

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT
FOR THE PROPOSED NAIROBI SANITATION OBA PROJECT (PROVISION
OF SEWER CONNECTIONS IN INFORMAL SETTLEMENTS)**



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT

MAY 2017

SUBMISSION DETAILS

PROPONENT: Nairobi City Water and Sewerage Company Limited

PROPOSED PROJECT: Proposed Nairobi Sanitation OBA Project (provision of sewer connections in informal settlements)

REPORT TITLE: Environmental Impact Assessment Report

PROJECT NUMBER: P162248

This report has been done in compliance with the Environmental Management and Coordination Act, 1999 and the Environmental Impact Assessment and Audit Regulations, 2003 and World Bank OP 4.01 Environment Assessment. It was conducted and compiled by a team led by:

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Disclaimer:

This Environmental Impact Assessment Project Report is based on literature review and findings from field assessment. It is however, subject to conditions in the Environmental Management and Coordination Act 1999, Environmental (Impact Assessment and Audit) Regulations, 2003 and World Bank OP 4.01 (Environment Assessment).

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ACRONYMS AND ABBREVIATIONS

AWSB - Athi Water Services Board (AWSB)
DOSH – Directorate of Safety and Health
EA- Environmental Audit
EHS – Environmental Health and Safety
ESMP- Environmental and Social Management Plan
EMCA - Environmental Management and Coordination Act
ESIA – Environmental and Social Impact Assessment
KES – Kenya Shilling
MDGs – Millennium Development Goals
NEMA – National Environment Management Authority
NCC – Nairobi City County
NCWSC – Nairobi City Water and Sewerage Company
NEAP - National Environment Action Plan
NEC – National Environment Council
NGOs – non-governmental organizations
NPEP - National Poverty Eradication Plan
NWSS - National Water Services Strategy
OBA – Output Based Aid
OP – Operational Policy
PVC - Polyvinyl Chloride
SPAs - Service Provision Agreements
TBD – To be Determined
TOR – Terms of Reference
UoN – University of Nairobi
WASREB - Water Services Regulatory Board
WB – World Bank
WHO- World Health Organisation
WRMA - Water Resources Management Authority
WSB – Water Service Board

WSPs – Water Services Providers
WSTF - Water Services Trust Fund

EXECUTIVE SUMMARY

i) Company Brief

Nairobi City Water and Sewerage Company NCWSC was incorporated in December 2003 under the companies Act cap 486. It is a wholly owned subsidiary of Nairobi City County Government (NCCG) and has its Headquarters along Kampala Road, Industrial Area, Nairobi. The company's core business is the provision of water and sewerage services to the city of Nairobi and its environs. The mandate of NCWSC is to provide clean water and sewerage services to the residents of Nairobi County, in a financially sustainable manner and within Government regulations. The City has an estimated population of 3.8 million and projected to grow to 4.5 million by 2018/19. NCWSC has developed a five year strategic plan which focuses to provide the company with a strategic direction and assist it achieve efficacy in tandem with the planned international and national water sector goals of the government of Kenya. The services provided by the Company fall under eight functional directorates. These directorates are Financial Services, Human Resources & Administration, Commercial Services, Technical Services, Information Communication Technology (ICT), Legal Services, Internal Audit & Risk Management Services and the office of the Managing Director (MD). The eight directorates are further sub-divided in to various departments.

The employees are deployed in 17 stations some of which have several sub stations that are geographically dispersed in and outside the city of Nairobi. A dedicated team of staff with different specializations has been seconded to the Nairobi Sanitation Output Based Aid (OBA) project. The core team members include an Environment Coordinator who has been seconded to the project for its duration. As part of its commitment to implementing a social connection policy, NCWSC created an "informal settlements region" to cater for customers in informal settlements. This newly created "region" operates alongside the six geographical regions through which the company carries out its day to day operations, and is staffed with sociologists, customer care staff, finance/revenue and a technical team. They will ensure sustainability of the project by continuously engaging the communities, conducting awareness and revenue collection. The technical team shall be involved in sewer maintenance and clearing any blockages.

ii) Project Justification & Description

NCWSC is appointed by Athi Water Services Board (AWSB) to provide Water and Sewerage Services to Nairobi City under an agreed framework specified in the Service Provision Agreement

(SPA) that ensures adequate and quality water supply, affordable tariffs, maintenance and improvement of water and sewerage infrastructure. Access to improved sanitation systems remains a nationwide problem in Kenya. These problems are especially acute in the informal settlements. Most of the informal settlements lack adequate sanitation. Significant sections of the areas in the informal settlements use septic tanks and pit latrines for discharging their sewage with possibilities of environmental pollution, particularly in regard to water sources (surface sources and ground aquifers). Consequently, there is always potential risk of disease outbreaks, especially in the highly populated areas not served with sewerage systems as well as areas with high population density.

The proposed project will not only reduce risks of health problems but also lead to pollution control of rivers, water sources and the environment in general.

To help increase access to basic sanitation (and where not available, water) services, NCWSC developed the Nairobi Sanitation OBA Project. The project is partially financed by the World Bank with a grant from the Global Partnership on Output Based Aid (GPOBA) funded by the United Kingdom's Department for International Development (DFID). The objective of the project is to increase access to sanitation and water services in selected low-income communities of Nairobi, and in so doing, improve the living conditions in informal settlements through the provision of reliable, affordable and sustainable basic sanitation and water services to the poor.

The OBA project financed by the World Bank presents an opportunity to alleviate sanitation problems in Nairobi's informal settlements. The project is aimed at upgrading the existing plot based pit latrines, pour flush toilets and WC connections to septic tanks in the selected informal settlements within Nairobi into standard mains sewer connections (existing sewers). The project involves the rehabilitation of existing sanitation facilities, installation of wash hand tank and 400 liters storage water tanks. Based on data gathered and economic analysis, the proposed project demonstrates overwhelmingly net positive benefits. Furthermore, all negative impacts can be either prevented or mitigated. Overall, the environmental (and socioeconomic and community health) impacts of sanitation projects are positive, while potential negative impacts are temporary and manageable. After completion the project, it is anticipated that the project implementation will not only reduce risks of health problems, but also lead to pollution control of waters, water sources and the environment in general. The residents are expected to have a number of benefits, these are:-

- Improved sanitation – these areas experience frequent leaking septic tanks and pit latrines and with the new sewerage toilets this will be fully solved

- Improved living standards- waste water will be properly disposed
- Prevention of communicable diseases which are associated with poor sewer/waste management, with the existing sanitation facilities being rehabilitated all the waste water will be managed hence improving the health of the residents
- Cheap waste water management as there will be no need for exhausting services which were far expensive for the landlords.
- Clean environment, which will be enhanced by the proper management of fecal waste

The World Bank has provided an initial grant of US\$4.33 million and an additional US\$2.6 million to the Government of Kenya for the NCWSC to implement the project. The project provides subsidies to connect households (including compound households in informal settlements) to trunk infrastructure put in place in low-income areas of Nairobi through the World Bank financed Water and Sanitation Services Improvement Project and the Kenya Informal Settlements Improvement Project. The project will pay an output-based subsidy to NCWSC to partially reimburse the costs incurred in achieving specific water and sanitation services related outputs. The outputs under the project are:

- Water supply connections to low-income households / compounds
- Sewer connections and associated internal plumbing, including toilets, hand washing basins and storage tanks as necessary, to low-income households / compounds.

