

East African Public Health Laboratory Networking Project (EAPHLNP)



**NATIONAL PUBLIC
HEALTH LABORATORY
SERVICES**



**A Division of The Ministry
of Health**

Initial Environmental & Social Audit Study Report

**Regional Public Health
Laboratory**

Located in Busia Town



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ACRONYMS AND ABBREVIATIONS

dB “A”	-Decibels “A” weighted
EA	-Environmental Audit
EAPHLNP	-East Africa Public Health Laboratory Networking Project
EIA	-Environmental Impact Assessment
EMCA	-Environmental Management and Cordination Act
ESIA	-Environmental and Social Impact Assessment
ESMF	-Environmental and Social Management Framework
ESMP	-Environmental and Social Management Plan
HCWMP	-Health Care Waste Management Plan
KEBS	-Kenya Bureau of Standards
Mg/L	-Milligrams per Litre
MSDS	-Material Safety Data Sheets
NEMA	-National Environment Management Authority
PM	-Perculate Matter
STDS	-Standards
VMPP	-Vulnerable and Marginalized Peoples Plans
VOCs	-Volatile Organic Compounds
WHO	-World Health Organisation

EXECUTIVE SUMMARY

Introduction

The Government of Kenya received funding from the World Bank to strengthen laboratories in Kenya. Part of the credit was used to construct the Regional Public Health Laboratory at Busia Town. The project was designed to expand access to high quality, reliable and timely laboratory services. This laboratory project required an Environmental Audit in compliance with the World Bank Environmental and Social Safeguards and the Environmental Management and Coordination Act Cap 387 requirements.

The purpose of the Environmental Audit Study at the National Public Health Laboratory Services Laboratory in Busia was to assess whether there are significant environmental and social impacts or sensitive and fragile habitats at the sites; and to prepare an Environmental Audit (EA) Report on the potential environmental consequences of structures on the environment, and socio-economic impact of the operationalization of the expanded public health laboratory.

Project location

The National Public Health Laboratory Service Project is located in Busia town, Busia County. The County is located on the Western part of Kenya and it borders Bungoma County to the north, Kakamega County to the east and Siaya County to the south west. Part of Lake Victoria is in the County on the South East and borders the Lake with the Republic of Uganda to the west.

Busia County covers an area of 1,694.5 km² with 10 divisions, 60 locations and 181 sub-locations based on the previous administrative arrangement. Since 2010, there are new administrative units covering the same area in form of sub-counties numbering 7 and 35 wards. The seven administrative Sub-counties include; Funyula, Budalang'i, Butula, Matayos, Nambale, Teso North and Teso South. The laboratory is located in Busia Town, Busia County, off Kisumu-Busia Road at the Busia County Referral hospital as shown in the map below at Latitude 0.4589212 North and Longitude 34.0925508 East.

Baseline Conditions

The altitude in Busia County is undulating and rises from about 1,130m above sea level at the shores of Lake Victoria to a maximum of about 1,500m in the Samia and North Teso Hills. Busia County receives an annual rainfall of between 760mm and 2000 mm. The annual mean maximum temperatures range between 26°C and 30°C while the mean minimum temperature range between 14°C and 22 °C.

The rocks around samia hills consist of acid and sub-acid lavas, tuffs, and agglomerates, banded quartzite and iron stones. The Kavirondo series rocks are developed around Busia, Nambale and Butula while the granites dominate the northern parts of the County. The soils in the County are moderately deep, generally rocky and stony consisting of well-drained red clays which have a low natural fertility.

All headquarters for the seven sub-counties in Busia County have operational water supply schemes including the major urban centers such as Sio Water Supply for Busia town and its environs and the Bunyala Supply Scheme for Port Victoria town. The County is served by rivers Malakisi to the extreme north, Malaba in the northern entry of the central region and River Sio in Funyula and Nambale Sub-counties. Malaba and Malakisi Rivers, whose source is Mt. Elgon traverses the county through the Teso Sub-county.

There are 237 springs, 458 shallow wells and 154 boreholes. The quality of water from rivers, streams, water vendors and unprotected springs is poor due to environmental degradation and pollution. The average distance covered to get access to a watering point is approximately 1.5 km.

Poor domestic waste disposal poses a great challenge to the environment in the county occasioned by lack of designated dumpsite in major market centers, lack of sewer system in urban centers except Busia town in which it serves a section of the town. According to the census of County population of 2009, about 70 percent had access to latrines while 30 per cent use the bush for ablution. Busia town is the only area with a modern sewage system. The County is yet to attain adequate and quality sanitation services. Busia County poverty level is at 64.2 per cent compared to national poverty level of 45.9 per cent. The rate of unemployment in the county is estimated at 70 per cent. Approximately 70 per cent of the labor force is engaged in family farms 29 per cent are distributed over other economic activities such as fishing, trading and employment in the formal and informal sectors, while about one (1) per cent is in blue collar jobs.

Legal and policy compliance

The relevant legal and policy requirements that were considered during the environmental audit study of the laboratory facility were the EMCA Cap 387 and the World Bank Environmental and Social Safeguards. An Environmental and Social Impact Assessment (ESIA) for the individual laboratory project was conducted in 2012 and the said report was disclosed to the public and stakeholders. There was public participation and consultation for the project as part of the Social Impact Assessment and Vulnerable and Marginalized Peoples Plans requirements. The environmental impact assessment license was obtained on 29th May, 2013 and was made available during the Audit. It is therefore safe to conclude that the project achieved substantial legal and policy compliance.

Methodology

The Initial Environmental Audit Study for the Public Health Laboratory in Busia Town was conducted using various methods and sources, including ; the review of literature and policies, review of project designs, site visit inspections, interviews and public consultations with key stakeholders including public health officials, medical and laboratory personnel, community representatives using a structured audit questionnaire. Sampling and testing of water and measurements of air quality and noise levels at the laboratory was conducted too.

Findings

Socio-economic

- The laboratory serves a large community within Busia County and from across the Border of Uganda as well. The beneficiaries access the facility from Busia, Bulanda, Nambale, Mundika, Burumba, Angorom and Uganda side
- The Laboratory serves several ethnic communities including the Luhya ethnic community which constituted the highest percentage 58.6 (34) of respondents followed by the Luo and Teso respectively. Others were Kikuyu and Kisii ethnic communities, while the lowest percentage of 1.7 (1) was among the Karamoja and Gurreh
- Vulnerable groups such as children brought by their mothers and elderly patients indicated that they were given priority when queuing for laboratory services. Some of the services were reported to be offered for free such as TB tests.
- Some of the laboratory tests done at the facility include: Blood tests for Malaria, Sputum tests for TB, Urinalysis, Stool tests for water-borne infections, among others.
- Most 47(81%) of the respondents from the local community indicated that the cost service provision at the laboratory was affordable
- Most 42(72%) of the respondents indicated that the duration of laboratory services took more than one hour. This could be due to the fact that some of the tests conducted at the laboratory require time for processing such as culturing.
- There was indication that the laboratory tests for TB was free and that children were given special consideration.

Health and safety

- The Laboratory has established standard operating procedures which are posted on the notice boards at the workplace and a copy to be issued to workers after it is signed by the Laboratory Manager
- The Material Safety Data Sheets (MSDSs) for substances are available at the workplace; hence, the level of safety awareness among the workers on the safe handling of hazardous substances and emergency procedures is good.
- The emergency procedures in place are designed for handling emergencies likely within the scope of Occupier's business such as fire/explosion, spillages and splashes. The Occupier's fire prevention system comprises of water hydrants, water storage tanks, hose reels, and portable fire extinguishers (CO₂, dry powder, foam) mounted at various points at the facility. These appliances are serviced two times in a year by suppliers.
- It was confirmed that the smoke and fire detectors had been tested and were therefore found to be in good condition.
- There was awareness on the fire risks associated with emergencies among the laboratory staff which also ensures high level of risk preparedness and response status. There is provision for emergency eyewash unit at the facility as well.

Environmental Management

- Whereas the laboratory is located within Busia Town which has no sensitive ecosystems, some trees such as cypress and spathodea were cleared during construction to pave way for the laboratory. The loss of vegetation affects the ambient environment and the regulatory services derived from them
- The results of measurement indicate that the noise levels at the Laboratory and surrounding area are within the limit and therefore the noise from laboratory operations does not impact negatively to the environment
- The project safety and health procedures were emphasized during the project construction phase as evidenced in the project minutes of 19th March, 2013, these include; the need for Personal Protective Equipment, first aid kit and safety officer to be on site.
- The laboratory facility generates hazardous medical and general wastes. The wastes were segregated into black, yellow and red heavy polythene bags as

per the waste management regulations and were collected and central point for transportation to the burning chamber within the hospital facility

- It was observed that during the operation phase of the laboratory, the facility was still using an old incinerator for the disposal of medical waste whose opacity was high.
- The new incinerator had been installed at the time of the Audit and was scheduled for commissioning.

Recommendations

- Address the concerns of target beneficiaries such as putting in place measures to reduce the time it takes in the obtaining of services at the laboratory.
- As a precaution, there is need to control any new sources of noise and vibration, maintain appliances and machinery and provide appropriate PPEs to staff.
- There is need to improve on emergency preparedness by conducting fire drills, servicing appliances such as the eyewash unit and train the staff on its use.
- There is need for landscaping and tree planting to compensate and ameliorate for the impacts due to the construction phase of the project.
- Ensure that the preventive environmental management plan and the corrective action plans are followed during the installation and operation of the new incinerator.
- Implement corrective actions for medical waste management
- Implement corrective actions for improved drainage, plumbing, roofing and aesthetics of the facility.
- Prepare an environmental policy and sustainability plan for institutionalized environmental protection

1. INTRODUCTION

1.1 Background

The Government of Kenya received funding from the World Bank to strengthen laboratories in Kenya. Part of the credit was used to construct the Regional Public Health Laboratory at Busia Town. The project was designed to expand access to high quality, reliable and timely laboratory services. This laboratory project therefore required an Environmental Audit in compliance with the World Bank Environmental and Social Safeguards and the Environmental Management and Coordination Act Cap 387 requirements.

1.2 Justification and scope

Since the ESIA/ESMPs were prepared in 2012 prior to construction, there was need for carrying out an Environmental and Social Audit (EA) in order to ensure that there was due diligence in the application of safeguards during the project cycle and to plan for mitigating and/or addressing any potential adverse risks during the operational phase.

An Environmental Audit was therefore required for systematic documentation, and objective determination and evaluation of the environmental and social liabilities of the laboratory operations in full compliance with the World Bank Safeguard policies including the ESMF, ESIA, HCWMP, VMGF that were prepared and recently disclosed in-country and at the World Bank's InfoShop. The Environmental Audit purposes to indicate the level of compliance with Environmental, Health and Safety Guidelines with the objective of protecting the health of workers and the general public living in the area as well as to protect the bio-physical and social environment.

The scope of the Environmental Audit covered the project cycle and activities related to public health laboratory in Busia under the East Africa Public Health Laboratory Networking Project (EAPHLNP) as well as the operationalization of the waste management plan for the said health institutions supported at the satellite laboratories by the EAPHLN project.

1.3 Audit Objectives

The primary objective of the consultancy was to undertake an Environmental Audit (EA) of the Laboratory in Busia Town under the EAPHLNP in order to ensure compliance with:

- (i) The EMCA, Cap 387 and EIA and Audit Regulations, 2003; and
- (ii) World Bank's Operational Policy on Environmental and Social Safeguards.

The Environmental Audit aimed at determining how far the activities that relate to the implementation as well as operation of the laboratory have complied with the ESIA's, ESMPs, HCWMP, VMGF and sound Environmental Health and Safety management practices of the World Bank and requirements under national laws and regulations.

The audit was necessary to ensure that the safeguard instruments have been implemented appropriately, and that relevant mitigation measures have also been identified and implemented.

The Audit identified corrective actions to be effected to the safeguard instruments to improve their implementation effectiveness. The key objective of the Environmental Audit was to identify gaps in Environmental Management measures and to prepare an Action Plan that will be implemented during the rest of the project period and operations of the facility.

1.4 Terms of Reference

The purpose of the Environmental audit study at the NPHLS Laboratory in Busia Town was to assess whether there are significant environmental and social impacts or sensitive and fragile habitats at the sites; and to prepare an environmental audit report on the potential environmental consequences of structures on the environment, and socio-economic impact of the operationalization of the expanded public health laboratory.

The overall objective of the consultancy required an Initial Environmental Audit Study as provided for under the EIA/EA Regulations, 2003 given that this is the first and main Environmental Audit. The objective required compliance to the Environmental Management and Coordination (Amendment) Act 2015 and EMCA, Cap 387 while giving adequate background information, consultant's tasks and activities and the general guidelines, methodology and expected outputs.

1.5 Scope of work

The following is the scope of work:

Review and Gap Analysis

- To review the environmental legal and regulatory requirements applicable to the laboratory project;
- To determine on-the-ground compliance to these requirements, and identify gaps;
- Verify the levels of compliance by the project during construction and with the conditions of the ESMF, ESIA, ESMP, HCWMP, VMGF, and identify gaps;
- To review the Environmental Management practices being implemented both from the point of view of adequacy as well as effectiveness, and identify gaps;
- Determine the magnitude of the predicted impacts of the projects on various physical and social parameters at the project sites and compliance monitoring;
- Determine the extent to which expected benefits of the project has been realized for the stakeholders, community, and the environmental components;
- To review the environmental monitoring, planned and being done to ensure the necessary verification of the effectiveness of implementation, and identify gaps;
- To review the staff/human and other resources capacity available to implement environmental management practices, and identify gaps;
- To review the earlier stakeholder/public consultations done in order to determine the issues relevant to the Environmental Audit;
- To consult key stakeholders which include the hospital and laboratory officials, contractors and consultants, immediate neighbouring communities during the audit; and
- To assess the major environmental non-compliance issues and challenges.

Based on the review and gap analysis carried out above, the consultant:

- Identified the specific environmental management measures and corrective actions that are required to be implemented during the rest of the project - completion of civil works stage and in the operation stage. These management measures include mitigation and remedial measures

- Identified specific environmental monitoring required during the implementation of safeguards instruments during the remaining phase of the project;
- Identified how the management and monitoring measures should be addressed in order for contractors to implement these measures;
- Assessed additional capacity and costs or budgetary requirements in order to conduct the additional management and monitoring measures; and
- Discussed findings of the environmental audit exercise with the relevant project authorities and county officials where the public health laboratory is located in order to find appropriate solutions locally.

1.6 Approach and Methodology

The Initial Environmental Audit Study for the Public Health Laboratory in Busia Town was conducted using various methods and sources, including ; review of literature and policies, site inspections, interviews and public consultations with key stakeholders including public health officials, medical and laboratory personnel, community representatives using a structured audit questionnaire. Sampling and testing of water, measurement of noise levels and air quality. Details of the approach and methodology used in the Audit are described below.

1.6.1 Literature review

The consultant reviewed the relevant literature and policies, legislations touching on Environmental and Social Safeguards both at International and local level. Specifically, the consultant reviewed;

- The World Bank Environmental and Social safeguard policies,
- National Health Care Policies and Plans,
- National Health Care Waste Management Plan;
- Legislation on Environmental Management and Coordination,
- Regulations on Waste management and Environmental Audit,
- Legislation on Public Health and
- Legislation and Regulations on Occupational Safety and Health

The purpose of literature review was to establish the level of compliance with the said safeguards, policies, plans, regulations and laws in order to recommend corrective measures and actions.

1.6.2 Review of Documents

The review of documentation involved a study of available documents on the project sites including; the project designs and layout plans.

An Environmental Impact Assessment for the project was conducted in January 2012 and the said report submitted to NEMA for purposes of obtaining an EIA License prior to the commencement of construction works. A Copy of the EIA license was however not available at the time of the Audit.

The client provided copies of minutes for the public participation and consultation conducted prior to the commencement of the construction works. Further to that, the consultant reviewed the project design outline and concepts and copies of the same are attached in Appendix 1 of this report. The consultant as well reviewed relevant environmental policies, standard operating procedures to establish how laboratory activities comply with these standard procedures and their level of deviation to inform corrective actions.

1.6.3 Site visit and inspections

A project site visit and assessment were conducted to evaluate the environmental and social benefits and risks associated with the construction and operations of the laboratory. This was done by observation of the project location and adjacent Land uses in the project area; predominant Flora, fauna and avifauna found on the site; the site landscape; drainage pattern within the neighborhood of the site and; the general environment and its sensitive receptors found within the environs of the site.

The laboratory facility was inspected by use of a predetermined checklist in order to ascertain the level of compliance with the waste management regulations and the waste management plan. A copy of the filled checklist is attached in Appendix 2 of this report.

