrete sewer line constructed in 1978. LVSWSB had implemented a parallel and bigger sewer main of steel pipe to gradually replace the old concrete sewer line.</p>	<p>The auditee agrees with our finding .</p>
<p>Observations revealed that major sewer manhole in Bishop Abiero Secondary School in Shaurimoyo estate was constantly overflowing, but KIWASCO did not address the situation, despite the school's complaints. This poses a risk to the environment and health of the school community.</p>	<p>Agreed. The spillage in a manhole at Bishop Abiero Secondary School was due to the under-capacity of the sewer network downstream of the school resulting into constant back-flow. The problem has been solved after the rehabilitation and augmentation of the sewer network under LTAP-3.</p>	<p>Our finding remains as reported. However, the Office will do a follow-up to establish whether the problem has been dealt with.</p>
<p>It was further observed that Kendu Lane pump station has continuously failed to operate. On enquiry, KIWASCO staff claimed that the station was connected to a low power supply that has continuously failed to run the system. As a result, waste water overflows at the station, ending up in the storm drains adjacent to it and eventually to Lake Victoria.</p>	<p>Agreed. Kendu Lane station is an old pumping station which used to operate well when the population density in lower Milimani was low. After rehabilitation and expansion works which has been completed by LVSWSB, the station is now operating properly due to bigger and extended pumps.</p>	<p>Our finding remains as reported. However, the Office will do a follow-up to establish whether the problem has been dealt with.</p>

<p>As a result of inadequate maintenance, the treated sewage being discharged back to the environment from the treatment plant does not meet NEMA recommended quality standards as measured by Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS). The team was only provided with quality analysis reports covering only July, 2014 to March 2015 for both Nyalenda and Kisat treatment works. It was, however, revealed from the analysis that the quality of effluents for Kisat during the reported period was within NEMA effluent standards. This was attributed to the recent rehabilitation of the plant.</p>	<p>Agreed. The objective of the rehabilitation and expansion of sewerage project was to ensure that sewerage from the City is collected and properly treated to acceptable standard before discharging into the environment.</p>	<p>The LVSWSB agrees with our finding.</p>
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