NCWSC has taken a commercial loan to finance the project, which will cover a significant portion of the project cost, with the balance being covered by the subsidy. NCWSC will charge consumers a uniform connection fee to access the service, and will charge an additional capital cost recovery fee to customers over a period of up to five years to generate revenue to repay the loan. The consumers will also pay monthly water and sewerage consumption charges that have been approved by the WASREB. The consumer contributions and monthly payments have been set after assessing consumer affordability, project demand, and taking into account the financing requirements to successfully implement the project. The initial consumer connection and monthly capital cost recovery fees are: Consumers applying for water and sanitation connections under the project pay an upfront fee of KShs 1,648 for a water connection and KShs 1,648 for a sewer connection, and sign an agreement to make monthly payments towards capital costs of KShs 150 for 3 years for a water connection and KShs 450 for 5 years for a sewer connection, in addition to the monthly consumption charges. The consumers are made aware of the charges before signing up

for connections, and each person applying for a connection completes a customer services agreement with NCWSC that clearly states the customer payment obligations.

iii) ESIA Justification

In accordance with the EMCA, 1999, all new projects must undergo environmental impact assessment so as to comply with the EIA Regulation, 2003. In addition the National Policy on Water Resources as well as the Water Rules established under the Water Act, 2002 calls for environmental impact assessment on water related projects for long term sustainability and acceptability by the beneficiaries. Water related project including sewage disposal are listed in the 2nd schedule of EMCA, 1999 as among project that should undergo EIA. The proposed intervention projects are expected to have an overall positive impact to the people and the environment. However, construction phases and certain aspects of the operations are anticipated to have environmental impacts that would require to be mitigated. This document entails an Environmental and Social Management Plan describing how these potential negative impacts will be avoided or mitigated. Environmental screening, assessments, and mitigation measures that might be necessary during the project planning, construction, and operational stages for the proposed have been identified. The magnitude of the projects justifies the ESIA to provide an Environmental and Social Management Plan (ESMP) for integration into implementation process.

iv) Study Scope

The scope of the report was to describe the project, document all baseline information, assess both the positive and negative impacts and develop mitigation measures for negative impacts including designing environmental management plan for the proposed project. This study has been carried out within the framework of the guidelines and procedures spelt out in the Environmental (Impact Assessment and Audit) Regulations 2003, Environmental Impact Assessment guidelines and Administrative procedures, and as a result of consultations with the project proponent.

World Bank OP 4.01- Environmental Assessment of the World Bank has been triggered in order to identify, avoid, and mitigate the potential negative environmental impacts associated with the project. The scope of the study included carrying out of environmental investigations within the current legislative framework. This was done in line with the requirements of Environmental Management and Coordination Act (EMCA) 1999 and Environmental (Impact Assessment and Audit) Regulations 2003 and World Bank OP 4.01 among other legal and regulatory frameworks.

The study covered the physical extent of the project site and its immediate environs, implementation works of the proposed development (upgrading, laying of pipes) among other activities and installation of key utilities and other facilities required for the project to function optimally.

v) Objectives of the Study

The need for ESIAs has become increasingly important and is now a statutory requirement in many developing countries. Environmental Impact Assessment is a tool for ensuring new projects and programs incorporate appropriate measures to mitigate adverse impacts to the environment and peoples' health and safety as well as enhancing sustainable operations with respect to environmental resources and co-existence with other socio-economic activities in their neighborhood. The Government of Kenya efforts aimed at formulating a clear policy strategy culminated in the enactment of legislation on water management. The Water Act 2002 is aimed at harmonizing and streamlining the management of water resources, water supply and sanitation services. This Project falls within Schedule 2 of EMCA 1999 and therefore requires an EIA. The Proponent has commissioned the environmental impact assessment in compliance with the Act.

The Proponent shall be required to commit to implementing the Environmental and Social Management Plan laid out in the report and any other conditions laid out by NEMA in order to ensure environmental and social sustainability of the project. This will ensure that the project is environmentally sustainable and will result in minimal environmental hazards.

The environmental impact assessment is therefore meant to achieve the following objectives:

- To identify and evaluate the significant environmental impacts of the proposed project
- Propose mitigation measures for the identified negative impacts.
- To assess and analyze the environmental costs and benefits associated with the proposed project
- To evaluate and select the best project alternative from the various options available
- Prepare an environmental management plan for the project.
- To incorporate environmental management plans and monitoring mechanisms during implementation, operation and decommissioning phases of the project
- Incorporate the findings of public consultations.

vi) Study Methodology

The study methodology involved scoping and use of checklist, field survey techniques, observation and recording, use of questionnaires and review of existing literature. A participatory approach that recognizes the importance of all stakeholders, and seeks to incorporate opinions and suggestions of all, especially the intended beneficiaries was adopted. The methodology comprised field visits and data collection from the project area, data analysis and report writing. The approach, process and methodology was based on the objectives of the project, i.e. to alleviate the lives in informal settlements through provision of reliable, affordable and sustainable basic sanitation services to the poor. The team reviewed the available background documentation as a basis for identifying the existing situation, assessments and interaction with the intended beneficiaries.

vii) Terms of Reference (TORs)

This environmental impact assessment involved;

- Field evaluation of the proposed project areas for baseline information and verification to establish current status of the proposed site and its environs
- Concise description of the national environment legislative and regulatory framework, and any other relevant information related to the project
- Identification of predictable effects of the development on the environment (including infrastructure, occupational health and safety issues) and direction and magnitude of the change.
- Evaluation and analysis of alternatives including the proposed project, project alternative, design and technology and no action alternative.
- Analysis of the compatibility of the proposed project with the surrounding land uses (as per the prevailing policy and legal framework)
- The proposition of potential mitigation measures to be undertaken throughout the project cycle.
- Development of an Environmental and Social Management plan (ESMP) with proposed mechanism for monitoring and evaluating the compliance and environmental performance
- Prepare a comprehensive ESIA report providing the project description, potential impact and their mitigation as well as environmental and social management plans

The key activities that took place were as follows:

Desk Studies

- Consultations with the Client

- Review of relevant documents, data and existing baseline conditions of the project areas,
- Consultative meetings with the stakeholders involved in the project.

Field Assessment

- Visits to the project site with beneficiary community leaders.
- Field visits for physical observations of the existing infrastructure, amenities, general environmental and social setting

The project is estimated to cost **KES 1,029,759,701.67**

viii) Policy and Legislative Framework

The proposed project is subject to Kenyan legislation framework and the requirement of the World Bank Operation Policy 4.01 on Environmental Impact Assessment. Kenyan Laws and Acts of Parliament Discussed include; EMCA 1999, Water Act 2002, Public Health Act Cap 242; Occupation Health and Safety Act 2007; Way leaves Act Cap 292; Vision 2030 and World Bank Safeguard Policies.

ix) Anticipated Environmental and Social Impacts

The proposed project may impact negatively on environment, workers, neighbors, pedestrians and society at large. The impacts may be positive or negative. This report proposes mitigation measures for negative impacts and identifies the desirable social and economic benefits. The following impacts have been identified as likely to arise from the proposed project and which this report seeks to address: These impacts include the following and will need mitigation:

Positive Impacts:

Positive impacts will include the following:

- Improved state of sanitation and hygiene in the target informal settlements with the overall effects of acceptable habitation
- Reduction in pollution to surface water sources running within the project areas
- Improved aesthetic.
- Improved/enhanced family health
- Employment opportunities contributing a direct economic benefit to the residents.
- Improvement of skills among those involved as casual workers, the project could, therefore, act as training and capacity building and therefore a transitional stage from unskilled to semi-skilled labor.