Observation and photography were used too as means of evaluation and evidence gathering. Occupational safety and health aspects of the project were assessed by observation against a pre-designed checklist too. Ventilation and thermal effects in heating areas including the incinerators were considered too.

1.6.4 Sampling and measurements

The environmental aspects measured during the Audit included; emissions, dust, noise level, and water as briefly outlined below and overleaf.

a) Emissions measurements

The ambient air quality measurements within the facility were undertaken using a Dragger Tube Flue Gas Analyzer. The measurements were carried out by placing the probe within a reasonable distance from the source and directly reading the levels of the parameters on the tube. Sampling was done at four sampling points including at the source and three immediate neighbouring locations within 5, 15 and 30 meters from the site. The field measurements determined the concentration of;

- Carbon monoxide (CO),
- Carbon Dioxide (CO₂),
- Sulphur Dioxide (SO₂),
- Hydrocarbons Residuals (C_xH_y),
- Nitrogen oxides (NO_x).

b) Dust measurements

In order to measure particulate matter, Static dust samples (total dust) were taken on Millipore cellulose 0.08µm membrane filter by placing pre-weighed filters at a selected location for three to twenty minutes. Sampling was done at four sampling points including within the facility and three immediate neighbouring locations within 5, 15 and 30 meters from the site. A close supervision on the sampling instrument was done to make sure that the sampler operates as expected.

c) Noise level measurements

Measurements of noise levels was done by use of a precision integrating sound level meter type CR 262A S/No. B21122FA with an Omni-directional microphone. The instrument was calibrated using Bruel and Kjaer sound level calibrator type 4230 for sound level meter at 94 dB (A) and 1000 Hz. The calibration was meant to check the sensitivity of the instrument immediately before and after the measurement period. The meter measured the A-weighted noise level, which varies with the frequency and intensity like the sensitivity of the human ear.

The sound level meter was held at 1 meter from ground and L_{eq} (the continuous equivalent sound pressure level) sample measurements around the source of noise. The L_{eq} is

indicative of the 'average' noise level over a given period. Sampling was done at four sampling points including within the facility and three immediate neighbouring locations within 5, 15 and 30 meters from the benchmark point at the site.

d) Water quality

The consultant sampled water from the facility and transported them to the Lake Victoria South Water Services Board laboratory for testing. The test results were compared to the WHO and KEBS water quality standards in order to ascertain the level of adherence or deviation from the same and advice accordingly.

Water Sampling was done at 4 sampling points including the public toilet, hematology laboratory, staff lounge and the hospital borehole. The physical chemical parameters that tested in each sample included; P.H., color, turbidity, conductivity, calcium, magnesium, total hardness, total alkalinity fluoride, Iron, chloride, and total dissolved solids. The bacteriological parameters that were tested in each sample included; total coliforms and E. Coli colonies per 100 ml of water.

The testing the physical-chemical and the bacteriological parameters showed that all the test results were within the allowable limits as per the KEBS and WHO standards and therefore the water was safe for human consumption. Table 1:1 overleaf shows a summary of the water quality test results. Detailed water quality test results are attached in Appendix 3 of this report.

Table 1:1: Summary of Water Quality Test Results

Parameter	Units	Public Toilet	Hematology Laboratory	Staff Lounge	Hospital Borehole	WHO STDS	KEBS STDS	NEMA/EMCA
Physical-Chemical Test Results								
p.H	p. H Scale	6.8	6.9	7.0	6.8	6.5-8.5	6.5-8.5	6.5-8.5
Color	Mg Pt/L	0	0	0	0	Max 15	Max 15	~
Turbidity	N.T.U	0.46	0.67	0.51	0.58	Max 5	Max 5	~
Conductivity	μS/cm	346	247	247	231	Max 2000	Max 2000	~
Calcium	Mg/L	30.46	26.45	25.65	24.05	Max 250	Max 250	~
Magnesium	Mg/L	5.35	9.72	10.69	8.25	Max 100	Max 100	~
Total Hardness	MgCaCo ₃	98	106	108	94	Max 500	Max 500	~
Total Alkalinity	MgCaCo ₃	70	76	68	68	Max 500	Max 500	~
Fluoride	Mg/L	0.1	0.02	0.03	0	Max 1.5	Max 1.5	Max 1.5
Iron	Mg/L	0	0	0	0	Max 0.3	Max 0.3	~
Chloride	Mg/L	20	19	19	13	Max 250	Max 250	~
Total Dissolved Solids	Mg/L	123	124	124	115	Max 1500	Max 1200	Max 1200
Bacteriological Test Results								
Total Coliforms	Colonies/ 100ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil
E. coli	Colonies/ 100ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil

1.6.5 Consultations and interviews

Consultations and interviews with various stakeholders were carried out using a structured questionnaire to obtain relevant information from respondents. The target respondents were sampled from;

- The laboratory staff;
- County Executive officers in charge of Health;
- Occupational Safety officers;
- County Administrators;
- National Government Administrators;
- Project contractors, and
- Residents from the local community.

Purposive and Simple Random Sampling of 58 respondents for the laboratory facility at Busia was done. They included key informants from Busia District Referral Hospital and relevant institutions within Busia Town and from the community. A sample of 58 persons was interviewed. The sample size was dependent on the target population and said sample size was deemed to be representative across the different sample groups listed above. Sample questionnaires are attached in Appendix 4 of this report

1.6.6 Demographics of vulnerable populations

The vital demographic information of the county population in terms of its distribution by age, sex and projections up to the year 2017 is as per the 2009 Kenya Population and Housing Census statistics. Further to the gender and age cohort projections, population projections for selected age groups have a great bearing on the health sector investment decisions including the importance of vulnerable groups such as children, women and the aged population. The relationships of demographics and vulnerable groups in the county as far as the application of the Vulnerable and Marginalized Peoples Plans is presented in chapter 3 Caption 3.3.1 of this report.

1.7 Consultant's Eligibility

The National Public Health Laboratory contracted Mr. Kennedy Simiyu Wafula to offer consulting services for Environmental Audit of already constructed public health laboratory in Busia Town. As required by Regulation 14 of the EIA/Audit Regulations, Mr. Kennedy Simiyu Wafula is registered and licensed by NEMA as a Lead Expert in Environmental Impact Assessment and Audit and is therefore authorized to undertake the Environmental and Social Audit study. Appendix 5 of this Report contains a copy of his Registration Certificate with NEMA and Practicing License for the year 2017. Table 1:2 below and

Table 1:3 overleaf show the Environmental and Social Audit Study team composition and their qualifications.

Table 1:2: Structure and composition of the Audit Team

Name	Position	Task
Kennedy Simiyu Wafula	Lead Consultant and Senior Environmental and social safeguards Specialist	<ul style="list-style-type: none"> ▪ Coordinated all tasks of the Environmental Audit through communication; Site visits, Environmental health and safety inspections, reporting, and outputs. ▪ Assessed the environmental, safety and health issues related to construction and operation of the laboratory facilities and develop corrective measures for negative impacts. ▪ Coordinated the sampling and measurements of emissions, dust, noise and water ▪ Compiled the Final Environmental Audit Study report
Seth Odera Omondi	Deputy Environmental and Social Safeguards Expert	<ul style="list-style-type: none"> ▪ Gave an analysis of adverse effects on environmental, social, health and safety aspects and gave practical suggestions on how this can be mitigated. ▪ Provided an analysis and evaluation of the social and policy considerations of the project construction and operation aspects. ▪ Assisted in reviewing the draft reports, incorporating clients' comments and proof reading the final output.
Lawrence Wachira	Assistant Environmental and Social Safeguards Expert	<ul style="list-style-type: none"> ▪ Assisted in data collection on environmental and social aspects and give practical suggestions on how this can be mitigated. ▪ Provided an analysis and evaluation of the social and policy considerations of the project construction and operation aspects
Albert Muriuki	Occupational Hygiene expert	<ul style="list-style-type: none"> ▪ Assisted in data collection on occupational health and safety aspects and give practical suggestions on how this can be mitigated. ▪ Provided an analysis and evaluation of the safety and health considerations of the project

		construction and operation
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Table 1:3: Support Staff

Name	Position	Task
Brian Ondieki	Field Assistant	<ul style="list-style-type: none"> ▪ Assisted in data collection ▪ Assisted in data entry and analysis ▪ Assisted in Documentation
Florence Mnyazi	Field Assistant	<ul style="list-style-type: none"> ▪ Assisted in data collection ▪ Assisted in data entry ▪ Assisted in data analysis

1.8 Outline of the report

This Initial Environmental Audit Study report assesses compliance of the project proponent and documents the field findings that include a summary, key audit findings and an environmental and social action plan. The Environmental Audit Report contains;

- Executive Summary-Key Audit Findings and Recommendations;
- Chapter One -Introduction, Scope and Methodology;
- Chapter Two -The description of the project footprint;
- Chapter three- The Baseline Environmental and social conditions;
- Chapter Four- Policy, Legal and Administrative framework;
- Chapter Five -The findings;
- Chapter Six-Public Participation and Consultation;
- Chapter Seven- Mitigation and Corrective Actions;
- Chapter Eight- Conclusion and Recommendations; and
- Appendices- Consultants Licenses, questionnaires and Test Results, List of Respondents

2. PROJECT DESCRIPTION AND FOOTPRINT

2.1 Introduction

The Government of Kenya through the Ministry of Health under the Regional East Africa Public Health Laboratory Networking Project (EAPHLNP) received funding from the International Development Agency/the World Bank to strengthen laboratories in Kenya. The development objective of the regional project was to establish a network of efficient, high quality, accessible public health laboratories for the diagnosis and surveillance of communicable and non-communicable diseases.

This regional project triggered OP/BP4.01 (Environmental Assessment) due to the construction of laboratories as well as the potential generation of medical waste at the completed laboratories. Thus, the project was assigned the Environmental Category B. Also, the Bank's Safeguard Policy on Indigenous Peoples (OP/BP4.10) was triggered premised on the assumption that the projects may affect vulnerable and marginalized communities.

In view of the triggering of these two Safeguard Policies, the regional EAPHLNP prepared an omnibus Environmental and Social Management Framework (ESMF) that included an Environmental and Social Management Plan (ESMP) for Kenya to ensure proper assessment and mitigation of potential adverse environmental and social impacts and risks. The ESMF outlined the steps in the environmental and social screening process, and included Environmental Guidelines for Contractors, a summary of the Bank's Safeguard Policies, an Environmental and Social Checklist, Generic Environmental Assessment (EA), Terms of Reference to be applied in the event that the screening results indicate the need for site-specific ESIA reports and Environmental and Social Management Plans (ESMPs).

Part of the World Bank credit to the Government of Kenya under the EAPHLNP was used to construct the regional public health laboratory at Busia Town. Other key units participating in and benefiting from the project include the Disease Surveillance and Response Unit and Tuberculosis and Malaria Programs. The Kenya Medical Supplies Agency and Kenya Medical Research Institute are also implementing the supply chain management and research components respectively.

In Kenya, an elaborate Vulnerable and Marginalized Peoples Plans (VMPP) was prepared, consulted upon and disclosed. Also the Kenya project adopted a National Health Care Waste

Management Plan (HCWMP), and carried out site-specific Environmental and Social Impact Assessment (ESIA) studies for each of the project sites. These have been consulted upon, approved by the National Environmental Management Authority (NEMA) and disclosed in-country and in the World Bank Info shop much later when most of the construction had either started or completed

2.2 Location

The National Public Health Laboratory Project is located in five towns including Busia County, Busia Town. The County is situated at the extreme western region of Kenya and it borders Bungoma County to the north, Kakamega County to the east and Siaya County to the south west. Part of Lake Victoria is in the County on the South East and borders the Lake with the Republic of Uganda to the west.

The new laboratory is located in Busia Town, Busia County, off Kisumu-Busia Road at the Busia County Referral hospital as shown in the map below at Latitude 0.4589212 North and Longitude 34.0925508 East.



Figure 1: Location of the Laboratory at Busia County Referral Hospital

Source: Google maps 2017

2.3 Project Design Outline

The project designs are presented in Appendix 1 of this report. The design outline of the laboratory has the following components: The Ground Floor comprises of the waiting area, toilets; Board Room; Administration Offices; LIMS office; Staff Lounge; Donor Counselling Room; Drug stores and Cleaners Stores

The First Floor comprises of the Chemistry/Serology/Hematology laboratories; Microbiology laboratories; Parasitology Laboratories; Glass ware washing and decontamination room and PCRI Room. The Other key design components include; roofing, firefighting system, sewerage system; water reticulation system; an incinerator; Public Toilets, and Fire assembly point.

2.4 Project construction activities

2.4.1 Site Investigations

The implementation of the project's design and construction phase was done thorough investigation of the site bio-physical characteristics in order to enhance the integrity of the structures and minimize any unforeseen adverse impacts during the project cycle.

2.4.2 Material sourcing

Construction materials were sourced from NEMA approved sites within Busia County and neighbouring areas and transported to the project site using transport trucks. Greater emphasis was laid on procurement of building materials from NEMA licensed suppliers within the local area, which made both economic and environmental sense as it reduced negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles.

2.4.3 Storage of materials

Building materials were stored on site. Bulky materials such as rough stones, ballast, sand and steel were carefully arranged and organized on site. To avoid piling large quantities of materials on site, the contractor procured materials such as sand, gravel and stones in bits. Materials such as cement, paints and glasses among others were stored in specific structures within the project site for this purpose.

2.4.4 Earthworks and spoil management

The soils in the project area are moderately deep, generally rocky and stony consisting of well-drained red clays which have a low natural fertility. The spoil materials and soils were excavated and transported to NEMA approved disposal sites within Busia County. Excavation was carried out to prepare the site for construction of foundations, pavements and drainage systems which involved the use of earthmoving machinery. The useful materials were temporarily stored within a holding area and used as backfill material within the site.

2.4.5 Concrete works

The construction of the building walls, foundations, floors, pavements, drainage systems and the Incinerator unit among other components of the project involved a lot of masonry work and related activities. General masonry and related activities include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are labor intensive and were supplemented by machinery such as concrete mixers.

2.4.6 Steel works

The laboratory and the incinerator buildings were reinforced with structural steel for stability which involved steel cutting, welding and erection.

2.4.7 Roofing

Roofing activities included sheet metal cutting, raising the roofing materials such as iron sheets and structural timber to the roof and fastening the roofing materials.

2.4.8 Electrical works

Electrical work during construction of the premises included installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there were other activities involving the use of electricity such as welding and metal cutting. Qualified electricians were used as well as PPEs were worn to ensure safety measures are adhered to in line with electrical safety rules

2.4.9 Plumbing

Installation of pipe-work for water and sanitation was carried out within the laboratory and associated facilities. In addition, pipe-work was done to connect sewage from the premises to the existing sewerage system, and for drainage of storm water from the rooftop into the

peripheral storm water drainage system. Plumbing activities also include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others.

2.4.10 Landscaping

To improve the aesthetic value or visual quality of the site once construction ceases, the contractor was required to carry out landscaping. This includes establishment of flower gardens and lush grass lawns and replenishment of the topsoil. It is noteworthy that the contractor was to use plant species that are available locally preferably indigenous ones for landscaping. These landscaping works were being done at the time of the Audit.

2.5 Status of the New Incinerator

The new incinerator is located in a green field within the Busia District Referral hospital compound, on the North western side of the hospital. During the Environmental Audit process, it was observed that the facility housing the new incinerator had been completed and minor installation works of the incinerator were being finalized. These activities have minor impacts on the environment. Thus, these impacts are as well addressed in chapter seven of this report under mitigation and corrective action plans. The incinerator shown below was awaiting commissioning at the time of the Environmental Audit.



Plate 1: The New Incineration Facility

2.6 Project Operation and Environmental Audit

2.6.1 Operation and accreditation status

During the environmental audit study, it was established that the laboratory had been in operation for six months from February 2017. According to the project coordinating officers, during the 2017 Regional Peer assessment exercise, the Busia laboratory site scored 3 stars as per the SLIPTA checklist. In 2017/18, the project plans to enroll all the original project sites including Busia site to KENAS for accreditation. The Project had obtained the EIA license from NEMA and therefore was environmentally compliant.

The Busia laboratory project's core business is the diagnosis and testing of diseases etiology and related processes. The Occupier operates the laboratory facility for the benefit of patients and the larger public. In essence, the following are the major activities associated with the operations of the laboratory facility.

- Administrative operations;
- Sample collection and processing;
- Generation of medical and general wastes;
- Material storage;
- Housekeeping;
- Safety, health and welfare practices;
- Sanitation and hygiene practices, and
- Disposal of wastes

2.6.2 Site Operations and environmental audit

The operations of the laboratory facilities have both positive and adverse bio-physical and social impacts. It was therefore necessary that an Initial Environmental Audit Study for the activities of the laboratory facilities be carried out in order to determine these impacts.