Negative Impacts

- Increased solid waste generation during construction phase
- There may be potential but temporary disruptions of surface runoff where sewer extensions shall be constructed
- Increased noise and vibration levels during construction
- Impacts on occupational safety and health of the workers during the construction phase.
- Impact on water quality during emptying/exhausting the existing pit latrines and construction activities

Social Impacts

The overall social impact of the proposed project is positive. There will be no social or economic disruptions anticipated from the project in the target areas.

The Environmental and Social Management Plans (ESMPs) was designed with appropriate mitigation measures. These plans considered the potential negative impacts, mitigation measures, and responsible parties, monitoring indicators, frequency of monitoring and estimated costs of such measures.

After assessing the project impacts, the Environment and Social Impact Assessment team's view is that the negative impacts arising out of the proposed project can be managed and therefore the Proponent should be allowed to proceed with this project on condition that the proposed Environmental and Social Management Plan is implemented and Compliance with all the relevant principal laws, by-laws and regulations impacted on by the proposed project are met.

1.0 BACKGROUND INFORMATION

INTRODUCTION

1.1 General overview

Most urban areas in Kenya are characterized by informal settlement arising from high population and poverty in addition to various other factors. The National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999) was established with an objective to preserve, conserve and protect available water resources and allocate it in a sustainable rational and economic way. It also aims at supplying water of good quality and in sufficient quantities to meet the various water needs while ensuring safe disposal of wastewater and environmental protection. The policy focuses on streamlining provision of water for domestic use, agriculture, livestock development and industrial utilization with a view to realizing the set goals (that are also in line with the United Nations Millennium Development Goals (MDGs) as well as Kenya's Vision 2030 (improved social wellbeing of the populace, enhanced performance of the economy and promotion of national economic development and a properly conserved ecosystem). Based on the policy, the Water Act 2002 was formulated and in effect implemented recommendations of the policy. Water Act 2002. Provides for formulation of a national water services strategy to design a programme to ensure the progressive extension of water and sanitation services to everyone in Kenya and ensure that all areas in the country are adequately served. The proponent would wish to alleviate sanitation problems in the informal settlements as well as proper disposal of wastes so as to be compliant with the law.

1.2 Impacts of poor/lack of proper sanitation

The impacts of poor/lack of proper sanitation are adverse but perhaps the most identified is health. Environmental degradation occurs mostly due to mismanagement of waste disposal systems, both solid and grey waters, overpopulation, poor planning and other human practices. Environmental negative impacts also lead to health impacts and health impacts cause economic problems and vice versa. Many diseases are associated with inadequate water, sanitation and hygiene. In terms of gender, having no proper means for excreta disposal is a great inconvenience to many women and girls who in particular face problems of distance, lack of privacy and personal safety. Poor sanitation is also a serious threat to the cleanliness of the environment and the water resources used for the supply of drinking water both surface and groundwater. Groundwater aquifers are recharged from the surface and as they are slow to accumulate, contaminants are also slow to move out. It is

highly possible for untreated waste water to leach into soils thus reaching water tables and also polluting soils. The constant bad odour from excreta both from badly ventilated and unclean toilets or open defecation also cause air pollution and increase the risk of disease (WHO 1999).

1.3 Characteristics of Informal Settlements

According to UN-Habitat (2003), the following are the characteristics of an informal settlement (slum):

- Lack of basic services;
- Unplanned and underserved neighborhood typically settled by squatters
- Overcrowding and high density;
- Poor housing conditions as reflected in hazardous location, impermanent structure and insufficient living area (three or more people per room);
- Inadequate access to improved water at affordable prices and without extreme effort to improved sanitation to a private or public toilet shared with a reasonable number of people;

It is estimated that there are over 100 informal settlements in Nairobi alone. These can be categorized into two; squatter settlements and those that arise out of illegal sub-divisions of either government or private land. Rapid growth of informal slum settlements in Nairobi County can be attributed to a number of factors among them increasing income inequalities, urban poverty and increasing rates of rural urban migration. Most of the inhabitants earn low incomes and have limited assets.

1.4 Terms of Reference (TORs)

This Environmental and Social Impact Assessment involved;

- Field evaluation of the proposed project areas for baseline information and verification to establish current status of the proposed site and its environs
- Concise description of the national environment legislative and regulatory framework, and any other relevant information related to the project
- Identification of predictable effects of the development on the environment (including infrastructure, occupational health and safety issues) and direction and magnitude of the change.
- identification and evaluation of the potential impacts associated with project implementation and subsequent operation

- Evaluation of the technology, procedures and processes to be used in the implementation of the project
- Evaluation and analysis of alternatives including the proposed project, project alternative, project site, design and technology and no action alternative.
- Analysis of the compatibility of the proposed project with the surrounding land uses (as per the prevailing policy and legal framework)

1.5 Study Scope

This study has been carried out within the framework of the guidelines and procedures spelt out in the Environmental (Impact Assessment and Audit) Regulations 2003 and Environmental Impact Assessment guidelines and Administrative procedures, and as a result of consultations with the project proponent. World Bank OP 4.01- Environmental Assessment of the World Bank has been triggered in order to identify, avoid, and mitigate the potential negative environmental impacts associated with the project. The scope of the study included carrying out of environmental investigations within the current legislative framework. This was done in line with the requirements of Environmental Management and Coordination Act (EMCA) 1999 and Environmental (Impact Assessment and Audit) Regulations 2003 among other legal and regulatory frameworks and World Bank OP 4.01 on Environmental Assessment. The study covered the physical extent of the project site and its immediate environs, implementation works of the proposed development (ground preparations, laying of pipes) among other activities and installation of key utilities and other facilities required for the project to function optimally.

The scope of this ESIA study includes the following;

- A review of policy, legal and administrative framework
- Description of the proposed project
- Baseline information including biophysical and socio-Economic environment and land use
- Assessment of the potential environmental impacts on the project area
- Development of the mitigation measures and future monitoring plans
- Proposition of alternative sites and technology
- Occupational health and safety

1.6 Responsibilities

While the Environmental experts provided the technical understanding on the baseline environmental status, potential impacts, management options and legal framework, the client was

expected to provide the full details of proposed operations and activities, input materials, site operational outline, products and by-products and any waste to be generated.

The output from the ESIA Experts was an ESIA project report comprising of an executive summary, study approach, baseline conditions, existing and anticipated impacts and potential mitigation measures for anticipated negative impacts and a comprehensive environmental management plan (ESMP)

1.7 Justification for the project

It is estimated that approximately 80% of the hospital attendance in Kenya is due to preventable diseases; 50% of these diseases being water, sanitation and hygiene related. Access to safe water and adequate sanitation is therefore the foundation of health and a key step out of poverty. Several constraints in realization of this goal in Kenya include inadequate financial resources to develop water supply and sanitation services especially in the informal settlements. Consequently, there is always potential risk of disease outbreaks, especially in the highly populated areas with poor sanitation systems. The priority project should not only reduce risks of health problems but also lead to pollution control of rivers, water sources and the environment in general. The main objective of the proposed project will be to alleviate the lives in informal settlements through provision of reliable, affordable and sustainable clean water and basic sanitation services to the poor.

The OBA project financed by the World Bank presents an opportunity to alleviate sanitation problems in Nairobi's informal settlements. OBA project is aimed to upgrade the existing pit latrines, pour flush toilets and the septic tanks in the informal settlements within Nairobi to conventional standard main sewers connection. The works also involve installation of water storage tanks. After completion the project, it is anticipated that the project implementation will not only reduce risks of health problems, but also lead to pollution control of waters, water sources and the environment in general. The project should not only reduce risks of health problems but also lead to pollution control of rivers, water sources and the environment in general. The residents are expected to have a number of benefits, these are:-

- Improved sanitation – these areas experience frequent leaking septic tanks and pit latrines and with the new sewerred toilets this will be fully solved.
- Improved living standards- waste water will be properly disposed hence improved lifestyles.

- Prevention of communicable diseases which are associated with poor sewer/waste management, with area being sewerred all the waste water will be managed hence improving the health of the residents
- Cheap waste water management as there will be no need for exhausting services which were far expensive for the landlords.
- Clean environment, which will be enhanced by the proper management of the waste water/sewer

1.8 Relevance of the policy interventions

There are quite a number of people using pit latrine in informal settlements. This leads to lack of privacy, security, hygiene, poor structural condition and filled pits. The practical solution is the dumping of human waste in alleys and ditches using plastic bags (referred figuratively as “flying toilets”). If the project is implemented, the people living in these informal settlements will have access to basic sanitation and sewerage services. This is a basic human right and the provision of these services will reduce incidence of diseases save time, improve security, and contribute in poverty reduction. The proposed intervention project is expected to have an overall positive impact to the people and the environment. However, construction phases and certain aspects of the operations are anticipated to have environmental and social impacts that would require to be mitigated. The magnitude of the project justifies the ESIA to provide an environmental management plan (ESMP) for integration into implementation process.

1.9 Conclusion

The proposed project will have very limited impacts on the environment which are manageable. It is possible to mitigate these potential negative impacts at minimal costs or cost free. These impacts are largely localized to the site. Predicted socio-economic impacts are entirely positive, principally through creation of jobs and income. There is high appreciation of the proposed project from the residents, majority who are youth and women with direct hands-on experiences with poor sanitation and hygiene on daily basis. The potential negative impacts of the project are insignificant and should not prevent the project from proceeding, as long as the proponent and the contractor undertake measures to alleviate the potential impacts identified in this report. Implementation of the proposed water and sanitation project in various informal settlements will have major benefits to residents in these areas and overall savings both at household and general public levels in form of expenditures on health.

2.0 INSTITUTIONAL POLICY AND LEGAL FRAMEWORK

2.1.1 The Environment Management and coordination Act, 1999

The Act entitles every person in Kenya to clean and healthy environment and aims to safeguard and enhance the environment. Though there are other sectoral laws on environmental conservation, this is the supreme Act. It provides guidelines on issues of environment, stipulates offences and penalties and also lists the type of projects, which must be subject to EIA process. The proposed development is among those that require EIA process.

The following subsidiary regulations should also be complied with during the implementation of the project:-

- 1. The Environmental Management and Co-ordination (Water Quality) Regulations,**

2006: These regulations set the standards of domestic water and waste water. The regulations are meant for pollution control and prevention and provide for the protection of water sources;

- 2. Environmental Management and Co-ordination (Waste Management) Regulations**

2006: These regulations define the responsibilities of waste generators and define the duties and requirements for transportation and disposal of waste. The regulations provide for mitigation of pollution and handling of hazardous and toxic wastes. The regulations require a waste generator to dispose waste only to a designated waste receptacle. The proponent shall adhere to the regulations and proposes to contract a NEMA registered waste transporter;

- 3. Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) (Control) Regulations, 2009:** These regulations are aimed at minimizing the impacts of noise and vibrations from the proposed activities, and set acceptable noise thresholds for the activities in addition, working hours are limited between, 8.00 am and 5.00 pm among other guidelines in connection with noise abatement.

2.2 Institutional Structure of the Water Sector

The National Policy on Water Resources Management and Development and the Water Act 2002, presently guides water resources management. The overall goal of the national water development policy is to facilitate the provision of water in sufficient quantity and quality and within a reasonable distance to meet all competing uses in a sustainable, rational and economical way. This policy separates policy formulation, regulation and services provision and defines clear roles for sector actors within a decentralized institutional framework and includes private sector

participation and increased community development. Under the policy, the Ministry of Water and Irrigation is responsible for policy development, sector co-ordination, monitoring and supervision to ensure effective Water and Sewerage Services in the Country, sustainability of Water Resources and development of Water resources for irrigation, commercial, industrial, power generation and other uses. The Ministry executes its mandate through the following sector institutions.

2.2.1 Water Services Regulatory Board (WASREB)

The regulatory Board is responsible for the regulation of the water and sewerage services in partnership with the people of Kenya.

Relevance to this project

- Shall issue guidelines for tariff considering that the project is implemented in the informal settlements. This will ensure users are able to pay hence sustainability of the project
- Shall review and approve tariff changes if need be especially water pricing in informal settlements

Relevance to the project

-shall participate in capacity building activities and awareness creation are without adequate water services

Relevance to the project

Shall assist in monitoring and evaluating the project impacts

2.2.2 Water Services Boards (WSBs)

The WSBs are responsible for the efficient and economical provision of water and sewerage services in their areas of jurisdiction.

Relevance to this project

Nairobi Water and Sewerage Company being the implementer of the project fall under the jurisdiction of Athi Water Services Board. The board shall assist in preparation of performance targets for the project which will directly have an impact on provision of water and sanitation services to the informal settlements

2.2.3 Water Services Providers

Water Service Providers are the utilities or water companies. Nairobi water and Sewerage Company being the implementer of the project shall;-

- Ensure effective communication of all matters related to project to the target group.
- Sensitize the community for buy in of the project and ensure its sustainability.
- Ensure implementation of the project in accordance with the project rules

2.3 NEMA Compliance

The government established the National Environmental Management Authority (NEMA) as the supreme regulatory and advisory bodies on environmental management in Kenya under EMCA 1999. NEMA is charged with the responsibility of coordinating and supervising the various environmental management activities being undertaken by other statutory organs. NEMA also ensures that environmental management is integrated into development policies, programs, plans and projects.

2.4 Administrative Framework

2.4.1 Way-leaves Act (Cap 292)

Under Section 3 of this Act, the Government may carry any sewer, drain or pipeline into, through, over or under any lands whatsoever but may not in so doing interfere with any existing building.

2.5 National Environmental Acts

The EIA guidelines available for Kenya, especially the EMCA 1999 and NEMA Environmental Impact and Audit Regulations 2003, were closely followed in this ESIA. Awareness regarding the relationship between the environment and economic development in Kenya continues to grow since 1992 when Kenya joined the rest of the world in endorsing Agenda 21 as the global blueprint for sustainable development. To this end Kenya has recognised the need for mainstreaming environmental issues in all aspects of its economic development. This will ensure that the project is environmentally sustainable and will result in minimal environmental hazards.

2.5.2 Public Health Act Cap 242

The Act protects human health. It prevents and guards against introduction of infectious diseases into Kenya from outside, promotes public health as well as the prevention, limitation or of infectious, communicable or preventable diseases within Kenya. Its objective is also to advice and direct local authorities in regard to matters affecting the public health to promote or carry out researches and investigations in connection with the prevention or treatment of human diseases. This Act provides the impetus for a healthy environment and gives regulations to waste management, pollution and human health. This act provides for securing and maintaining health. This Act defines what an environmental nuisance is and this includes emissions of wastes, gases, smoke and the general pollution of land, air and water. During the construction of the bridge, it is likely that wastes and accidents may occur. Section 118 (c) deems it a nuisance for any street ,

road, or any part thereof, any stream, pool, ditch, gutter, watercourse, sink, water tank etc. so foul or in such a state or so situated or constructed as in the opinion of the medical officer of health to be offensive or to be injurious or dangerous to human health. Street here includes bridges, footway, square, court, alley etc.