Further to that, there was need to establish the level of project compliance with the local environmental legal and policy requirements and the World Bank Environmental and Social Safeguard policies.

3 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

3.1 Introduction

The National Public Health Laboratory Service project is located in Busia town, Busia County. The County is located on the Western part of Kenya and it borders Bungoma County to the north, Kakamega County to the east and Siaya County to the south west. Part of Lake Victoria is in the County on the South East and borders the Lake with the Republic of Uganda to the west.

Busia County covers an area of 1,694.5 km² with 10 divisions, 60 locations and 181 sub-locations based on the previous administrative arrangement. Following the promulgation of the new Constitution in 2010, there are new administrative units covering the same area in form of sub-counties numbering 7 and 35 wards. The seven administrative Sub-counties include; Funyula, Budalang'i, Butula, Matayos, Nambale, Teso North and Teso South.

3.2 Physiographic and Natural Conditions

3.2.1 Topography

Most parts of Busia County fall within the Lake Victoria Basin. The altitude is undulating and rises from about 1,130m above sea level at the shores of Lake Victoria to a maximum of about 1,500m in the Samia and North Teso Hills. The central part of the County, especially Butula and Nambale Sub-counties, are occupied by a peneplain marked by low flat divides of approximately uniform height, often capped by lateritic and a shallowly incised swampy drainage system.

3.2.2 Hydrology

The southernmost part of the County is covered by the Yala Swamp which is a down warped area associated with the formation of Lake Victoria. The area forms a colony of papyrus growth and is broken by irregular water channels and occasional small dams with grassy islands. This area is covered with locustrine and alluvial deposits of recent and Pleistocene times.

The County has several rivers crisscrossing it and large water mass of Lake Victoria which borders Budalang'i and Funyula Sub-counties. It is served by rivers Malakisi to the extreme north, Malaba in the northern entry of the central region and River Sio in Funyula and Nambale Sub-counties. Malaba and Malakisi Rivers, whose source is Mt. Elgon traverses the county through the Teso Sub-county. River Nzoia drains into Lake Victoria through Budalang'i Sub-County.

3.2.3 Geology and Soils

The Samia Hills represent the basement complex and consist of acid and sub-acid lavas, tuffs, and agglomerates, banded quartzite and iron stones. The Kavirondo series rocks are developed around Busia, Nambale and Butula while the granites dominate the northern parts of the County. The northern part of the central region features granitic outcrops, which is essentially part of the peneplain and is characterized by the presence of large granitic hills and towers such as Amukura and Chelelemuk.

The soils in the County are moderately deep, generally rocky and stony consisting of well-drained red clays which have a low natural fertility. In parts of Nambale and Butula there are soils that are well drained, deep, brownish and sandy with moderate water holding capacity. In the parts of Budalangi and Funyula that adjoin Lake Victoria, soils are poorly drained and mainly of clay type due to frequent flooding. In the swamps, there are heavy clay types, which are very difficult to cultivate, both when it is dry and wet. The relatively good soils of Nambale and Butula, together with the higher rainfall, promote production of a variety of crops, which are not prevalent in Budalangi and Funyula.

3.2.4 Climate

Busia County receives an annual rainfall of between 760mm and 2000 mm. 50% of the rainfall falls in the long rain season which is at its peak between late March and late May, while 25% falls during the short rains between August and October. The dry season with scattered rains falls from December to February.

The temperatures for the whole County are more or less homogeneous. The annual mean maximum temperatures range between 26°C and 30°C while the mean minimum temperature range between 14°C and 22 °C.

3.2.5 Biodiversity

There are over 200 tree species in Busia County. Above 90 species are trees and over 100 are shrubs and herbs. All the shrubs and herbs are endemic in the hills and are endangered by persistence of fires which occur occasionally during the dry season. The most important species found in Busia and particularly in riverine ecosystems include: *Albizia coriara*, *Cordia africana*, *Vitex domiana*, *Acacia polyacantha*, *Sysygium guineense*, *Chlorophora excelsia*, *Terminalia brownii*, *Maesopsis eminii*, *Aloizia coriara*, *Eucalyptus saligna* and *Vitex damiana*.

Most of the shrubs and majority of trees are significant for their cultural and medicinal values though some are now being over-exploited and are threatened with extinction. The threatened plant species in Busia can be categorized into trees and herbs. The trees include Mvuli, *Albisia gummisera*, *Albisia amara* around Samia and Bunyala hills, *Dombea* and *Olea africana*. Threatened herbs include *Commallina bengatensis*, spider weed, indigenous amaranthas and the local herb known as Sinyolonyolo. According to the agricultural office in Busia, the disappearance of these herbs is a result of application of herbicides, chemical fertilizers and weeding of the weeds.

Main types of wildlife found in the County include hippopotamuses, wild pigs and velvet monkeys found in pockets of the county, mainly around the lake shores. There are areas which are occasionally invaded by monkeys in Funyula and Budalangi. These are among the endangered animal species and therefore require protection. There are over 160 known bird species and there is also presence of reptiles such snakes. The main livestock in the County is the zebu cattle, sheep, goats, pigs and free-range local chicken.

3.3 Socio-Economic Environment

3.3.1 Demography and vulnerability

This section presents vital demographic information of the county population in terms of its distribution by age, sex and projections up to the year 2017. The 2009 Kenya Population and Housing Census statistics forms the basis for the population projections. The County's annual population growth rate is 3.1 per cent.

According to the 2009 population census report, Busia County has a population size of about 743,946 of which 356,122 (47.87%) are males and 387,842 (52.13%) females with an average household size of 4-6 members. The County has a population density of 437 persons per Km². In addition, the County has a child rich population, where 0-14-year olds constitute 48% of the total population. This is due to high fertility rates among women.

The 2012 population of Busia was estimated to be 816,452 with females numbering 425,622 (53.13%) and the males 390,830 (47.87%) respectively. By the year 2017, the population is estimated to have grown to a total of 953,337 (456,356 males and 496,981 females). Out of the estimated total population in 2012, a total of 144,616 (17.71%) people were below the age of five years while in 2017 the number is expected to be 168, 862.

Further to the gender age cohort projections, population projections for selected age groups have a great bearing on the major public and private sector investment decisions and hence the economic growth of the County. These projections are presented in **Table 3:1** overleaf.

Table 3:1 : Gender and Age Segregated Demographics

Age Groups	2009 (Census)			2012 (Projections)			2015 (Projections)			2017 (Projections)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Under 1	13568	13705	27273	14890	15041	29931	16342	16507	32848	17387	17562	34949
Under 5	78711	78877	157588	86382	86565	172947	94801	95001	189802	100865	101078	201943
Primary school Age (6-13)	88807	90101	178908	97462	98882	196345	106961	108520	215481	113803	115461	229263
Secondary School age (14-17)	37593	36658	74251	41257	40231	81488	45278	44152	89430	48174	46976	95150
Youth Population (18-35)	89527	105454	194981	98252	115732	213984	107828	127011	234839	114725	135135	249860
Reproductive age female (15-49)	-	169782	-	-	186329	-	-	204489	-	-	217569	-
Labour force (15-64)	166538	193605	360143	182769	212474	395243	200582	233182	433764	213412	248097	461509
Aged Population (65+)	12,040	15,310	27350	13213	16802	30016	14501	18440	32941	15429	19619	35048

Source: Kenya National Bureau of Statistics, 2013

a) Under 1 Cohort

In 2009 Housing and Population Census, the total population under one year old was 27,273 comprising of 13,568 males and 13,705 females. This age cohort population in 2012 was estimated at 29,931 and was projected to increase to 32,848 and 34,949 in 2015 and 2017 respectively. This information is important in terms of provision of health care services such as antenatal and post-natal care services in order to reduce infant mortality rates and increase immunization rate. The consideration of this cohort as constituting a vulnerable group is important in ensuring the expected health benefits from the public health laboratory are realized.

b) Under 5 Cohort

This is the age bracket when a child is very vulnerable and requires special care in terms of food, shelter, protection both social and health. In 2012 this age cohort had a total of 172,947 children and is projected to grow to 189,802 in 2015 and 201,943 by 2017. This large population requires expansion of existing health facilities and establishment

of more Early Childhood Development (ECD) centres from the current 459 to accommodate the rising number of children in need of pre-school education, as well as formalize employment of ECD instructors.

c) Labour Force (15-64):

The labor force in Busia County in 2012 was estimated to be 395,243 and is projected to increase to 433,764 and 461,509 in 2015 and 2017, respectively. About 71 per cent of the labour force is engaged on family farms while the remaining 29 per cent work in other economic activities such as fishing, trading and employment in the formal and informal sectors. Given the size of arable land in the county, it implies that majority of the labour force is not gainfully employed. With an undeveloped industrial and production system, the rate of unemployment is bound to rise.

d) Female Reproductive Age Group (15-49):

This age cohort stands at 183,842 (22.66 percent) out of the total population of 811,324. Currently, the total fertility rate for Busia County is estimated to be 6 percent which is far above the national average of 4.6 percent. With the high fertility rate and large population of the female reproductive age, the county should be poised for a rapid population explosion and its associated effects. This calls for intensified social behavioral change interventions for the underage and birth control mechanisms for mature ones. Further interventions should focus on out-of-health facility deliveries which currently stand at 72.2 per cent of the expectant mothers.

Regarding gender equity and equality, the County, like the rest of Western Kenya experiences gender-based disadvantage in three dimensions—reproductive health, empowerment and the labour market. The Kenya Human Development Report (2009) indicates that the country's overall Gender Inequality Index (GII) is 0.651. The GII index for Western region stands at 0.457. This is however, not equal everywhere as there are County and Sub-County disparities within the region. Improving equity in gender issues and reducing gender disparities will benefit all sectors and thus contribute to sustainable economic growth, poverty reduction and social injustices.

e) Aged Population

The number of senior citizens (those above the age of 65) stands at 29,790 in the county with this number projected to rise to 32,941 and 35,048 in 2015 and 2017 respectively. This indicates that life expectancy levels are on the increase and measures should be put in place to address their varied needs; especially those associated with old age since they are no longer active economically.

3.3.2 Poverty, Livelihoods and vulnerability

The poverty line is a threshold below which people are deemed poor. Busia County poverty level is at 64.2 per cent compared to national poverty level of 45.9 per cent. The County's poverty level translates to a total of 520,230 people living in poverty. The numbers of people who are food poor are 440,818 translating to 54.4 per cent of the total population. These figures are way above the national poverty which is 45.9 percent, by a positive variance of 18.4 per cent. This poverty level is very high by any standards and requires concerted efforts by all stakeholders in the County to address this menace.

The unemployed are among the most vulnerable in society and are prone to poverty. The rate of unemployment in the county is estimated at 70 per cent. This implies that the majority of the labour force is not gainfully employed or is in disguised employment. Approximately 70 per cent of the labour force is engaged in family farms. The remaining 29 per cent are distributed over other economic activities such as fishing, trading and employment in the formal and informal sectors and 1 per cent in the blue-collar jobs.

The laboratory project provides diagnosis services to all the vulnerable members of the society in the county including the poor persons due to unemployment. The vulnerable women and elderly are also target beneficiaries. The project construction and operation has also provided several job opportunities to the locals, including skilled and unskilled labour.

3.3.3 Water supply, hygiene and Sanitation

In Busia County, 61.3% of households use water from improved sources such as protected springs, protected wells, boreholes, and rainwater. Piped water as part of the improved sources serves 4.7% of the households in the county. On the other hand, only 38.7% of households in the county use water from improved sources such as ponds, dams, lake, rivers, streams, unprotected springs, wells and water vendors.

In the County, 61.3% of households a well have access to improved sanitation such as pit latrines, VIP latrines, cesspool, septic tanks and only 0.3 are connected to the main sewer. On the other hand, only 38.7% of households in the county use unimproved sanitation such as bush, bucket latrines including 31.5% of households who use uncovered pit latrines.

3.3.4 Waste Management

Solid waste includes garbage, rubbish and all forms of refuse from domestic, institutional and commercial premises. Poor domestic waste disposal poses a great challenge to the environment in the county occasioned by lack of designated dumpsite in major market centers, lack of sewer system in urban centers except Busia town in which it serves a section of the town. In Busia Town, whereas the county government and private companies are involved in the management of solid wastes, there is no designated point for disposal of solid waste since open disposal including burning is predominant. Solid waste that is not disposed properly poses a serious health hazard and can lead to the spread of diseases. The recommended solid waste disposal method is controlled land fill.

3.3.5 Land Use

The County has a total area of 1,694.5 Km². Land use within Busia County include: Agriculture, forestry, mining, construction of human settlements, business, social and public amenities. Land is also used as collateral to obtain credit as well as for aesthetic purposes.

The County has approximately 228,622 acres (924 Km²) of agricultural land. The total acreage under food crop cultivation (maize, cassava, finger millet, beans, sorghum, rice, sweet potatoes, cowpeas, groundnuts, bananas, green grams, sesame, soya beans) is 145,412.5 acres, while 33,652.5 acres are under cash crop cultivation (cotton, tobacco, sugarcane, oil palm, and pepper). The average farm size in the county is as per the mean holding size in 1.7.1.

The County has a natural forest covering the hills of Samia and Budalang'i while other parts of the County have on farm woodlots that have been integrated with agricultural farming. There are two gazetted replanted forests mainly located in Budalang'i Sub-county totaling to only 528.8 Ha.

3.3.6 Education

1.1.1.1 3.2.3.1 Pre-School Education

The County has 459 Early Childhood Development (ECD) Centers attached to public primary schools and private ones. The teacher: pupil ratio stands at 1:37. The County had a population of 51,160 attending pre-school according to 2009 census however the total pre-school population within the county stands at 171,649 for the year 2012 and is projected to be 197,928 children in 2017. The proportion of these children attending pre-school as compared to those who are not is almost 65.3 %.

1.1.1.2 3.2.3.2 Primary Education

According to 2009 Kenya Population and Housing Census, the total population of children who were in the primary school going age group of between ages 6-13 years, was 432,088 but the primary school going population was 178,908. Currently, the County has 450 primary schools with an enrollment of 220,101 pupils. This indicates that more than 50 % of the County population is attending primary school. The teacher pupil ratio in primary schools stands at 1:64. A total of 62% of Busia County residents have only a primary level of education.

1.1.1.3 3.2.3.2 Secondary Education

Total enrollment in secondary school is 20 % of the secondary school going age of between 14-17 years. There are 105 Secondary schools in the County with a total enrollment of 23,100 students. The teacher to student ratio is 1:33. There are a number of private secondary schools in the County complementing the public ones. 16% of Busia County residents have a secondary level of education or above.

1.1.1.4 3.2.3.2 Tertiary Education

Busia County hosts 17 Youth Polytechnics and 3 University constituent colleges and private commercial colleges. The three university constituent colleges which include Masinde Muliro University of Science and Technology (MMUST) in Nambale Sub-County, University of Nairobi (UoN) in Matayos Sub-county and KCA University in Teso North Sub-county. According to the 2009 Kenya Population and Housing Census, 18,681 of the population in the County have attained tertiary education.

3.3.7 Literacy

According to the 2009 Kenya Population and Housing Census, 75.3 % of the population, aged 15 years and above in Busia County have the ability to read and write which is 4.7% below the national target

3.3.8 Economics of Busia County

Agriculture, fishing and trade are the main economic activities in Busia County. Busia's climate is conducive for agriculture. Some of the crops that are grown within the County include maize, cassava, finger millet, beans, sorghum, rice, sweet potatoes, cowpeas, groundnuts, bananas, green grams, sesame, soya beans, cotton, tobacco, sugarcane, oil palm, and pepper. There are also horticultural crops including pineapples, tomatoes, kales, cabbages, water melons, local vegetables, papaya, amaranth, onions and, mangoes. Fishing is also a major economic activity in Busia, thanks to the nearby Lake Victoria that supports a huge population of fish including Nile Perch and Tilapia.

Being the entry points between Kenya and Uganda, Busia and Malaba towns are thriving trade centres where livestock, agricultural products and manufactured goods are traded. The County has over 80 trading centres with two towns and three established urban centres mainly at the respective Sub-county headquarters. Some of the main urban centres and markets include: Busia, Nambale, Malaba, Bumala, Funyula, Amagoro, Sio Port, Port Victoria, Butula and Ang'urai, among others. Most of the markets in the County are open air markets which are unplanned, and the main activity is sale of agricultural produce.