2.5.3 Occupational Safety and Health Act, 2007

The Act makes provision for the health, safety and welfare of persons employed in factories and other places of work. The provisions require that all practicable measures be taken to protect persons in places of work from dust, fumes or impurities originating from any process within the workplace. The provisions of the Act are also relevant to the management of hazardous and non-hazardous wastes, which may arise at a project site. The Act provides for all necessary safety precautions to ensure the health and safety of workers. The proponent and contractor undertake to prevent pollution, minimize the emission of dust and production of noise during the process of site preparation and development. The proponent should also undertake to provide all workers with Personal Protective Equipment for all works associated with this project as applicable so as to ensure health, safety and welfare for the workers that will be employed onsite.

World Bank Safeguard Policies

Under World Bank environmental safeguard policies, projects are required to include measures for environmental and social sustainability, which includes screening potential negative impacts. Although the project is expected to produce net benefits, certain project activities may have environmental or social impacts that require mitigation. The World Bank's Safeguard policies are designed to help ensure that projects proposed for Bank financing are environmentally and socially sustainable. These operational policies include:

- OP 4.01 Environmental Assessment;
- OP 4.04 Natural Habitats;
- OP 4.09 Pest Management;
- OP 4.11 Cultural Heritage;
- OP 4.12 Involuntary Resettlement;
- OP 4.10 Indigenous People;
- OP 4.36 Forests;
- OP 4.37 Safety of Dams;

- OP 7.50 Projects on International Waterways;
- OP 7.60 Projects in Disputed Areas.

Of the 10 SGPs only OP 4.01 (Environmental Assessment) is applicable to the proposed project.

Environmental Assessment (OP 4.01)

OP 4.01 requires Environmental Assessment (EA) for projects proposed for Bank financing to ensure that they are environmentally sound and sustainable, and as a basis for decision making. Under OP 4.01 projects are screened and assigned either of four categories each of which requires different levels of environmental assessment as follows:-

- Category A: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.
- Category B: A proposed project is classified as Category B if it's potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than for Category A projects.
- Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.
- Category FI: A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary in subprojects that may result in adverse environmental impacts.

The policy is applicable as the project involves works with potential negative environmental impacts. During the screening it was determined that the project activities in informal settlements in the selected areas may have limited, site specific, mostly reversible impacts. It was proposed to assign Environmental Assessment Category B to this project, based on subproject screening exercise. ESMP was developed to identify the potential environmental impacts and propose measures to avoid, minimize or mitigate these effects.

Physical Cultural Resources (OP 4.11)

The project will not include areas of significant cultural value.

Involuntary Resettlement (OP 4.12)

The project will not result in land take neither result in displacement of people. No disturbance is expected as most of the lateral lines have been developed and only connection to the houses will be carried out

Natural Habitats (OP 4.04)

The proposed project will not be implemented in any protected area

Indigenous Peoples (OP 4.10)

The project will not impact any vulnerable and marginalized groups as it will be implemented in an urban area, which does not answer the four criteria of the OP 4.10.

In Kenya, it is a mandatory requirement under EMCA 1999 for all development projects (Schedule Two) to be preceded by an EIA study. Thus, under the Laws of Kenya, environmental assessment is fully mainstreamed in all development process consistent with World Bank policies.

Table 2-1: The World Bank Safeguard Policies

POLICY	APPLICABILITY IN THIS PROJECT
Environmental Assessment (OP 4.01)	Yes
Forests (OP 4.36)	No
Physical Cultural Resources (OP 4.11)	No
Indigenous peoples (OP 4.10)	No
Involuntary Resettlement (OP 4.12)	No
Projects in International Waters (OP 7.50)	No
Pest Management (OP 4.09)	No
Projects in Disputed Areas (OP 7.60)	No
Projects on International Waterways(OP 7.50)	No
Safety of Dams (OP 4.37)	No

3.0 STUDY METHODOLOGY

3.1 Objective

This project report was prepared in accordance to the EMCA Act of 1999 and based on the environmental impact Assessment and Audit guidelines of 2003. The proponent has therefore conducted this study in order to fully comply with the Act and its Regulations as well as to ensure best environmental practices. This was done in line with the requirements of Environmental Management and Coordination Act (EMCA) 1999 and Environmental (Impact Assessment and Audit) Regulations 2003 among other legal and regulatory frameworks and World Bank OP 4.01

The scope of this study is to describe the project and evaluate all possible positive and negative environmental impacts in order to propose the mitigation measures necessary to reduce the effect of the identified negative impacts.

3.2 Scoping and use of checklists

In analyzing of the impacts of the proposed project, a scoping checklist was used to isolate the broad areas on which the project would potentially have impacts on the environment. This helped in identifying and predicting on the possible impacts that are expected from the proposed development.

3.2.1 Field survey techniques

The field survey adopted various techniques of baseline data collection on the existing environmental conditions, namely:

- Field observation
- Discussions with stakeholders
- Interviewing the residents

3.2.2 Observation and recording

Some data were generated through observation and recording at site. The current land use systems, topography, geology and natural drainage system, communication system and infrastructure were observed during the site visits while verbal inquiries from the residents helped in providing the recent changes that have occurred in the area in terms of land use. Information on, biological environment and human environment was also gathered through observation and recording.

3.2.3 Use of questionnaires

For public participation, an interview was conducted through a semi-structured questionnaire.

The interview targeted people and sought to document from these people:

-any issues, objection, interest and concerns that they might have on the proposed project

-alternatives or option if any which can cater for their objection, interest or concern

3.2.4 Photography

Photos were taken to show the actual site of the proposed development, resources on site and neighboring developments

3.3 Review of existing literature

The following documents were consulted for the respective purposes:

The Environmental Impact Assessment and Audit regulations were consulted to help in organizing on how to conduct the study and appropriate layout of the report to be compliant with the regulations. The Environmental Impact Assessment (EIA) (Guidelines and Administrative Procedures) issued by NEMA and World Bank Safe guard Policies were also consulted.

Several statutes were browsed to pick out issues that the proposed project has to comply with. To complement this, a report on Environmental Rights and Offences under EMCA and other Laws was consulted

4.0 PROJECT LOCATION, SCOPE, AND ACTIVITIES

4.1 Nature and Scope of the Proposed Project

The proponent proposes to upgrade of existing plot based pour flush toilet connections and plot pit latrines to convectional standard mains sewer connections (existing sewers) in the 12 selected informal settlements areas within Nairobi. The proponent intend to:-

- 1) Type A connection - this will include the connection of existing toilets discharging to the drains to the conventional sewer line and any required rehabilitation, installation of wash hand facility and 400 L water storage tank.
- 2) Type B Connection - These are the existing pit latrines facilities which will need to be exhausted, backfilled and facility rehabilitated or rebuild. There will be installation of the Toilet Basin and connecting to the Conventional sewer lines, installation of Hand wash Basin and 400L storage tank
- 3) There will be reticulation in areas where the sewer lines need to be extended.