The County has various tourist attraction sites such as Kakapel Rock Art Museum, captivating Kakapel caves, rock paintings found at the Kakapei National Monument in Teso North Sub-county, rocky hills of Kisoko. Lake Victoria Viewpoints, the beautiful stretch of Lake Victoria and neighbouring islands, beaches such as Marenga in Budalang'i sub-county, Bumbe and Busijo in Funyula Sub-county, rich cultural heritage, traditional dances, annual cultural events, herbal medicine, artifacts and musical instruments all add value to Bunyala and Samia cultural centers as great tourist attractions to the County. Some of the visible hotels and restaurants in Busia County include: Farm View, Mulukoba Lodge, Blue York, and Bumala Inn, among others. There are several conference facilities and restaurants in various urban centers in the County

Busia County has a number of commercial banks among them Cooperative Bank of Kenya, Kenya Commercial Bank, Equity Bank, Barclays Bank of Kenya, Ecobank, National Bank of Kenya, Spire Bank, Post Bank, Kenya Women Finance Trust, Faulu Kenya and Family Bank offering financial services. There are also a few informal microfinance lenders complementing formal financial institutions. Insurance

companies in the County include British American Insurance, Pan African Insurance, African Merchants Assurance Company (AMACO) and Cooperative Insurance Company of Kenya among others. Most of these financial institutions are located in the urban centers.

3.3.9 Transport and communication networks

1.1.1.5 3.2.6.1 Road, Railway Network and Airports

The County has a total of 583.1 km of roads managed by different authorities and agencies. Of these, 58.6 km are of bitumen and 377.5 km are gravel surface while earth surface roads cover 147.0 km. Class C roads in the County include Lwakhakha-Malakisi; Kwhirale-Mungatsi; Malaba-Alupe; Bumala-Funyula-Ruambwa and Ruambwa-Mukhobola-Mabinju. Class D roads include MalabaAng'urai-Malakisi; Amukura-Nyanga; Nangina-Namboboto; Nangina-Sio Port-Mundere and Lake Victoria-Port Victoria-Mundere.

The County is traversed by only 11 km of railway and served by one railway station at Malaba border crossing point which is a key entry point into the Republic of Uganda. The County has one airstrip located at Busia town, but not in use because of its poor state. There are two ports at the Lake Victoria shores, the Sio-Port in Funyula Sub-county and Port Victoria in Budalang'i Sub-county which mainly serve as fish landing ports.

1.1.1.6 3.2.6.2 Telecommunication and Postal Network

Busia County has a total of 23 post offices and over ten licensed private couriers among them G4S, Wells Fargo, and a number of public service vehicle couriers such as Easy Couch and Crown Bus. The entire County is covered by cellular phone network provided by Safaricom, Airtel, Orange, Telkom, and Yu. There are over seventy licensed cyber cafes most of which are located in urban centres.

3.3.10 Health

The County has four level 4 hospitals, one private hospital, twelve health centres and three nursing homes. The doctor population ratio stands at 1:41,200. The County has poor access to health care services whereby 10.3 % of the population are within less than 1 Km from the nearest health facility, while 19 % are within a radius of 1.2-4.9 km away from the nearest and those covering more than 5 km making 70.7% of the population.

The five most common diseases in order of prevalence are malaria, Respiratory Tract Infections (RTI), Skin diseases, Diarrhea and Typhoid. Most of the diseases are caused by poor hygienic practices.

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Introduction

This chapter reviews and discusses the policies, legal and administrative framework relevant to the environmental audit study for the constructed laboratory and associated infrastructure. It also evaluates the level of legal and policy compliance by the project. The key policy, legal and administrative documents considered in this study include;

- The World Bank Environmental and Social safeguard policies;
- The World Bank Vulnerable and Marginalized Groups Framework;
- National Health Care Policies and Plans,
- National Medical Waste Management Plan;
- Environmental Management and coordination Act Cap 387,
- Waste Management Regulations, 2006
- Environmental Impact assessment and Audit Regulations, 2003,
- Public Health Act Cap 244;
- Occupational Safety and Health Act, 2007;
- Water Quality Regulations, 2009;

4.2 World Bank Safeguard policies

Policy	Objective	Trigger for the Policy	Review/Evaluation
OP/BP 4.01 Environmental Assessment	<ul style="list-style-type: none"> The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts on its area of influence. OP 4.01 covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and transboundary and global environment concerns. 	<ul style="list-style-type: none"> Depending on the project, and nature of impacts a range of instruments can be used: EIA, environmental audit, hazard or risk assessment and environmental management plan (EMP). When a project is likely to have sectoral or regional impacts, sectoral or regional EA is required. The Borrower is responsible for carrying out the ESIA. 	<ul style="list-style-type: none"> The project was categorized under category B and required identification and mitigation of any adverse environmental impacts by the project proponent. Whereas an ESMP for the project was prepared, there was no evidence of an EIA Reports and license for this project.
OP/BP 4.10 Indigenous Peoples	<ul style="list-style-type: none"> The objective of this policy is to (i) ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples; (ii) ensure that adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and (iii) ensure that indigenous peoples receive culturally appropriate and gender and inter- 	<ul style="list-style-type: none"> The policy is triggered when the project affects the indigenous peoples (with characteristics described in OP 4.10 para 4) in the project area. 	<ul style="list-style-type: none"> A Vulnerable and Marginalized Peoples Plan for this project was prepared. Representatives of the local community were consulted during the preparation of the VMGF

Policy	Objective	Trigger for the Policy	Review/Evaluation
	<p>generationally inclusive social and economic benefits. The policy requires free, prior and informed consultation with indigenous peoples.</p>		<p>for this project.</p>
<p>The WB Group Environment, Health and Safety Guidelines (General & specifics).</p>	<p>The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. The guidelines include;-</p> <p><u>Environment</u></p> <ul style="list-style-type: none"> • Air Emissions and Ambient Air Quality • Energy Conservation • Wastewater and Ambient Water Quality • Water Conservation • Hazardous Materials Management • Waste Management • Noise • Contaminated Land 	<p>These guidelines will be followed during the preparation of mitigation measures. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.</p>	<p>The Kenyan Occupational Safety and Health Act, Cap 2007 covers the safety and health requirements and is further evaluated in the subsequent sections of this audit report.</p> <p>The National Healthcare Waste Management Plan was considered as well</p>

4.3 National Policies and Plans

4.3.1 National Environmental Policy, 2013

The National Environmental Policy is an outcome of the Sessional Paper No. 6 of 1999 entitled “Environment and Development”. The overall goal of the policy is better quality of life for present and future generations through sustainable management and use of the environment and natural resources. One of the objectives of the policy is to promote use of vital tools such as ESIA necessary to ensure environmental quality and resource productivity on long term basis. The Policy among other important objectives calls for promotion of domestication, coordination and maximization of benefits from Strategic Multilateral Environmental Agreements (MEAs). The Policy further calls for integration of environmental concerns into development policies, plans and activities.

The National Environmental Policy proposes a broad range of measures and actions responding to key environmental issues and challenges. It seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the Country. It recognises the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support the achievement of the desired objectives and goal.

Relevance

The Policy requires that projects such as this one, which are likely to have significant environmental and social impacts should undergo environmental assessment in order to establish sound environmental management plans and practices.

4.3.2 National Plan on Health Care Waste Management

The National HCWM Plan 2016 – 2021 was developed to provide viable technical and management options as well as a roadmap for the domestication of the National HCWM Strategic Plan 2015 -2020 in Kenya for the next five years.

Strategic planning for health care waste management (HCWM) covers not only the technical aspects related to waste management such as waste handling, storage, transportation, treatment, and disposal, but also capacity-building and awareness creation.

Relevance

This is in a bid to domesticate the 2012 environment policy as well as ensure conformity to the new constitutional dispensation which provides for each person's entitlement to a clean and healthy environment.

This National HCWM plan brings out a deliberate strategy aimed at strengthening the management of HCW within both hospitals and community settings in order to improve and safeguard public health and realize a sustainable safe environment.

The immediate benefit of implementing this plan is to prevent, reduce and mitigate the likely risks of transmission of infections likely to be acquired from unsound HCWM, such as HIV/AIDS, hepatitis B, and other health care associated infections (HAIs) as well as safe guard the environment for sustainable development. The plan provides feasible options of applying the best available technologies (BAT) and best environmental practices (BEP) in HCWM.

4.3.3 National solid waste management strategy

The National Solid Waste Management Strategy (NSWMS) seeks to establish a common platform for action between stakeholders to systematically improve waste management in Kenya. NEMA with other stakeholders undertook an assessment of waste management practices to form a basis on which this strategy was developed. The strategy lays the framework for improved waste management in the country.

Relevance

The National Environmental Management Authority strived to develop this strategy to assist the public and institutions involved to be a 7R oriented society, by Reducing; Rethinking; Refusing; Recycling; Reusing; Repairing and Refilling their waste. All the efforts are driven towards compliance with the Environmental Management and Coordination Act of 1999 and Environmental Management and Coordination (Waste Management) Regulations of 2006 in order to ensure a clean and healthy environment for all, keeping in line with the Article 42, of the Constitution of Kenya 2010.

4.4 National Legal and Administrative framework

Legal Section	Relevant Provisions	Compliance	Recommendations
The Environment Management and Co-ordination Act, Cap 387	<p>Part II of Environment Management and Co-ordination Act, 1999 states that every person in Kenya is entitled to clean and healthy environment and has duty to safeguard the same.</p> <p>Part VI and section 68 of Environment Management and Co-ordination Act, 1999 requires an Environmental Audit for an ongoing project.</p> <p>An Environmental Audit is conducted by a proponent to form the basis for continuous audits providing baseline information. Self-Audits by a proponent ensures internal controls are put in place. Control audits conducted by NEMA as a check on the Environmental Audit conducted by a proponent</p>	By undertaking this Initial Environmental Audit Study, the client has ensured compliance with this statute	The client to implement corrective and mitigation measures to protect environment
Environmental (Impact Assessment and Audit) Regulations, 2003	<p>The Environmental (Impact Assessment and Audit) Regulations, 2003 state in Regulation 3 that “the Regulations shall apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act”.</p> <p>Part V Section 31 states that an environmental</p>	This section provided guidance to the environmental auditors on the requirements during the audit process.	The client to implement the audit findings as presented in this report

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>audit is expected to be undertaken on the development activities likely to have adverse environmental impacts. The audit exercise is expected to be conducted by a qualified environmental lead expert or environmental inspector registered in accordance with regulation 14.</p> <p>Section 31(3) the environmental Audit study is prepared based on the baseline information provided in the Environmental impact assessment study report which will be used as baseline information upon which subsequent environmental control audit studies shall be undertaken.</p> <p>According to section 31(7) information required to be included in the audit report is mentioned; past and present impacts of the project, responsibility and proficiency of the operators of the project, existing internal control mechanisms to identify and mitigate activities with negative environmental impacts, existing internal control mechanisms to ensure workers health and safety, existence of environmental awareness and sensitization measures including environmental standards and regulations, law and policy for managerial and operational personnel.</p>		

Legal Section	Relevant Provisions	Compliance	Recommendations
<p>Environmental Management and Coordination (Waste Management) Regulations, 2006</p>	<p>The regulations are formed under sections 92 and 147 of the Environmental Management and Coordination Act, 1999. Under the regulations, a waste generator is defined as any person whose activities produces waste while waste management is the administration or operation used in handling, packaging, treatment, conditioning, storage and disposal of waste.</p> <p>Part II of regulations, regulation 4 (1) states that no person shall dispose of any waste on a public highway, street, road, recreational area or in any place except in a designated receptacle.</p> <p>Regulation 4 (2) further states that a waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations.</p> <p>Regulation 5 (1) provides for cleaner production methods. It states that “a waste generator shall minimise the waste generated by adopting the following cleaner production methods:</p> <ul style="list-style-type: none"> (a) Improvement of production process through: <ul style="list-style-type: none"> (i) Conserving raw materials and 	<p>It applies on disposal of solid wastes into the environment.</p> <p>The client is expected to comply with the established standards and procedures all the time.</p>	<p>The client to manage medical wastes as recommended in the findings</p>

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>energy;</p> <ul style="list-style-type: none"> (ii) Eliminating the use of toxic raw materials; and (iii) Reducing toxic emissions and waste. <p>(b) Monitoring the product cycle from beginning to end by:</p> <ul style="list-style-type: none"> (i) Identifying and eliminating potential negative impacts of the product; (ii) Enabling the recovery and re-use of the product where possible; and <p>(c) Incorporating environmental concerns in the design and disposal of a product”.</p> <p>Regulation 8 of the regulations provides for responsibility of waste transporters. It states that “any person granted a license to transport waste shall ensure that:</p> <ul style="list-style-type: none"> (1) The collection and transportation of such waste is conducted In such a 		

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>manner that will not cause scattering of the waste;</p> <p>(2) The vehicles and equipment for the transportation of waste are in such a state that shall cause scattering of, flowing out of waste or emission of noxious smells from such waste;</p> <p>(3) The vehicles for transportation and other means of conveyance of waste follow the scheduled routes approved by the Authority from the point of collection to the disposal site or plant and</p> <p>(4) He or his agent (s) possess at all times during transportation of the waste, a duly filled tracking document as set out in Form III in the first schedule to these regulations and shall produce the same tracking document on demand to any law enforcement officer”.</p>		
Environmental Management and Coordination (Noise and	Part II section 3(I) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or	It applies in relation to the effects	The client to control all

Legal Section	Relevant Provisions	Compliance	Recommendations						
<p>Excessive Vibration Pollution) (Control) Regulations, 2009</p>	<p>endangers the comfort, repose, health or safety of others and the environment and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Section 4 also states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30m from any moving source.</p> <p>Regulation 5 of these regulations provides for permissible noise levels. The regulation states that “No person shall cause noise from any source which exceeds any sound level as set out in the applicable column in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property”. The Table below shows the permissible noise levels as set in the First Schedule to these Regulations.</p> <table border="1" data-bbox="555 1302 1205 1390"> <thead> <tr> <th data-bbox="555 1302 875 1342">Zone</th> <th data-bbox="875 1302 1160 1342">Sound Level</th> <th data-bbox="1160 1302 1205 1342">N</th> </tr> </thead> <tbody> <tr> <td data-bbox="555 1342 875 1390"></td> <td data-bbox="875 1342 1160 1390">Limits dB(A)</td> <td data-bbox="1160 1342 1205 1390">L</td> </tr> </tbody> </table>	Zone	Sound Level	N		Limits dB(A)	L	<p>of activities with noise and vibrations in excess of the established standards.</p> <p>The level of noise and vibrations during construction and operation of the laboratory and the incinerator were within acceptable limits</p>	<p>sources of excessive noise and vibration from all activities as recommended</p>
Zone	Sound Level	N							
	Limits dB(A)	L							

Legal Section	Relevant Provisions				Compliance		Recommendations
			(Leq, 14h)		(Leq, 14h)		
			Day	Night	Day	Night	
A	Silent Zone	40	35	30	25		
B	Places of worship	40	35	30	25		
C	Residential:	45	35	35	25		
	Indoor	50	35	40	25		
	Outdoor						
D	Mixed residential (with some commercial and places of entertainment)	55	35	50	25		
E	Commercial	60	35	55	25		
	<p><u>Time Frame</u> Day: 6.01 a.m. – 8.00 p.m. (Leq, 14 h); Night: 8.01 p.m. – 6.00 a.m. (Leq, 10h)</p> <p>Regulation 13 of these Regulations provides for construction at night. Regulation 13 (1) states that “Except for the purposes specified in sub-Regulation (2) hereunder, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric</p>						

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>hoist) or perform any outside construction or repair works so as to emit noise in excess of the permissible levels as set out in the Second Schedule of these regulations”.</p> <p>Regulation 13 (2) states that “This Regulation shall not be deemed to prohibit-</p> <ol style="list-style-type: none"> 1. any work of an emergency nature; 2. work of a domestic nature on buildings, structures or projects being undertaken by a person residing in such premises; or 3. public utility construction, or, with respect to construction of public works, projects exclusively relating to roads, bridges, airports, public schools and sidewalks: <p>Provided that, if any domestic power tool, including but not limited to mechanically powered saws, sanders, grinders and lawn and garden tools used outdoors, is operated during the night time hours, no person shall operate such machinery so as to cause noise within a residential building or across a residential real property boundary where such noise interferes with the comfort, repose, health or safety of members of the public within any building or</p>		

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>outside of a building, at 30 metres or more from the source of the sound”.</p> <p>Regulation 14 of these Regulations provides for noise, excessive vibrations from construction, demolition, mining or quarrying sites. Regulation 14 (1) states that “Where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding-</p> <ul style="list-style-type: none"> a. machinery that may be used, and b. the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations”. <p>Regulation 14(3) further states that “Any person carrying out construction, demolition, mining or quarrying works shall ensure that the vibration levels do not exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from the moving source”.</p> <p>Regulation 15 of these regulations states that “Any person intending to carry out construction, demolition, mining or quarrying work shall, during the Environmental Impact</p>		

Legal Section	Relevant Provisions	Compliance	Recommendations									
	<p>Assessment studies-</p> <ul style="list-style-type: none"> (a) identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction, demolition, mining or quarrying; (b) determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibration impacts; and (c) incorporate the needed abatement measures in the plans and specification”. <p>The Table below shows the maximum permissible noise levels for construction sites (measurement taken within the facility) as per the second schedule of these regulations.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: left;">Facility</th> <th style="text-align: center;">Maximum Noise (Leq) in dB (A)</th> </tr> <tr> <th colspan="2"></th> <th style="text-align: center;">Day</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">(i)</td> <td>Health facilities, educational</td> <td style="text-align: center;">60</td> </tr> </tbody> </table>	Facility		Maximum Noise (Leq) in dB (A)			Day	(i)	Health facilities, educational	60		
Facility		Maximum Noise (Leq) in dB (A)										
		Day										
(i)	Health facilities, educational	60										

Legal Section	Relevant Provisions			Compliance	Recommendations
		institutions, homes for disabled etc.			
	(ii)	Residential	60	35	
	(iii)	Areas other than those prescribed in (i) and (ii)	75	65	
	<u>Time Frame</u> Day: 6.01 a.m. – 6.00 p.m. (Leq, 14h) Night: 6.01 p.m. – 6.00 a.m. (Leq, 14 h)				
The Water Act 2002	According to Section 5 of this Act, the right to use of water from any water resource is hereby vested in the Minister, except to the extent that it is alienated by or under this Act or any other written law. Section 4 (1) of the same Act states that “the Minister shall have and may exercise control over every water resource in accordance with this Act”. Subsection 2 states that “it shall be the duty of the Minister to promote the investigation, conservation and proper use of water resources throughout Kenya and to ensure the effective exercise and performance by any authorities or persons under the control of the Minister of their powers and duties in relation to water”. Subsection 3 further states that “the Minister shall be assisted in discharge of his duties under			<ul style="list-style-type: none"> ▪ The statute established to coordinate sustainable utilization of water resources including protection of the same from pollution and degradation (abstraction, use and disposal of wastewater thereof). ▪ Related water rules should be applied at all times. ▪ Where a project adversely pollutes water resources in the project site, adequate mitigations should be put in place. 	

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>this Section by Director of Water”.</p> <p>Section 13 provides for determination of a reserve. Section 13 (1) states that “the Minister shall, by notice in the Gazette, determine the reserve for the whole or part of each water resource which has been classified under this Part”. Subsection 2 further states that “a determination of the reserve shall ensure that adequate allowance is made for each aspect of the reserve”. Section 13(3) states that “the Minister, the Authority and all public bodies shall, when exercising any statutory power or performing any statutory function in relation to the water resource concerned, take into account and give effect to the requirements of the reserve”.</p> <p>Part II section 18 provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority to demand from any person, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept and the information thereof furnished to the authority on demand.</p> <p>Section 25 of the Act requires a permit to be</p>		

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>obtained for among others any use of water from a water resources, discharge of a pollutant into any water resource. According to section 29 of the same Act, application for such a permit shall be subject to public consultation as well as an environmental impact assessment as per the Environmental Management and Coordination Act, 1999. The conditions of the permit may also be varied if the authority feels that the water so used is causing deterioration of water quality or causing shortage of water for other purposes that the authority may consider has priority. This is provided for under section 35 of the Act.</p>		
<p>Water Resources Management Rules, 2007</p>	<p>One of the outcomes of the water sector reforms has been improved regulatory framework for water resource management and use. In addition to the Water Act 2002, the main document outlining the regulations is the Water Resource Management Rules 2007. The rules set out the procedures for obtaining water use permits and the conditions placed on permit holders. Sections 54 to 69 of the Water Resources Management Rules 2007 impose certain statutory requirements on dam owners and users in regard.</p> <p>Other sections within the rules imply that the Water Resources Management Authority</p>	<ul style="list-style-type: none"> ▪ Sets the standard procedures and rules to be followed in the utilization of water resources including abstraction controls, modes of use and responsibilities in protection of the resources including effluent treatment standards. ▪ The rules were established as implementation tools for the Water Act 2002. 	<ul style="list-style-type: none"> ▪

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>(WRMA) can impose water quality sampling requirements from the water sources and impacts to the hydrology, water chemistry and river morphology downstream basin. Section 16 of the Water Rules requires approval from the WRMA for a variety of activities that affect the water resources, including the storage of water in dams and pans. Approval by WRMA is conferred through a Water Permit. A permit is valid for five years and must be renewed.</p> <p>Section 104 of the Water Resource Management Rules requires certain water permit holders to pay water use charges. The intention of the water use charges was to raise revenue for water resource management, raise revenue for catchment conservation activities, improve efficiency of water resource abstraction and provide a system of data collection on water resource usage.</p>		
Public Health Act (Cap 242)	Part IX section 115 states that no person shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health.	<ul style="list-style-type: none"> ▪ For all Project activities with direct or indirect implications on the health of the workers or the neighbouring communities. ▪ All health and safety measures should be in place to ensure the workers involved in project construction and operation 	<ul style="list-style-type: none"> ▪

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as, in the opinion of the medical officer of health, to be offensive or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into Public Street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also deemed as a nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.</p> <p>On the responsibility of local authorities, Part XI section 129 of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes, and purifying such supply so polluted”. Section 130 provides for making and imposing on local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water</p>	<p>works are not exposed to risks.</p>	

Legal Section	Relevant Provisions	Compliance	Recommendations
	supply as mentioned in section 129.		
The Penal Code (Cap. 63)	<p>Section 191 of the Penal Code states that any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence.</p> <p>Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighbourhood or those passing along public way, commit an offence.</p>	This statute controls public nuisance including safety and security from construction activities.	
Occupational Safety and Health Act, 2007	<p>This is an Act of Parliament that provides for the safety, health and welfare of workers and all persons lawfully present at work places to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. Section 3 (1) states “that the Act shall apply to all workplaces where any person is at work, whether temporarily or permanently”.</p> <p>Section 13 part 1(a) the employee is expected to ensure his own safety and health and of the other person who may be affected by his acts or omissions at work place, (c)requires the employee at all times to use protective equipment or clothing provided by the</p>	This statute handled issues of health and safety especially during the Project operation and maintenance phase.	

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>employer for purpose of preventing risks to his safety and health, (f) report to the supervisor any accidents or injury that arise in connection with his work Part 2 states that any employee who fails to follow this section commits an offence and shall on conviction be liable to a fine or imprisonment.</p> <p>Section 21 provides that the employer or self-employed person to notify the occupational health and Safety Officer of any accidents, dangerous occurrence, or occupational poisoning which has occurred at the work place. Section 32 gives power to the occupational safety and Health officer to enter inspects examine by day or night, a work place which he has reasonable cause to believe to be a work place and any part of any building of which forms a work place.</p> <p>Part V of the Act provides for the registration of workplaces. Section 43 states that “the Director shall keep a register of workplaces in which he shall cause to be entered such particulars in relation to every workplace required to be registered under this Act as he may consider necessary”. Section 44 (1) further states that “Before any person occupies or uses any premises as workplace, he shall apply for the registration of the premises by sending to the</p>		

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>Director a written notice containing the particulars set out in the fourth schedule” Section 44 (2) states that “Upon receipt of the notice referred to in subsection (1), the Director shall take such steps as may be necessary to satisfy himself that the premises are suitable for use as a workplace of the nature stated in the notice, and upon being so satisfied, shall cause the premises to be registered and shall issue to the applicant, upon payment of the prescribed fee, a certificate of registration in the form set out in the Fifth Schedule”. Section 44 (4) states that “All workplaces which were registered under the Factories and Other Places of Work Act (now repealed) shall be deemed to have been registered under this Act”.</p> <p>Part VI of the Occupational Safety and Health Act, 2007, addresses provisions concerning health. These provisions are:</p> <ul style="list-style-type: none"> i. Cleanliness; ii. Overcrowding; iii. Ventilation; iv. Lighting; v. Drainage of floors; and vi. Sanitary conveniences. 		

Legal Section	Relevant Provisions	Compliance	Recommendations																																																
	<p>Department of Occupational Health and Safety of the Ministry of Labour.</p> <p>According to the scale for sanitary accommodation issued by Director of Occupational Safety and Health, LD280, the table below shows the guides for scale for sanitary accommodation:</p> <table border="1"> <thead> <tr> <th colspan="2">Ladies WC</th> <th colspan="2">Gents WC</th> <th colspan="2">Gents Urinals</th> </tr> <tr> <th>No. of staff</th> <th>No. of facilities</th> <th>No. of staff</th> <th>No. of facilities</th> <th>No. of staff</th> <th>No. of facilities</th> </tr> </thead> <tbody> <tr> <td>1 - 12</td> <td>1</td> <td>1 - 15</td> <td>1</td> <td>1 - 6</td> <td>0</td> </tr> <tr> <td>13 - 20</td> <td>2</td> <td>15 - 35</td> <td>2</td> <td>7 - 20</td> <td>1</td> </tr> <tr> <td>21 - 40</td> <td>3</td> <td>36 - 65</td> <td>3</td> <td>21 - 45</td> <td>2</td> </tr> <tr> <td>41 - 57</td> <td>4</td> <td>66 - 100</td> <td>4</td> <td>46 - 70</td> <td>3</td> </tr> <tr> <td>58 - 77</td> <td>5</td> <td>101 - 200</td> <td>Add 3%</td> <td>71 - 100</td> <td>4</td> </tr> <tr> <td>78</td> <td>6</td> <td>Ove</td> <td>Add</td> <td>101</td> <td>Add</td> </tr> </tbody> </table>	Ladies WC		Gents WC		Gents Urinals		No. of staff	No. of facilities	No. of staff	No. of facilities	No. of staff	No. of facilities	1 - 12	1	1 - 15	1	1 - 6	0	13 - 20	2	15 - 35	2	7 - 20	1	21 - 40	3	36 - 65	3	21 - 45	2	41 - 57	4	66 - 100	4	46 - 70	3	58 - 77	5	101 - 200	Add 3%	71 - 100	4	78	6	Ove	Add	101	Add		
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Legal Section	Relevant Provisions						Compliance	Recommendations
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	10 1 – 20 0	Add 5%			Ove r 200	Add 2.5 %		
	Ov er 20 0	Add 4%						
	<p>Section 55 requires all plant, machinery and equipment whether fixed or mobile for use at work place to be used for designed work and operated by a competent person.</p> <p>Part VIII of the Occupational Safety and Health Act, 2007 describes safety general provisions.</p> <p>Section 74 (1) provides for storage. It states that “all goods, articles and substances stored in a workplace shall be stored or stacked –</p>							

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>(a) in such a manner as will ensure their stability and prevent any fall or collapse of the stack;</p> <p>(b) in such manner as not to interfere with the adequate distribution of the natural or artificial light, the natural ventilation systems, the proper operation of machines or other equipment, the unobstructed use of passageways, gangways or traffic lanes, and the efficient functioning of sprinkler systems, the unobstructed access to other fire extinguishing equipment within the workplace; and</p> <p>(c) on firm foundations not liable to overload any floor”.</p> <p>Section 74 (2) further states that “No goods, articles or substances shall be stored or stacked against a wall or partition unless the wall or partition is of sufficient strength to withstand any pressure caused thereby”.</p> <p>Section 76 provides for ergonomics at the workplace. Section 76 (1) states that “Machinery, equipment, personal protective equipment, appliances and hand tools used in</p>		

Legal Section	Relevant Provisions	Compliance	Recommendations
	<p>all workplaces shall comply with the prescribed safety and health standards and be appropriately installed, maintained and safe guarded”.</p> <p>Section 76 (2) states that “Every employer shall take necessary steps to ensure that workstations, equipment and work tasks are adapted to fit the employee and the employee’s ability including protection against mental strain”.</p> <p>According to Section 76 (3) “Every manufacturer, importer and supplier or an agent of a manufacturer, importer and supplier of the machinery and equipment referred to in paragraph (1) shall ensure that the equipment complies with the safety and health standards prescribed under this Act and shall provide adequate and appropriate information including hazard warning signs”.</p> <p>Section 76 (4) further states that “An employer shall not require or permit any of his employees to engage in the manual handling or transportation of a load which by reason of its weight is likely to cause the employee to suffer bodily injury”.</p> <p>Section 97 prohibits employers to employ persons below the age of 18 years at the work</p>		

Legal Section	Relevant Provisions	Compliance	Recommendations
	place or perform work by which its nature it's likely to harm the persons safety or health.		
National Construction Authority Act No.41 of 2011	<p>Part II-Sec 5(1), (2) it establishes the National Construction Authority whose function includes overseeing the construction industry and coordinating its development.</p> <p>Part III-Sec 15, 16, 17 18 and 19 defines and sets forth the requirements of trading as a contractor of local and international origin.</p> <p>The Third schedule-Sec 16(2) of the Act sets forth the classes of contract works including; A-Building works, B-Civil Engineering, C-Electrical Engineering, and D-Mechanical Engineering services.</p>	<ul style="list-style-type: none"> • The construction of the project works was to obtain all the necessary clearance from the National Construction Authority (NCA) • The contractors for the works were to be procured inconsideration of the class of the contract works • There were no reports of stoppage of works by the NCA due to any non-compliance 	<p>Since there were no report of stoppage of works by the NCA due to any non-compliance, the client should maintain all the necessary documentary evidence of clearance and approvals from NCA</p>

5 AUDIT FINDINGS

5.1 Introduction

This Chapter presents the findings of the field investigations and analysis during the environmental audit of the EAPHLNP laboratory facility in Busia Town. It covers the findings on the facility during construction and operations and identifies gaps and areas for correction and mitigation. The impacts considered include; bio-physical, socio-economic and occupational safety and health as they relate to the laboratory and immediate environment.

5.2 Bio-Physical Impacts

5.2.1 Impacts on vegetation

The immediate vicinity of the hospital and laboratory facility has a number of tree species that provide aesthetic, ornamental and environmental regulation services. These species include; grevillea spp, spathodea spp, Markhamia lutea, cordia spp, among others.

During the environmental audit site investigation, it was observed that the laboratory compound site was predominantly grassy with some species of live fence. Some trees such as cypress and spathodea were cleared during construction to pave way for the laboratory. The loss of vegetation affects the ambient environment and the regulatory services derived from them and hence the need for landscaping and tree planting to compensate and ameliorate for the impacts due to the construction phase of the project.

5.2.2 Noise and vibration impacts

As part of the audit process, noise level measurement was undertaken at the facility and the immediate environment to comply with Legal Notice No. 25 of 2005 (Noise prevention and Control Rules). The sound level meter was held at 1 meter from ground and L_{eq} (the continuous equivalent sound pressure level) sample measurements around the source of noise. The L_{eq} is indicative of the ‘average’ noise level over a given period. Sampling was done at four sampling points including within the facility and three immediate neighbouring locations within 5, 15 and 30 meters from the benchmark point at the site

Table 5:1 : Results of Noise Measurements

Location	MEASURED LEVELS)		TLV	Comments
	Leq dB (A)	No. of persons exposed		
Main entrance	72.0	1	75	Within the limit
Reception	62.0	3	75	Within the limit
Parking area	68.2	1	75	Within the limit
Board room	61.5	1	75	Within the limit
Staff Lounge	59.8	1	75	Within the limit
Upstairs corridor	61.0	1	75	Within the limit
Gate 2 Area	65.0	1	75	Within the limit
Afrique Hotel Area	74.0	1	75	Within the limit
Road next to Hospital	80.2	-	84	Within the limit

The results of measurement indicate that the noise levels at the new laboratory and surrounding area are within the limit and therefore the noise from laboratory operations does not impact negatively to the environment.

As a precaution however, in order to protect the workers from any exposure to excessive noise levels at the laboratory, the occupier has to Provide PPE (ear protectors; ear plugs and ear muffs) to employees who may be exposed to excess noise and to undertake regular maintenance of machines.

5.2.3 Impacts on air quality and safety

The laboratory construction and operation activities were observed and reported to have had mixed contribution to the impacts on air quality. During the construction phase, there was construction-related dust and emissions from construction activities and machinery. The site meeting and inspection minutes for the construction phase held on 19th March, 2013 emphasized on the need for implementing safety controls on site including; provision of PPE, first aid kits and a safety officer on site.