They shall be installed in residential houses where the customers/plot owners will be required to apply for water connections. They were determined on availability/existence of sewer lines to connect the facilities. The proponent intend to;-

- Upgrade 4871 no. existing Plots based pour flush toilet connection to conventional standard main sewers connection (Type A),
- Upgrade 3742 no. existing plots based pit latrines to conventional standard main sewers connection (Type B).
- Connecting 6438 poor households to water connections

Figure 4-1: Map of Nairobi showing the project sites

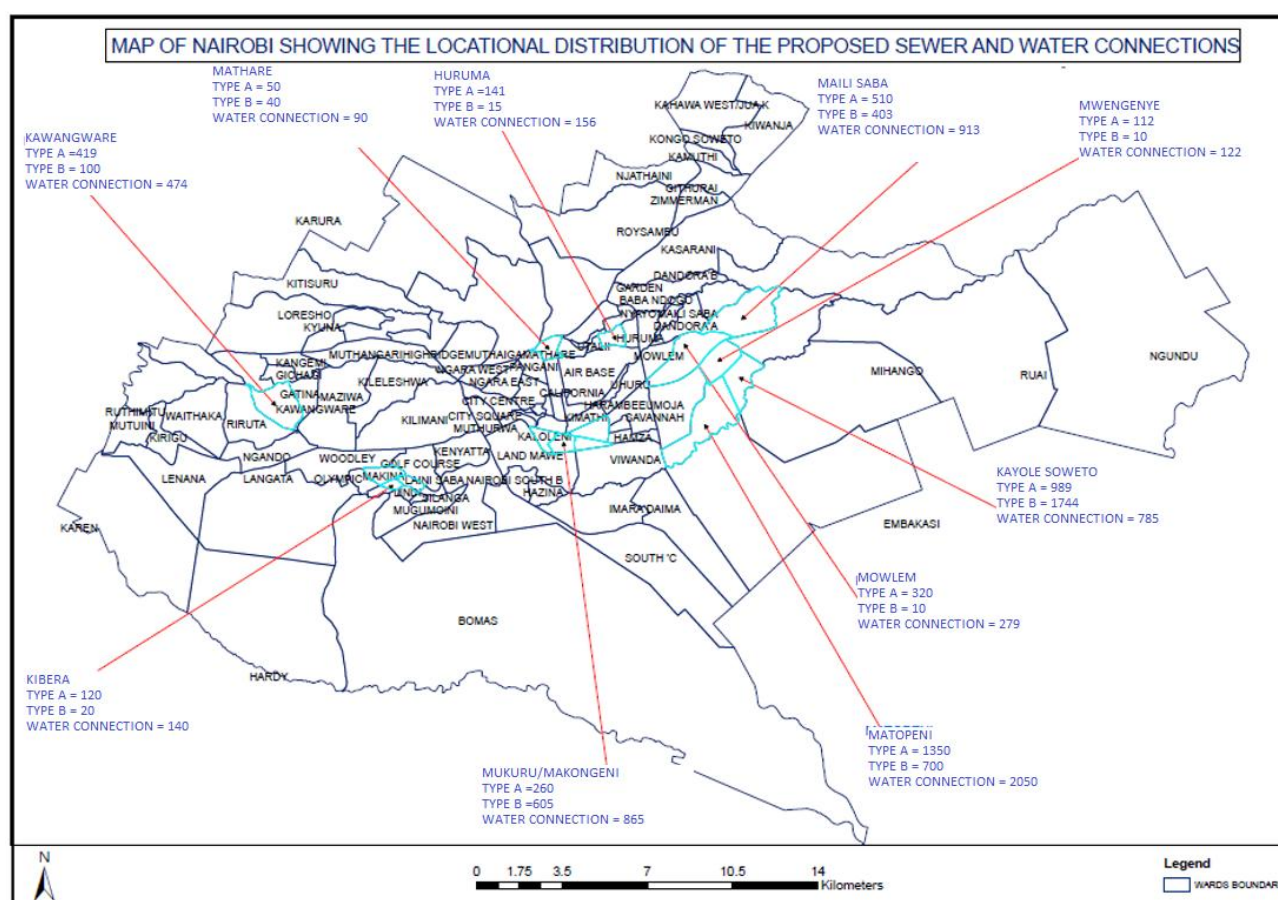


Table 4-2: Targeted Settlements.

SETTLEMENT	Coordinates (UTM-Arc1960)	
	EASTINGS	NORTHINGS
Kayole Soweto	267,612	9,857,965
River Bank	267,120	9,857,060
Matopeni	269,386	9,860,660
Mukuru	264,525	9,854,848
Mathare	261,976	9,860,766
Huruma	263,290	9,861,478
Maili Saba	268,070	9,862,303
Mowlem	266,255	9,860,623
Canaan	265,103	9,861,472
Mwengenye	268,137	9,861,868
Kawangware	248,696	9,858,777
Kibera	253,585	9,855,094

4.2 Project specifications

The following are specific descriptions of the project.

- Materials to be used will be of approved quality which will include stones, sand, cement, timber, steel, PVC products etc.
- All finishes will be approved materials including cement and paints
- All reinforcement shall be of standard quality to structural engineer's details
- All soil and wastewater drainage pipes laid within the development will be of UPVC materials.
- All internal fixtures and fitting will be of approved standards and specifications and will be carried out by qualified personnel
- Waste water will be connected to the sewer lines.

4.3 Proposed Project Implementation (Construction)

Rehabilitation of existing pour flush toilets and pit latrines to conventional standard mains sewers connection and construction of sewer laterals shall be based on applicable building standards of Kenya. The works will incorporate environmental guidelines, health and safety measures.

Table 4-3: Project Targets

SETTLEMENT	Proposed Targets		
	Type A	Type B	Type C(Water Connections)
Kayole Soweto	989	1744	785
River Bank	370	85	455
Matopeni	1350	700	2050
Mukuru	260	605	865
Mathare	50	40	90
Huruma	141	15	156
Maili Saba	510	403	913
Mowlem	320	10	279
Canaan	230	10	109
Mwengeny	112	10	122
Kawangware	419	100	474

Kibera	120	20	140
	4,871	3,742	6,438
Total Connections		8,613	6,438

4.3.1 Construction Activities and inputs

The project inputs include the following;

Water

The water to be used both during operation of the project will be obtained from Nairobi Water and Sewerage Company (proponent)

Labor

A wide range of both skilled and unskilled labor will be required for implementation of the project. It is expected that the majority of this labor will be sourced from the locals.

Equipments

Equipments used in the project implementation are-:

- water bowsers
- exhausters
- Construction machines including machinery such as excavators, compressors and other tools and equipment
- pick-ups and trucks

4.3.2 Construction Materials

Most of the materials that will be used will be locally sourced, such as; Construction raw materials i.e. sand, cement, stones, crushed rock (gravel/ballast), blowers among other. All this should be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies. Construction machines include trucks, concrete mixers, tools and other relevant construction equipment.

4.3.2 Construction activities

The main activities during the project implementation will include but not limited to the following:

- Procurement of construction materials from approved dealers
- Transportation of construction materials and debris using heavy and light machinery
- Appropriate storage of construction materials.
- Exhaustion of existing pit latrines-this will be done by use of licensed exhausters.
- Removal of pit latrines slabs.

- Backfilling of pit latrines
- Preparation of the grounds-this will involve excavation works to create space for laying of sewer pipes
- Plumbing works: Includes installation of sewer pipes, connection to existing sewer
- Covering of the laid sewer lines and landscaping
- excavation, earth works and filling, masonry works
- Disposal of the resulting debris/waste materials. All debris and excavated materials will be dumped on approved sites but should be recycled in then project as much as possible e.g. in backfilling
- Sanitary works. This will be done by reputable expertise
- Completion of the development and operation

4.4 Activities during Operation Phase

The facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include;-

- Carrying out any required repairs. The contract has a defect liability period for one Year, during which the Contractor will be responsible for any defect to the facility and will hence be carrying out any required repair and put in pace an emergency response plan

The proponent (NCWSC) shall;-

- Maintain sewers and ensuring manholes are covered at all times to eradicate potential overflow of sewage from the immediate manholes into open drains
- Provide/supply reliable water for flushing the toilets
- Continuously sensitize the users on the proper use of the toilets and how to keep the facilities clean
- Creating appropriate sense of responsibility to all the users on keeping the facilities clean and functional at times.
- Engaging community groups and leaders in resolving emerging issues. This shall be done by having focus group discussions.
- Collection of payments by the proponent (NCWSC). Payment will be collected through the water bills as the sewer charges.