Further to that, the site engineer ensured that the machinery operated by the contractor were calibrated and well serviced to control emissions. It was reported that during the operation phase of the laboratory, the facility was still using an old incinerator for the disposal of medical waste whose opacity was very high indicating low combustion efficiency. This is due to the fact that the new incinerator was at commissioning stage.

The air quality measurements at the Laboratory were undertaken to determine the concentration of stack emission during furnace heating. The parameters assessed are: Carbon monoxide (CO), Carbon Dioxide (CO₂), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Hydrocarbons (C_xH_y) and Particulate Matter as tabulated overleaf.

- Chimney stacks characteristics

The Chimney stacks have diameter of not less than 0.60m and a height of 6m and have dust filter systems installed to remove particulate matter. The table below represents the details of stacks designs characteristics.

Table 0:2 Details of the characteristic of sampling sites

Facility	Details
Incinerator chimney stack	Height: 6 metres Diameter: 0.25 metres Temperature of operation: 1000 ⁰ C

- Particulate matter Assessment

The particulate matter assessment was carried out as per ISO standards that give numerical values which approximate to the average experimental values for individuals exposed equally to all wind directions. The dust particle size captured were equivalent to the ISO aerodynamic diameter which are as:

d (µm)	0	10	30	60	100	185
Inhalable dust %	100	73.3	51.7	34.3	19.7	0

Where d is: The aerodynamic diameter of a particle is of a sphere of density 1 gm/cm³ (1 kg/dm³) with the same terminal velocity in air as the particle.

The particulate matter assessment method involves inserting a probe nozzle made from stainless steel into the stack, through a pittot tube and the particulate matter were trapped on a pre-weighed glass microfiber filter. The stainless steel filter holder was fitted with heat resistant seals to avoid any leaks. Suction pressure was maintained using isokinetic sampling pump. The particulate matter emissions was calculated from the amount collected on the filter paper, taking into consideration the temperature, volume of exhausted gas sampled, emission velocity through the stack and the pressure drop for the sampling device.

- Stack Emissions Assessment Method

The flue gases measurements were undertaken using drager pump with Flue Gas tubes that are calibrated to measure parameters expected to be present at the flue gases. The drager pump and drager tube system is a measuring device that has the capacity to measure and display the products of combustion from industrial, domestic or commercial fossil fuelled appliances. It can also measure ambient air quality in rooms or buildings. The stack emissions measurements were undertaken by placing the probe into the chimney stack and analysing the concentration of the parameters. The results are presented in table 5.3 and table 5.4.

Table 0:3: Incinerator Chimney Stack Emission Characteristics

PARAMETER	ARITHMETIC MEAN OF THE READINGS	NEMA AIR QUALITY GUIDELINES	REMARKS
Carbon monoxide (CO)	0.05ppm	<input type="checkbox"/> Not indicated	Negligible
Carbon dioxide (CO ₂)	50µg/m ³ (500ppm)	<input type="checkbox"/> 500µg/m ³ (5000ppm)	Within NEMA Guidelines
Hydrocarbons (C _x H _y)	Not detected	<input type="checkbox"/> 300µg/m ³	Within limit
Sulphur dioxide (SO ₂)	Not detected	<input type="checkbox"/> 400µg/m ³	Within the limit
Nitrogen dioxide	Not detected	<input type="checkbox"/> 1500mg/m ³	Within the limit
Particulate Matter	Not detected	<input type="checkbox"/> 50µg/m ³	Within the limit

Table 0:4 : Incinerator Stack Emission Characteristics

PARAMETER	ARITHMETIC MEAN OF THE READINGS	NEMA AIR QUALITY GUIDELINES	REMARKS
Carbon monoxide (CO)	900ppm	<input type="checkbox"/> Not indicated	
Carbon dioxide (CO ₂)	100µg/m ³ (1000ppm)	<input type="checkbox"/> 500µg/m ³ (5000ppm)	Within the recommended range
Hydrocarbons (C _x H _y)	Not detected	<input type="checkbox"/> 300µg/m ³	Within the recommended limit
Sulphur dioxide (SO ₂)	10.5µg/m ³ (1ppm)	<input type="checkbox"/> 400µg/m ³	SO ₂ Emission is low.
Nitrogen dioxide	Not detected	<input type="checkbox"/> 1500mg/m ³	Within the limit
Particulate Matter	Not detected	<input type="checkbox"/> 50µg/m ³	Within the limit
Dioxins & Furans	Not detected		



Plate 2: Chimney Emissions from the old incinerator

5.2.4 Impacts on water resources

The main sources of water at the laboratory were piped water supplied by Busia water and Sewerage Company and supplemented by borehole water in the event of shortages. The construction phase of the project utilized water from the borehole which was adequate for the completion of works such as concrete works, among others.

The consultant sampled water at 4 sampling points including within the kitchenette, laboratory, borehole and storage tank. Each sample was collected in one-liter sampling bottle and the samples were transported to the Lake Victoria South Water Services Board laboratory for testing.



Plate 3: Sampling of Water at the Laboratory



Plate 4: Sampling of Borehole water

The test results were compared to the local water quality standards in and confirmed that all the parameters in the samples were within the recommended physical-chemical and biological standards. The parameters that were considered included; P.H., E-coli, TSS, TDS, among others as required. The results of the water quality testing are presented in Appendix 3 of this report.

5.3 Socio-economic impacts

5.3.1 Introduction

During the audit study, most of the respondents utilizing the Busia laboratory agree that the laboratory is useful in medical diagnosis and tests and consider it to have improved medical service delivery in the area.

5.3.2 Provision of diagnostic services

Consultations with the local community confirmed that the laboratory provides an array of diagnosis services to the local community within Busia County. Some of the laboratory tests done at the facility include: blood tests for malaria, sputum tests for TB, urinalysis, stool tests for water-borne infections, among others.

5.3.3 Access to the facility

During Consultations with the local community, it was confirmed that the laboratory serves a large community within Busia County and from across the Border of Uganda as well. The beneficiaries access the facility from Busia, Bulanda, Nambale, Mundika, Burumba, Angorom and Uganda side.

5.3.4 Affordability of Laboratory services

During consultations, most 47(81%) of the respondents from the local community indicated that the cost service provision at the laboratory was affordable.

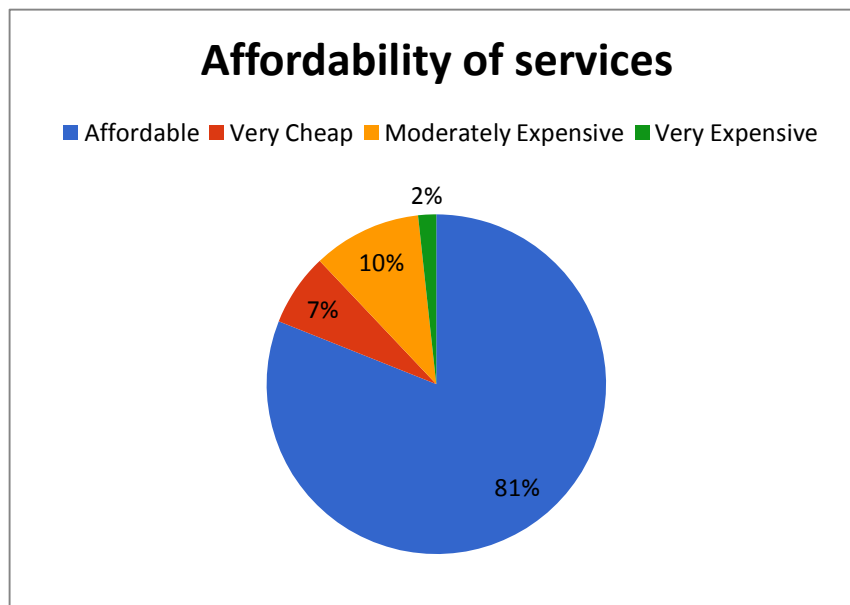


Figure 2: Affordability of laboratory services

5.3.5 Duration of Laboratory services

The results of consultation showed that Most 42 (72%) of the respondents indicated that the duration of laboratory services took more than one hour. This could be due to the fact that some of the tests conducted at the laboratory require time for processing such as culturing.

The local community may therefore not be aware of this requirement since the service charter that should show the throughput time for processes was not displayed. On the other hand, the laboratory workers are few and strained, thereby also contributing to the long waiting duration.

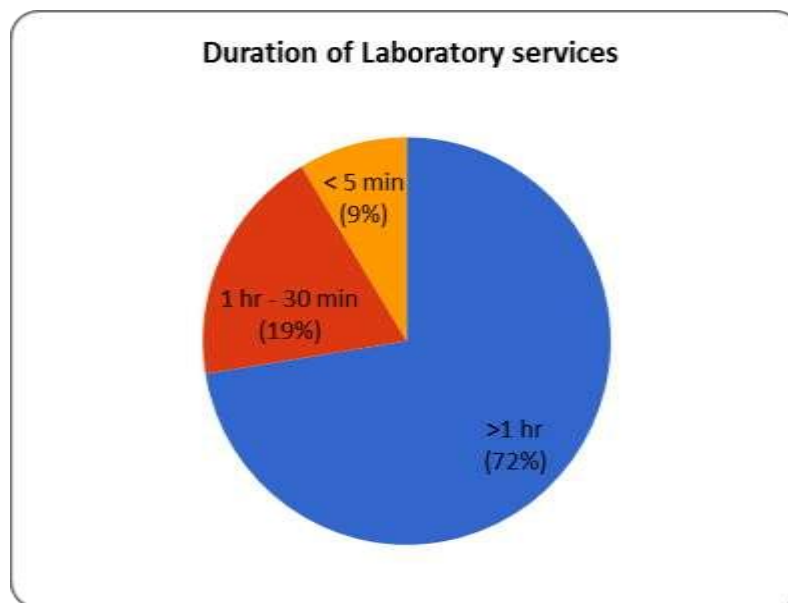


Figure 3: Duration of Laboratory Services

5.3.6 Special treatment of vulnerable groups

During the Audit, the vulnerable groups that were identified included children brought by their mothers, the youth, elderly and women. The children brought by their mothers and the elderly group of patients indicated that they were given priority when queuing for laboratory services. Some of the services were reported to be offered for free such as TB tests. Further to that, they also indicated that most of the services were greatly subsidized and hence the reasons as to why they prefer visiting the facility.

5.4 Occupational Safety

5.4.1 Standard operation procedures

The Laboratory has established standard operating procedures which are posted on the notice boards at the workplace and a copy to be issued to workers after it is signed by the Laboratory Manager. The procedures underscore the occupier's principal duty of affording a healthy and safe work environment for employees. There are manufacturers' operational manuals for most of the machinery used at the laboratory by the employees.

5.4.2 Chemical Safety

The Occupier uses both hazardous and nonhazardous chemicals during sample analysis. All the chemicals used have labels and adequate information. The labels were durable and legible and are available on site. The handling of chemicals at the workplace is both mechanized and manual. While handling the chemical manually, the staff is appropriately fitted with Personal Protective Equipment (PPEs) such as gloves, overalls and masks.

The Occupier utilizes a number of hazardous substances such as laboratory reagents. The Material Safety Data Sheets (MSDSs) for these substances are available at the workplace; hence, the level of safety awareness among the workers on the safe handling of hazardous substances and emergency procedures is good. The workers have been inducted on safe chemical handling and related hazards.

5.4.3 Emergency Response procedures

The Occupier has prominently displayed evacuation procedures in case of fire incidence. The procedures are written in English and are easily understood by the respective employees. The Occupier has also availed and posted safety notices and posters at prominent locations at the workplace that include; 'No Smoking' signs. Posters indicating safe use of appropriate PPEs are displayed.

The proponent has provided the employees with the PPE for use in their respective operations and also for use while responding to such emergencies such as chemical

release. The PPE provided include: overalls, laboratory coats, gloves, respirators and dust masks.

The emergency procedures in place are designed for handling emergencies likely within the scope of Occupier's business such as fire/explosion, spillages and splashes. The Occupier's fire prevention system comprises of water hydrants, water storage tanks, hose reels, and portable fire extinguishers (CO₂, dry powder, foam) mounted at various points at the facility. These appliances are serviced two times in a year by suppliers.

The occupier had clearly indicated a designated fire assembly point within the compound of the facility. The fire assembly point was clearly marked in green and white signage as required.



Plate 5: Firefighting equipment at the Laboratory

The Occupier has first aid kits but under untrained First Aiders and any emergency case that occur at the workplace is immediately attended to while major injuries/cases are referred to the Hospital. It was however observed that the smoke and fire detectors had not been tested and were therefore not working, thereby exposing the facility to fire risk.

There was no evidence of fire drill and training among the laboratory staff which also compromises the preparedness and response status. Whereas there is provision for emergency eyewash unit at the facility as shown overleaf, the functionality of the same was compromised and none of the staff could operate the same. There is need to service the eyewash unit and train the staff on its use.



Plate 6: Face/Eye wash unit

5.4.4 Machinery safety

The occupier utilizes several machines in processing samples at the laboratory. It is worth nothing that during onsite audit, the machines were fitted with appropriate guarding and functional emergency stops where appropriate.

The machines are provided with suitable starting, stopping and emergency switches. The portable tools and appliances were properly maintained. There were no cases of occupational accidents due to faulty machines. Some of the machinery with faults were separated and labelled, waiting for servicing.

5.4.5 Electrical Safety

The plants, equipment, appliances and machinery at the Occupiers' premises are in safe electrical conditions. During onsite inspection of the Occupier's workplace, the following were observed with regard to the electrical safety:-

- All the equipment, appliances and machinery did not have worn out or wires and conductors that are not insulated or drawing power directly from the socket without use of plugs or unsuitable plugs;
- The locking devices of power panels were in good condition;
- All equipment are earthed and the earthing tested;
- The workstations did not have overloaded power sockets nor had any electrical plants, equipment, appliances and machinery exposed to wet conditions.



Plate 7: Functional Power Panel

- Underground electric cables are suitably protected; the cables are within appropriate pipes
- Maintenance of electrical installations is done by in house team of trained technicians. The maintenance schedule involves regular checks of the facility and implementing corrective action. The checks are done on a daily basis, on or responding to reports by employees and other equipment users

5.5 Occupational health

5.5.1 Waste Management

The laboratory facility generates different types of wastes from the streams of its operations. These wastes include hazardous clinical and general wastes. The wastes were segregated in to black, yellow and red heavy polythene bags as per the waste management regulations and were collected and central point for transportation to

the burning chamber within the hospital facility as the new incinerator was still under construction at the time of the Audit. Plate 8 overleaf shows waste segregation at source as compliance and good practice on waste management.



Plate 8: Waste segregation at Source

5.5.2 House keeping

Housekeeping conditions at the laboratory were found to be relatively acceptable. The conditions of the floor in relation to the work processes, drainage, and accumulation of refuse or dirt in each workroom or workstation were generally good. The cleanliness of the floors, walls ceiling, and passages was good. The drug stores had all the medicines kept on racks and well labeled.

However, there were some areas such as the general cleaners' stores where cleaning materials were not well organized but left on the floor, hence unaesthetic. Some of the toilets were not functional due to blocked sewer system and some taps were leaking in the toilet sinks.

5.5.3 Ventilation

The circulation of fresh air at the Occupier's workplace is by natural means and air conditioners (AC). The natural and AC ventilation system is effective and suitable at most of the workstations in relation to the process or operations. There are however some rooms which lacked adequate ventilation including the stores and boardroom.

5.5.4 Lighting

The Occupier utilizes fluorescent tubes and natural light coming through the doors and windows to provide lighting in the workplace. The lighting in most of the workstations was observed to be sufficient and suitable for the work being performed. There were areas such as the ground floor corridor where not all the florescent lights were working and therefore required replacement.

6 PUBLIC PARTICIPATION AND CONSULTATION

6.1 Introduction

Public participation and consultation formed a vital component for gathering, understanding and establishing the project target populations' perceptions, expectations, level of involvement and views on its impacts during design, implementation and operation. Furthermore, through public participation and consultation, it is possible to enhance project performance, acceptability, and sustainability.

6.2 Stakeholder Engagement

The outcome of consultations with the Vulnerable and Marginalized Groups during the stakeholders' workshop prior to the project construction on free, prior and informed consultations held in February 2013 was;

- That there was serious need for awareness creation about the existence of the laboratory project among the VMGs;
- That the Project to construct the facility at accessible locations close to the communities;
- Community Health Workers among VMGs should be trained in diseases surveillance and be empowered to become local agents; and
- The Project should strengthen mobile testing in the VMG communities which should be done in an integrated manner with other mobile services

6.3 Purpose and criteria

The purpose of public and stakeholder participation in the environmental audit of the NPHLS Laboratory in Busia Town was to establish the level of target population involvement during the project cycle through their prior informed consent, how they derive project benefits and the challenges they face due to the project.