4.5 Activities during Decommissioning Phase

Decommissioning is an important phase in the project cycle and comes as the last to wind up the operations/activities of a particular project. The main purpose of decommissioning is to restore/ rehabilitate the site to acceptable standards. It is not applicable to the proposed project for now but in line with the principles of sound environmental management, it is paramount to develop a plan as a way of simplifying decommissioning in future.

5.0 PROJECT AREA AND ENVIRONMENTAL SETTING

5.1 Bio-physical

The Nairobi city is located within the Athi River Catchment and is traversed by three key rivers namely Nairobi, Mathare and Ngong. All the existing trunk sewers run along the riparian reserve of these rivers. Currently, the rivers experience pollution from both domestic and industrial point sources and from agriculture non-point sources. Nairobi's main drainage follows the regional slope of the volcanic rocks towards the east, while subsidiary internal drainage into the Rift region is confined to the western part. The lava plains east of the line Ruiru-Nairobi-Ngong are underlain by a succession of lava flows alternating with lakebeds, streams deposits, tuffs and volcanic ash. These plains, comprising mainly the Athi plains and the northern section of the Kapiti plain, extend westwards, rising from 1493m at the Athi River to 1829m in the faulted region near Ngong. The lava plains are crisscrossed with steep-walled gullies and canyon-like gorges, such as those along the Mbagathi valley. Further east this valley widens slightly where soft material is being actively eroded. Water draining eastward from the hill area accumulates on the low-lying ground between Parklands in the north and Nairobi South estate, forming a perched water table above the Nairobi phonolite.

5.2 Geology/Soils

The soils in Nairobi are products of mainly weathering and erosion of underlying volcanic rocks under relatively high temperatures, rainfall and poor drainage. As a result of impeded drainage of the plains, the soils are black to dark grey clays (Grumosolic) comprising black cotton soils with calcareous and non calcareous variants. The crystalline rocks are rarely exposed but occasionally fragments and found as agglomerates derived from the former Ngong volcano. The soils of the Nairobi area are products of weathering of mainly volcanic rocks. Weathering has produced red soils that reach more than 15m in thickness.

5.3 Natural Environment

Eastern part of Nairobi area is dominated by savanna grasslands, with mainly grass (short) and scattered drought resisting trees. The surrounding undeveloped area consists largely of scattered shrubs, the shrubs being with a canopy cover of less than 2%. Grassland are dominated by grasses and other herbs, sometimes widely scattered or grouped trees and shrubs. The area also has medium sized indigenous trees mostly of acacia species especially the *Acacia Abyssinica*, ferns, shrubs and grassland. Papyrus reeds and long green grasses are dominant along the main rivers - Ngong, Mathare and Nairobi River. Western and Eastern

part of Nairobi form catchments to Ngong, Mathare and Nairobi River. These rivers are dominated by exotic trees mainly eucalyptus (grandis), gravellia, whisling pines, Cyprus, Sesbania and lucena sp. The project will not affect any natural forest or any protected zones, biological environment will also not be affected. The connections (laterals) will be done within wayleaves eliminating the possibility of destruction of the river course.

5.4 Climate

The County has a fairly cool climate resulting from its high altitude. It has a bi-modal rainfall pattern. The long rains season fall between March and May with a mean rainfall of 899 millimeters (mm) while the short rains season falls between October and December with a mean rainfall of 638 mm. The mean annual rainfall is 786.5 mm. At 1,795 meters above sea level, Nairobi experiences a moderate climate. Under the Koppen climate classification, Nairobi has a subtropical highland climate. The altitude makes for some cold evenings, especially in the June/July season when the temperature can drop to 10 °C (50 °F). The sunniest and warmest parts of the year are from December to March, when temperatures average the mid-twenties during the day. The long rains form the first season and fall in the months of March to May, and the short rains forming the second rainy season, fall between October and December. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with light drizzles. As Nairobi is located close to the Equator, the differences between the seasons are minimal.

5.5 Population Growth

The 2009 Kenya National Population and Housing Census put the population of Nairobi County at 3,138,369. This population was projected to have grown to 3,517,334 million people by 2012 and 4,253,334 by 2017. This high growth is attributed to the high influx of immigrants from other Counties in search of job opportunities. Rural-Urban migration is a critical factor as far as population growth in the County is concerned. The County forms part of the country's capital city and receives a high percentage of job seekers from other parts of the country. A huge percentage of this population ends up in the informal settlements within the County. This has resulted in mushrooming of several informal settlements. The high population has overstretched facilities like water and sewerage. The challenges in the current human settlement patterns include; environmental pollution mainly from solid and liquid waste. The population increase is not commensurate with increase in resources and puts

pressure on the existing social resources. There is need to improve sanitation in order to reduce chances of contracting diseases.

5.6 Economic Activities

Nairobi County is the centre of commercial, manufacturing and industrial development in East Africa. The major economic activities in Nairobi City include trade. Like most modern cities, Nairobi has crowded markets and trading areas, middle class suburbs, and spacious mansions for the rich and powerful. It also has vast overcrowded slums (informal settlements).

5.7 Waste Management

Solid waste must be disposed of in accordance with Nairobi City County by laws and good environmental practice. The anticipated waste management related activities of the project area include solid waste deposition into receptacles in the area and later collected by registered solid waste handlers (registered with NEMA) whilst wastewater is channeled in Nairobi City Water and Sewerage sewer line for onward treatment at Ruai and Kariobangi Sewerage Treatment Works.

5.8 Administrative sub-divisions

The County is divided into nine sub-counties namely; Starehe, Kamukunji, Kasarani, Makandara, Embakasi, Njiru, Dagoretti, Langata and Westlands. The County has 27 divisions 64 locations and 135 sub-locations as shown in Table 1 below.

Table 5-3: Area of the County by Administrative Units

Sub County	Area(km2)	Divisions	No. of Locations	No. of Sub-Locations
Starehe	10.6	3	6	12
Kamukunji	11.7	3	9	18
Kasarani	85.7	2	11	24
Makandara	20.1	3	5	11
Embakasi	52.1	3	6	13
Njiru	156.2	3	6	10
Dagoreti	38.7	3	8	16
Langata	223.3	4	7	16
Westlands	97.6	3	6	15
TOTAL	97.6	27	64	135

Source: Provincial Commissioner, Nairobi, 2013

5.9 Selected informal Settlements

5.9.1 Kayole Soweto

Kayole Soweto village is situated in Embakasi Division in Nairobi's Eastlands area, 8 km from the city centre. It occupies an area of 1.9 sq. kms. The land in which the settlement is built belongs to the Nairobi City County. However, most of the residents have been given allotment cards. Administratively the settlement is divided into nine zones which are locally known as Muthaiga Central, Shauri Yako, Bahati, Muoroto, Kibagare, Gitau, Muungano and Mzesa. Some residents work casual and odd jobs in industrial area and in the neighbouring Komarock, Umoja, and Jacaranda estates. Most of the people who are self-employed operate small scale businesses. The status of the land it occupies is quasi-legal with isolated portion being allocated to individuals who have constructed permanent structures. Quarrying is also a major activity near Soweto.