The criteria for public participation are informed by the requirements under the Vulnerable and Marginalized Peoples Plans (VMPP) which require the said populations adequately participate in the project. Further to that, the Kenyan Constitution provides for public participation and consultation throughout the project cycle in order to enhance acceptability and sustainability of the expected project benefits.

6.4 Approach

Public participation and consultations during the environmental audit process was done through the administration of structured questionnaires to a sample of respondents drawn from institutions and the immediate target community members who utilize the laboratory facility. In-depth discussions inform of focus groups with waste handlers and healthcare workers were also done. A total of 58 respondents were interviewed during the audit process. The list of respondents is attached in Appendix 6.

6.5 Demographics of respondents

In the analysis of the respondents' demographics, their gender, age, occupation, ethnicity, and area of residence were considered. According to the analysis of the questionnaires, most 30 (52%) of the respondents in this consultation were male while 28(48%) were female. On the other hand, most 19(33%) of the respondents who use the facility were aged between 18 and 25 years while only 2(3%) were aged above 50 years of age. It is safe therefore to conclude that most 56(97%) of the users are still in their active and productive age.

6.6 Ethnic Differentiation of respondents

Further to that, the respondents' ethnicity was mixed including luhya, teso, karamoja, samia, luo, kikuyu, kuria and gurreh. The project area is dominated by the Luhya, luo and teso ethnic communities which can be said to be indigenous. However, when assessing vulnerability and marginalization, women and children in this community require special consideration due to the cultural influence on health seeking. Figure 4 below shows the ethnic differentiation of the respondents.

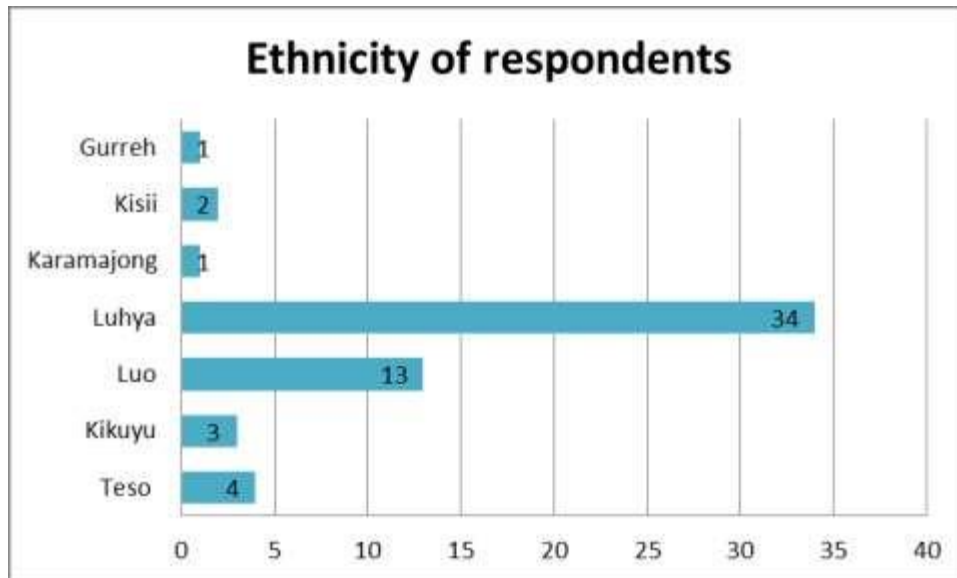


Figure 4 : Ethnicity of Respondents

As shown in Figure 4 above, the Luhya ethnic community constituted the highest percentage 58.6 (34) of respondents followed by the Luo and Teso respectively. Others were Kikuyu and Kisii ethnic communities, while the lowest percentage of 1.7 (1) was among the Karamoja and Gurreh ethnic communities.

6.7 Respondents views on the project

From the respondents, 55.2% thought that the laboratory had very good sanitation, whereas 58.6% were aware about the construction taking place and 93.1% of these respondents deduced that the construction had no adverse effect on the environment. The majority 91.4% of the respondents also thought that there was no air pollution during construction with 89.7% expressing that there was very little dust emissions during construction. Most 96.6% of the respondents agreed that there was no noise pollution in the area.

6.8 Respondents recommendations

In conclusion, most of the respondents utilizing the Busia laboratory agree that the laboratory is useful in medical diagnosis and tests and consider it to have improved medical service delivery in the area. They suggest that more staff need to be hired and efficient time management needs to be put in place to improve performance.

6.9 Impact on Vulnerable and Marginalized Groups

The project is located within Busia Town in an area that is served with a good road network and thus physically accessible by the communities. To address the cost of access, many of the services e.g. TB are free and the majority of respondents consulted said they were affordable, this is unlikely to be a huge constraint compared with other services. Busia hospital also has waivers and the County is registering vulnerable households for free NHIF.

Although the Banks OP4.10 was triggered for this project as a precautionary measure and a VMGF prepared, and VMGs are present in the catchment for the referral laboratory, the laboratory does not adversely affect vulnerable and marginalized groups, who are not present in the hospital vicinity, thus there is no need to implement a Vulnerable and Marginalized Group Plan.

7 MITIGATION AND CORRECTIVE ACTION PLANS

7.1 Introduction

During the Environmental Audit process, it was confirmed that the laboratory facility had been in operation for about six months since completion. However, minor installation works were being finalized at the new incineration facility which was yet to be commissioned and therefore a Construction Environmental Management Plan for the finishing of installation works is presented in Table O:1 overleaf.

This Chapter also proposes corrective actions for the activities in the laboratory premises and mitigation measures for the incinerator affecting Environment, Social, Safety and Health aspects.

Table O:1: Construction Phase Environmental Management Plan for Incinerator

Impacts	Proposed mitigation measures	Responsibility	Indicator	Cost (Kshs)	Time Frame
Noise pollution	<ul style="list-style-type: none"> Maintain construction equipment. Operations should only be carried out only during 0800hrs-1700hrs. 	Contractor Proponent	Noise levels	50,000.00	Quarterly
Hazardous Materials handling	In case of spills, absorbent materials e.g. absorbent granular or pad absorbents should be used to clean up the spill then the oil soaked pads and granules should be well disposed off.	Contractor	No oil spills and leaks on the site	To be determined	As need arises
Occupational safety risks	<ul style="list-style-type: none"> Provide PPE for all workers on site A well stocked first aid kit shall be maintained by qualified personnel Train first aiders and assign them at the facility 	Proponent	Contents of the first aid kit.	10,000.00	Monthly
Sanitation	<ul style="list-style-type: none"> Provide adequate means for disposal of sewerage Conduct inspections for drainage pipe blockages or damages and fix them. All waste water should be channelled to sewer line. 	Proponent	Effluent presence on open drains.	To be determined	Continiousy
Disaster preparedness	<ul style="list-style-type: none"> Emergency response plan to be prepared and Implemented. 	Proponent	-Number of fire drills carried.	To be determined	As need arises
De-vegetation	<ul style="list-style-type: none"> Restore the site to its original status or to a better state than it was originally Establish indigenous tree species to replace those that have been cut down 	Contractor, Proponent	-Number and species of trees planted	350,000.00	Annually

7.2 Preventive Action Plan for Incinerator Operation

The operation of the new incinerator poses potential environmental and public health risks. There is therefore need to institute preventive actions and measures to control the environmental, health and safety risks of the incinerator within the Project site. Table 0:2 shows the preventive action plans for the operation of the new incinerator.

Table 0:2: Preventive Action Plan for Incinerator Operation

Objective	To efficiently operate the new incinerator in an environmentally friendly manner
Policy interface	Ensure compliance with the Environment policy, EMCA, 1999, EIA/EA Regulations, 2003 and the Waste Management Regulations, National Health Care Waste Management Plan of 2016-2021
Parameters	Safe, Healthy and Efficient Incinerator Operations
Indicators	<ul style="list-style-type: none"> ✓ Type and quantity of medical wastes ✓ Number of incident among workers ✓ Quality of ash ✓ Logs of incidents and occurrences for maintenance ✓ Number of reports prepared ✓ Number of Records kept
Activities	<ul style="list-style-type: none"> ▪ Segregate and weigh all medical wastes; ▪ Loading and heating of the incinerator to be done as per the operating standards and manual; ▪ Ensure that there are adequate sanitation facilities for incinerator operators; ▪ Ensure the incinerator operators undergo periodic medical examination; handle the incinerator; ▪ Ensure operators are adequately trained with skills to ▪ Provide suitable means for collection and disposal of ash from the incinerator; ▪ Monitor the air quality emissions and noise levels within the incinerator; ▪ Keep the relevant records at the facility; and ▪ Provide adequate security at the facility
Monitoring method	<ul style="list-style-type: none"> ✓ Inspection, sampling and testing, Observation and recording ✓ Monitoring the emission of combustion gases from the incinerator ✓ Medical examination of waste handlers
Reporting	<ul style="list-style-type: none"> ✓ Daily Documentation ✓ Weekly Documentation ✓ Quarterly Reporting ✓ Annual Audits
Responsibility	<ul style="list-style-type: none"> ✓ NPHLS Project Manager ✓ Manager in-charge at Busia Laboratory
Timeframe	Continuous
Cost (Kshs)	Ksh 250,000.00 annually

7.2 Corrective Action Plans for Operation Activities

This section outlines the Corrective Action Plans for the significant Environmental, Health and Safety impacts associated with the Operations of the Laboratory and the incinerator facility.

7.2.1 Improving on Medical Waste Management

The Management of medical waste in the hospital and the laboratory poses an environmental and public health hazard. There is therefore need to institute corrective actions and measures to control the generation, accumulation and disposal of medical wastes within the Project site. Table 0:3 below shows the corrective action plan for medical waste management.

Table 0:3: Corrective Action Plan for Medical Waste Management

Objective	To effectively manage medical wastes within the laboratory premises
Policy interface	Ensure compliance with the Environment Policy, EMCA, 1999, EIA/EA Regulations, 2003 and the Waste Management Regulations, National Health Care Waste Management Plan of 2016-2021
Parameters	Generation, collection, transportation and disposal
Indicators	<ul style="list-style-type: none"> • Categories, Streams and quantity of medical waste materials handled at the premises including; <ul style="list-style-type: none"> ✓ Clinical wastes ✓ Medical wastes ✓ Pathological wastes ✓ Chemical wastes ✓ General wastes
Activities	<ul style="list-style-type: none"> ▪ Identify, categorize and quantify medical waste in the hospital and the laboratory; ▪ Sub-contract a NEMA certified company for collecting, holding, and transporting of the medical wastes; ▪ Utilize color-coded waste receptacles and designated waste collection and holding areas; ▪ Provide PPEs to waste handlers; ▪ Provide suitable means for collection and transportation of medical wastes in the hospital and the laboratory; ▪ Commission the new incinerator, service and

	<p>maintain the same;</p> <ul style="list-style-type: none"> ▪ Sensitizing all healthcare workers on safe handling and management medical wastes in the hospital and laboratory; ▪ Adhering to the Public Health Act provisions in relation to the management of medical wastes in the laboratory and the community
Monitoring method	<ul style="list-style-type: none"> ✓ Inspection, Observation and recording of waste streams ✓ Monitoring the emission of combustion gases from the incinerator ✓ Medical examination of waste handlers ✓ Periodic stakeholder consultations on medical waste management practices
Reporting	<ul style="list-style-type: none"> ✓ Weekly Documentation ✓ Quarterly Reporting
Responsibility	<ul style="list-style-type: none"> ✓ NPHLS Project Manager ✓ Manager in-charge at Busia Laboratory
Timeframe	Continuous
Cost (Kshs)	Ksh 150,000.00 per year

7.2.2 Enhancing Occupational Safety and Health

The Operation Phase of the laboratory facility carries with it a level of risk, especially with exposure to biological hazards to healthcare workers and patients. The different administrative and diagnostic services present different risk levels of, accidents, incidents, infections, cuts, falls and near misses.

There is need to enhance occupational safety and health in order to record zero cases of accidents in the laboratory. Table 0:4 below shows the corrective action plan for enhancing laboratory safety of laboratory workers and the larger community.

Table 0:4: Corrective Action Plan for Safety and health

Objective	To protect the safety of laboratory workers and patients
Policy interface	Ensure compliance with the Public Health Act, Occupational Health and Safety Act, 2007
Parameter	Safety and health of laboratory workers and the larger community members
Indicators	Incidence and cases of accidents, incidents, near misses and cases of work-related infections
Activities	<ul style="list-style-type: none"> ▪ Design a policy on occupational safety and health for the laboratory; ▪ sensitization and training of all staff on laboratory safety; ▪ Establishment of a safety and health committee for the facility; ▪ Test and service the fire detectors; ▪ Perform periodic fire drills; ▪ Install adequate air conditioners; ▪ Provide adequate and appropriate PPEs for all workers in different job cadres; ▪ Provide medical insurance against exposures; ▪ Provide Vaccination and PEPs to control exposure; and ▪ Train first aiders and fire Marshalls.
Monitoring method	<ul style="list-style-type: none"> • Keep records of exposure in an incident record book, • Physical inspections of the facility, • Conduct surveys
Reporting	Appropriate reporting and documentation.
Responsibility	Laboratory Manager
Timeframe	Bi-Annually
Cost (Kshs.)	160,000.00

7.2.3 Improving on Structural functionality

During the Audit, it was observed that there was need to improve on the Structural functionality and maintenance of the laboratory. The table below shows the corrective action plan for enhancing structural functionality of the laboratory.

Table 0:5: Corrective Action Plan for Structural functionality

Objective	To enhance housekeeping in the laboratory
Policy/Legal interface	Ensure compliance with Building code and Public Health Act
Parameter	Operation and Maintenance of the facility for functionality
Indicators	Functionality of roof gutters, plumbing and drainage works
Methods	Observation, material testing and measurements
Activities	<ul style="list-style-type: none"> ▪ Inspect and fix all the loose ceiling boards and roofing works; ▪ Inspect all plumbing structures and installations to detect leakages; ▪ Gutters from the roof to be connected, fitted and well drained to the environment; ▪ Connect all the plumbing and drainage works to the sewerage system. ▪ Harvesting of rain water once the gutters are fixed to the building
Reporting	Appropriate documentation and reporting
Responsibility	<ul style="list-style-type: none"> • Project Engineer • Laboratory Manager
Timeframe	First Quarter during defects liability Period
Cost (KES)	200,000.00

7.2.4 Enhancing Environmental Protection and Aesthetics

The construction and operation of the laboratory affected the physical and biological environment on different levels of impacts. It is therefore important to undertake corrective measures to protect the environment and enhance aesthetics. Table 0:6 below shows the corrective action plan for enhancing environmental protection and aesthetics.

Table 0:6: Corrective Action Plan for Environmental Protection

Objective	To enhance environmental protection and aesthetics within the vicinity of the laboratory
Policy/Legal interface	Ensure compliance with EMCA, Cap 387 and World Bank Environmental Safeguard Policies
Parameter	<ul style="list-style-type: none"> • Vegetation • Drainage and hydrology of the site • Topography • Soils
Indicators	<ul style="list-style-type: none"> • Type and number of trees planted • Surface and ground water system • degree of Slope of the land • Soil stability
Methods	<ul style="list-style-type: none"> • Observation and counts of tree species • Site Observation and Measurement • Soils and Material sampling and testing • water quality sampling and testing
Activities	<ul style="list-style-type: none"> ▪ Landscaping the site with local trees, shrubs, hedges and flowers after construction activities are finalized; and ▪ Protect underground water from any contamination by demarcating and controlled abstraction
Reporting	Appropriate documentation and reporting
Responsibility	<ul style="list-style-type: none"> • Project Engineer • Laboratory Manager
Timeframe	First quarter during defects liability Period
Cost (KES)	180,000.00

7.2.5 Enhancing Institutional and Administrative controls

In order to achieve the purposes of the laboratory services, it is important to enhance institutional and administrative controls. There is need to build the institutional capacity in order to provide efficient diagnostic service to the target community. Table 0:7 below shows the corrective action plan for enhancing Institutional and Administrative controls.

Table 0:7: Corrective Action Plan for Administrative Controls

Objective	To enhance institutional and administrative controls
Policy interface	National Constitution, Performance Targets and Health Sector Investment Plans, EMCA, Cap 387
Parameter	Environmental Policy Environmental Sustainability Plan
Indicators	<ul style="list-style-type: none"> • Environmental sustainability Policy in Place • Environmental Sustainability plans in Place • Human and Financial Resource allocation and accountability at national and county levels for Environmental Sustainability requirements
Activities	<ul style="list-style-type: none"> ▪ Integration of Environmental Policies and Sustainability planning in the project implementation ; ▪ sensitization and training of county and national government health workers on Environmental requirements of the project ▪ Establishment of a coordination team/committee for the implementation and monitoring of Environmental requirements ▪ Deploy more human resources to the county level to build the operational capacity of the laboratory facility
Monitoring method	<ul style="list-style-type: none"> • Performance Contracting Targets on Environmental Sustainability • Adherence to the Memorandum of understanding • Evaluate the impact of Training and capacity building on the project environmental management
Reporting	Appropriate reporting and documentation.
Responsibility	Laboratory Manager County Director of Health
Timeframe	Annually
Cost (Kshs.)	200,000.00

8 CONCLUSION AND RECOMMENDATIONS

8.1 Introduction

The Government of Kenya received funding from the World Bank to construct the Regional Public Health Laboratory at Busia Town. The project was designed to expand access to high quality, reliable and timely laboratory services. This laboratory project required an Environmental Audit in compliance with the World Bank Environmental and Social Safeguards and the Environmental Management and Coordination Act Cap 387 requirements.

The Audit Study revealed that an Environmental Impact Assessment for the laboratory was done and an EIA license was obtained from NEMA on 29th May, 2013 and the report was disclosed to stakeholders as part of the Environmental Safeguards requirements. Further to that, public and stakeholder consultations were carried out during the Environmental Assessment as part of the compliance with the Social Safeguards. The Environmental Audit identified several environmental, safety, health and social findings which require mitigation and correction as highlighted below.

8.2 Summary of Findings

Socio-economic

- The laboratory serves a large community within Busia County and from across the Border of Uganda as well. The beneficiaries access the facility from Busia, Bulanda, Nambale, Mundika, Burumba, Angorom and Uganda side
- The laboratory serves several communities including the Luhya ethnic community which constituted the highest percentage 58.6 (34) of respondents followed by the Luo and Teso respectively. Others were Kikuyu and Kisii ethnic communities, while the lowest percentage of 1.7 (1) was among the Karamoja and Gurreh ethnic communities.
- Vulnerable groups such as children brought by their mothers and elderly patients indicated that they were given priority when queuing for laboratory services. Some of the services were reported to be offered for free such as TB tests.

- Some of the laboratory tests done at the facility include: blood tests for malaria, sputum tests for TB, urinalysis, stool tests for water-borne infections, among others.
- Most 47 (81%) of the respondents from the local community indicated that the cost service provision at the laboratory was affordable.
- Most 42 (72%) of the respondents indicated that the duration of laboratory services took more than one hour. This could be due to the fact that some of the tests conducted at the laboratory require time for processing such as culturing.

Health and safety

- The laboratory has established standard operating procedures which are posted on the notice boards at the workplace and a copy to be issued to workers after it is signed by the Laboratory Manager
- The Material Safety Data Sheets (MSDSs) for substances are available at the workplace; hence, the level of safety awareness among the workers on the safe handling of hazardous substances and emergency procedures is good.
- The emergency procedures in place are designed for handling emergencies likely within the scope of Occupier's business such as fire/explosion, spillages and splashes. The Occupier's fire prevention system comprises of water hydrants, water storage tanks, hose reels, and portable fire extinguishers (CO₂, dry powder, foam) mounted at various points at the facility. These appliances are serviced two times in a year by suppliers.
- It was observed that the smoke and fire detectors installed at the facility, thereby reducing the exposure of the facility to fire risk.
- There was awareness on emergency procedures among the laboratory staff which enhances the disaster preparedness and response status. Whereas there is provision for emergency eyewash unit at the facility as well.
- There were some areas such as the general cleaners' stores where the storage of cleaning materials needs improvement to hence aesthetics. There was need to maintain the sewerage and drainage system in good condition as well.

Environmental Management

- The results of measurement indicate that the noise levels at the Laboratory and surrounding area are within the limit and therefore the noise from laboratory operations does not impact negatively to the environment
- Some trees such as cypress and spathodea were cleared during construction to pave way for the laboratory.
- The project safety and health procedures were emphasized during the project construction phase as evidenced in the project minutes of 19th March, 2013, these include; the need for Personal Protective Equipment, first aid kit and safety officer to be on site.
- The laboratory facility generates hazardous medical and general wastes. The wastes were segregated in to black, yellow and red heavy polythene bags as per the waste management regulations and were collected and central point for transportation to the burning chamber within the hospital facility
- It was observed that during the operation phase of the laboratory, the facility was still using an old incinerator for the disposal of medical waste which contributed high opacity in the ambient environment.
- The commissioning of the new incinerator was planned at the time of the Audit.

8.3 Recommendations

- Address the concerns of target beneficiaries such as long duration in the obtaining of services at the laboratory
- As a precaution, there is need to control any new sources of noise and vibration, maintain appliances and machinery and provide appropriate PPEs to staff
- There is need to improve on emergency preparedness by conducting fire drills, servicing appliances such as the eyewash unit and train the staff on its use.
- There is need for landscaping and tree planting to compensate and ameliorate for the impacts due to the construction phase of the project.
- Ensure that the environmental management plan is followed during the operation of the new incinerator

- Implement corrective actions for medical waste management
- Implement corrective actions for improved drainage, plumbing, roofing and aesthetics of the facility.
- Prepare and implement an environmental policy and sustainability plan for the facility

9 APPENDICES

Appendix 1- Project Designs

Appendix 2- Checklists for the Audit

ENVIRONMENTAL AUDIT CHECKLIST			
Environmental aspect	Parameters	Audit Observations	Mitigation or corrective action(s)
Occupational safety and health	<ul style="list-style-type: none"> Standard operating procedures for laboratory safety 	Standard Operating Procedures were displayed and followed at the laboratory	The Management to continue implementing the SOPs as per the standard requirements
	<ul style="list-style-type: none"> Availability of PPEs 	Most of the workers at the laboratory were provided with gloves, masks and safety shoes	There is need for the management to provide adequate and appropriate safety shoes and gloves especially those handling medical wastes
	<ul style="list-style-type: none"> Safety awareness and training 	There were no records on safety training and awareness among staff	There is need to undertake a Training Needs Assessment and train staff on Safety and Health
	<ul style="list-style-type: none"> Safety policy statements 	There was a laboratory safety procedure in place that is documented	There is need to develop a comprehensive laboratory policy on Environment, Safety and Health
	<ul style="list-style-type: none"> Occurrence of incidents and reporting 	There were few cases of near misses and splashes in the laboratory but were not documented	There is need to document in a standard reporting format all incidents at the laboratory including near misses
	<ul style="list-style-type: none"> Medical check-ups 	Workers have access to medical insurance cover. They are expected to undergo annual medical check-ups, however, there was no	There is need to undertake annual medical check-ups for all staff and document the same

ENVIRONMENTAL AUDIT CHECKLIST			
Environmental aspect	Parameters	Audit Observations	Mitigation or corrective action(s)
		record of such	
	<ul style="list-style-type: none"> • Fire safety 	There were procedures and equipment for firefighting at the facility such as hydrants and fire extinguishers which were inspected	There is need to train fire Marshalls and undertake annual fire drills at the laboratory
	<ul style="list-style-type: none"> • Emergency response plans 	There were emergency response plans displayed in the facility	There is need to sensitize staff on the emergency response plans and test their functionality
	<ul style="list-style-type: none"> • Emergency showers 	One emergency shower was provided at the facility in the corridor of the laboratories	<p>The emergency shower should be serviced and maintained periodically</p> <p>The staff need to be trained on the use of the emergency shower</p>
	<ul style="list-style-type: none"> • Ventilation 	Ventilation at the facility in form of AC and natural ventilation was provided	Some areas require improved ventilation such as the stores due to poor air circulation
	<ul style="list-style-type: none"> • Lighting 	Both artificial lighting by bulbs and florescent tubes were provided apart from	Some areas require replacement of non-functional florescent tubes such as the

ENVIRONMENTAL AUDIT CHECKLIST			
Environmental aspect	Parameters	Audit Observations	Mitigation or corrective action(s)
		windows for natural lighting	corridors
	<ul style="list-style-type: none"> • Use of LPGs 	The facility uses LPG in the kitchen and the laboratory	There is need to ensure that safety measures on the storage and use of LPG are observed
	<ul style="list-style-type: none"> • Food safety 	Foods and drinks are not allowed in the laboratory., However, workers have a lounge where they are allowed to eat	The management to continue implementing all the food safety rules are required
	<ul style="list-style-type: none"> • Resting space 	The workers are provided with a lounge where they can take short breaks	The management to continue implementing measures that enhance productivity of staff including short breaks from duty
	<ul style="list-style-type: none"> • Working space/crowding 	There was adequate working space for all staff since there was no overcrowding	The management to continue implementing measures that enhance adequate working space for each staff
Sanitation, hygiene and welfare	<ul style="list-style-type: none"> • Drinking Water sources 	Provisions have been made for the supply of safe drinking water at the facility	The management to continue implementing measures that enhance provision of safe drinking water
	<ul style="list-style-type: none"> • Number of toilets 	Adequate toilets are available at the facility	The management to ensure that the toilets are accessible and functional

ENVIRONMENTAL AUDIT CHECKLIST			
Environmental aspect	Parameters	Audit Observations	Mitigation or corrective action(s)
	<ul style="list-style-type: none"> Separate toilets for male and female 	Separate toilets for male and female are available at the facility	The management to ensure that the toilets are accessible and functional
	<ul style="list-style-type: none"> means of waste water disposal 	There is an existing sewer line for the disposal of waste water	The management to ensure all the waste water is connected to the sewer line and the line is maintained periodically
	<ul style="list-style-type: none"> Cleanliness 	The facility was clean and free from debris or foul smell	The facility was clean and free from debris or foul smell
	<ul style="list-style-type: none"> Lockers for personal effects 	Provisions have been made for staff lockers at the facility	The management to continue implementing measures that enhance safety of workers personal effects
	<ul style="list-style-type: none"> Changing facilities 	Provisions have been made for staff changing rooms at the facility	The management to continue implementing measures that enhance privacy of staff
	<ul style="list-style-type: none"> Facilities for persons living with disabilities 	Provisions have been made for a ramp and toilet for persons with physical disabilities	The management to continue implementing measures that make the facility user friendly to persons with disabilities
	<ul style="list-style-type: none"> Hand-washing facilities 	Provisions have been made for personal hygiene of staff and clients	The management to continue implementing measures that enhance personal hygiene at the facility
Medical waste	<ul style="list-style-type: none"> Sources of waste 	Medical wastes from the laboratory	Medical wastes to be segregated, transported

ENVIRONMENTAL AUDIT CHECKLIST			
Environmental aspect	Parameters	Audit Observations	Mitigation or corrective action(s)
management		procedures, and general wastes from the administrative activities	and disposed as recommended in the environmental audit report
	<ul style="list-style-type: none"> Characterization of wastes 	Segregation and color coding of waste was done, but no indication of recording of quantities of waste streams	There is need to keep a record of the quantities of waste from different streams or sources
	<ul style="list-style-type: none"> Waste segregation 	Waste was segregated in different receptacles	The management to continue with the segregation of waste at source as per the requirements of the regulations
	<ul style="list-style-type: none"> Waste receptacles labeling 	Color coding of wastes as per the waste management regulations was observed at the facility	The management to continue with the color coding of waste at source as per the requirements of the regulations
	<ul style="list-style-type: none"> Transportation 	Medical waste was transported to the incinerator on a wheelbarrow	The means for waste transportation should be improved to be by the required porter
	<ul style="list-style-type: none"> Provision of PPEs for waste handlers 	Inadequate and dilapidated personal protective equipment including gumboots and gloves were provided to the waste handlers	The management to provide adequate and suitable personal protective equipment to the waste handlers including suitable safety shoes, gloves, overalls, aprons and masks.
	<ul style="list-style-type: none"> Awareness and education 	The waste handlers were aware of the risks associated with medical waste	There is need for continuous education and awareness of waste handlers on the proper

ENVIRONMENTAL AUDIT CHECKLIST

Environmental aspect	Parameters	Audit Observations	Mitigation or corrective action(s)
		management	management and handling of medical waste
	<ul style="list-style-type: none"> Disposal of medical wastes 	The current method for disposal of medical waste was by single chamber incineration	The management should change from the single chamber incineration of medical waste to controlled incineration
	<ul style="list-style-type: none"> Material safety data 	Material safety data sheets were available for all hazardous materials and chemicals that are in store	The management should continue to maintain material safety data sheets for reference in handling chemicals and hazardous materials
	<ul style="list-style-type: none"> Design of new incinerator 	The new incinerator provides for controlled combustion of wastes and emissions from the waste disposal process	The installation of the new incinerator should follow the manufacturer's specifications
	<ul style="list-style-type: none"> Functionality of new incinerator 	The new incinerator had been installed but was yet to be commissioned	The new incinerator should be tested and commissioned as soon as practicable

Appendix 3- Water Quality Test Results

Appendix 4: Sample Questionnaires

Appendix 5: Lead Experts Registration and Practicing licence

Appendix 6- List of Respondents

	Name	Gender	Ethnicity	Age	Residence
1.	Lillian Nakhone	F	Luhya	26	Busia
2.	Nickson Bwire	M	Luhya	24	Busia
3.	Jared	M	Karamajong	58	Bulanda
4.	Etila C	M	Kenyan	30	Busia
5.	Irene Mito	F	Luhya	33	Busia
6.	Emelda Nangila	F	Luhya	50	Mundeka
7.	Richard Nanzala	M	Teso	50	Nambale
8.	Sheila Kafwa	F	Luhya	27	High Rock
9.	Charles Makokha	M	Luhya	49	Hospital Quarters
10.	Eric Wamalwa	M	Luhya	36	Busia
11.	Janet Akinyi Oduor	F	Luhya	25	Busia
12.	Catherine Ochieng	F	Luhya	25	Burumba
13.	Mary Owino	F	Luhya	30	Bulanda
14.	Mildred Achieng Otuko	F	Luo	27	Burumba
15.	Okoth Dennis Pascal	M	Luhya	22	Busia
16.	Peter Omondi	M	Luo	23	Mabale
17.	Bishar Hussein Abdullahi	M	Gurreh	20	Busia
18.	Eucabeth Atieno	F	Luo	22	Roadblock
19.	Masibo Mohammed	M	Luhya	23	Busia
20.	Nabwire Kevina	F	Luhya	18	Busia
21.	Oduor Wilkister	F	Luo	27	Mabale
22.	Eunice Anyango	F	Luhya	28	Busia
23.	Monica Wairimu	F	Kikuyu	30	Busia
24.	Nabwire Constance	F	Luhya	20	Busia
25.	Dina Makabui	F	Luhya	90	Butere
26.	Lillian Anyango	F	Luhya	22	Busia
27.	Malika Ahmed	F	Luo	24	Busia
28.	Odairo Maurice	M	Luhya	43	Ganjala
29.	Samuel Shikuku	M	Luhya	32	Bulanda
30.	Washington Omondi	M	Luhya	37	Busia
31.	Raphael Onyango	M	Luo	32	Busia
32.	James Nahulo	M	Luhya	45	Busia
33.	Mary Adongo	F	Teso	20	Kampala
34.	Lawrence Odongo	M	Luhya	44	Busia
35.	Gad Wafula	M	Luhya	16	Busia
36.	Eugene Okeda	M	Luhya	15	Nambuku-Busia
37.	Ponsiano Ochieng	M	Luo	41	Busia
38.	Peter Adungo	M	Teso	44	Busia
39.	Mark Isaack	M	Luhya	29	Busia
40.	Frederick Odhiambo	M	Luhya	24	Busia
41.	Godfrey Wabwire	M	Luhya	26	Busia

42.	Rachael	F	Luo	48	Busia
43.	Daudi Ibrahim	M	Kuria	28	Burumba
44.	Akinyi	F	Luo	28	Marachi
45.	Maureen Damar	F	Luo	25	Samaki Burumba
46.	Isaac Kubasu Ouma	M	Luhya	24	Angorom
47.	Aden Aziz	M	Luo	30	Busia
48.	Esther Otieno	F	Luo	40	Busia
49.	Anyango Osinya	M	Luhya	14	Busia
50.	John Njuguna	M	Kikuyu	30	Busia
51.	Tophister Nangira	F	Luhya	40	Busia
52.	Nabwire Maxmillan	F	Luhya	29	Busia
53.	Theresia Muthomi	F	Kikuyu	19	Busia
54.	Joseph Juma	M	Luhya	49	Busia
55.	Maureen Akinyi	F	Luo	23	Busia
56.	Topitha Knight	F	Luhya	30	Mundika_Busia
57.	George Omenge	M	Kisii	44	Busia
58.	Muduwa Juliet	F	Samia	32	Busia