Plate 1: A pit latrine at Kayole Soweto

The zone has essential infrastructures to support this type of project. There exist sewer line and a trunk sewer. The area is within the jurisdiction of Nairobi County Government which has responsibility of disposal of solid waste. However, the contractor has an option of contracting a NEMA licensed private garbage collecting company. The area is connected to the national grid and well covered by all communication facilities such as landline and mobile services. All these will facilitate communication throughout the project cycle. All solid wastes should be dumped in approved dumpsites and in accordance with the waste

management regulations of 2006. Most residents rely on onsite systems mainly pit latrines, for excreta disposal many of them built and maintained by the structure owners. Some Pit latrines are unkempt attract flies thus exposing food and water to contamination.

5.9.2 Riverbank

River bank informal settlement is Located in Embakasi location, Tassia sub-location. It is estimated that the size of the settlement is 30 acres. Residents settled in the settlement in 2002. Most of the land is under the ownership of the Nairobi City County while a small portion is on electricity way leave. Some people have managed to connect themselves to the Nairobi City Water and Sewerage Company network. There is a mixture of sanitation facilities in the settlement. There are two sewer lines passing through the area; one from Donholm through Embakasi and another from Industrial area through Embakasi and Umoja estates. Residents were found using various excreta disposal facilities among them pit latrines, pour flush toilets, and WC connected to septic tank.



Plate 2: Pit latrine at River bank

Ownership of the Excreta Disposal facilities is landlord while a few are individually owned. Women are responsible for the cleanliness of the pit latrines/toilets in Riverbank. In some plots, regardless of gender, all the users assume the responsibility of ensuring the cleanliness of their Excreta disposal facilities. Most of the pit latrines are shallow, majority of them three feet. This was attributed to the presence of hard rock beneath common in the settlement. Once the pits are full, they are emptied or a new pit is dug. In some places garbage thrown in the drains coupled with waste water result to blockage and existence of pools of stagnant water.

5.9.3 Kibera

Kibera is located southwest of Nairobi City Centre. It is approximately 5km southwest of the city centre. Much of its southern border is bounded by the Nairobi River and the Nairobi Dam. Kibera as a whole is an informal settlement comprising of ten villages covering approximately 250 hectares of land. Kibera generally comprises of steep hills and river valleys which ensures that the railway line that cuts across the slum had cut through a section of the hilly terrain creating steep trenches that drain the site to the Nairobi dam situated on the periphery of the slum. Kibera neighbourhood presents a microclimate of Nairobi city which lies one third degrees south of the equator thus expected to experience an equatorial climate. But due to the Cities altitude of about 5,500 feet above sea level, the climate is similar to that of low latitude highlands. The site enjoys a fairly moderate climate that is very attractive for human habitation. The altitude makes the area chilly in the mornings especially in the months of June to October which is usually cloudy and misty with temperatures dropping to about 12⁰C. Majority of the inhabitants are workers in middle and high income homes in the nearby Lavington, Highrise estates and Langata estates. Others are casual labourers in the factories nearby industrial area. There exist NGOs and CBOs that are supporting groups in undertaking small scale businesses through revolving funds.



Plate 3: Pit latrine

Many residents pay for the toilets situated far from residential areas. Some of these toilets are not children friendly and sometimes not very clean. These toilets are shared by many people. Some areas have no water connections and as a result they buy water from vendors. The proponent needs to put up sewer laterals to connect these people to the sewer lines. There is

need to provide proper sanitary facilities in the villages by upgrading the existing ones and connecting them to the sewer lines. Majority of the residents embraced the proposed and requested that the pour flush toilets be user friendly especially to the children

5.9.4 Mailisaba.

Mailisaba is situated in Eastern Part of Nairobi in Embakasi constituency, Saika Sub-Location, Njiru Location. It is subdivided into 9 villages (zones) including Bondeni, K.P.C.U, Silanga Railway, Bosnia, Silanga Riverside, Mailisaba Central, Biafra, Silanga Central and Ogopa. Water and basic sanitation services is lacking in some areas. The trunk sewer passes through Ogopa and Silanga. The residents have been issued with plot cards as survey on plot sub-division has been carried out pending issuance of title deeds. Most of the residents eke a living by working at the quarries (mostly youth and women) or at the Dandora and Kayole dumpsites where they collect waste materials for resale for recycling. The area is easily accessible both by paths and roads and borders Dandora Phase V on one side and Saika Estate on the other side. A large number of the residents own the plots/houses and housing is largely semi-permanent. The area lacks proper public sanitary facilities, with most of the residents sharing pit latrines which are dotted across homesteads.



Plate 4: waste discharged to the river

The area has water and sewer connections, on both sides of the village, trunk sewers pass through the area. Current supply to the settlement is by the Nairobi City Water and Sewerage Company. Residents of Mailisaba lack proper and sufficient drains to deal with the problem of waste water management. The situation is worsened by uncontrolled and indiscriminate garbage disposal which cause clogging of the few trenches serving as drains, making the

place highly impassable especially during the rainy seasons. Sullage water is disposed in the open ground, septic tanks or in the open drains/trenches.

5.9.5 Matopeni and Spring Valley

Matopeni/Spring Valley is in Njiru location bordering Kayole and Stone Quarry. Matopeni and Spring Valley Settlement are both planned. Nairobi City County has provided titles to individual plot owners and there are no obstacles to the proposed project. There are also some areas lacking basic sanitation services. Many households have no proper garbage disposal means and sanitation facilities. The ground in Spring Valley slopes towards Kangundo road. A brook to the north of the village carries all sullage and the sewage from the residential plots. Like in other areas waste water runs through open drains creating a health hazard in the area. The Matopeni ground slopes towards the river that passes through the Nairobi Industrial area. There are no obstacles to the proposed project as there is an existing sewer passing through the area. At the center of the village the area is flat. A waste stabilization pond treatment works used to occupy part of this area before it was moved to Ruai. Inadequate sanitation leads to a number of financial and economic costs including direct medical costs. Residents within Matopeni/Spring Valley/Manna have access to a variety of excreta disposal facilities; the most dominant ones being WC connected to septic tank and pit latrines.



Plate 5: Toilet connected to a septic

The presence of two public sewer lines near the settlement has made it possible for a few structures to be connected to the main sewer. However, it was reported that such connections are faced with a number of challenges, the major one being frequent blockages and bursts. For those using WC connected to the septic tanks, most of them were said to be very shallow

hence short durations taken to fill. Poor ground conditions mainly rocky surface increase the cost of digging the pits hence shallow pits.

5.9.6 Mathare

The water mains feeding Mathare is located along Thika Road. There are also two sewer trunks serving Mathare namely the new sewer along the Mathare River and coming from Parklands and the older sewer from the Mlango Kubwa area. The old Mathare sewer has been rehabilitated by AWSB with assistance of French Development Agency while new Mathare sewer is operational. The two villages i.e. Kosovo and Gitathuru were earmarked for upgrading.

1. Kosovo

There are only 5no. toilets serving the whole area serving over 300 No people. These toilets are managed by Wamama Tunaweza group. The area has a mixture of permanent and semi-permanent houses and a mixture of sanitation facilities. There exists water and sewerage infrastructure. Some areas have no water connections and as a result they buy water from vendors. In some areas there is a bathroom and water point and lacks children friendly toilets. The waste from these sanitation facilities are discharged direct to the river.



Plate 6: Toilet in the residential area

2. Gitathuru

There are only 4 toilets and water kiosks serving a huge population. All connections discharge to the river except a few which are connected to the sewer. Water and sewer infrastructure exists. Many schools and churches without toilets and the existing toilets discharge direct to the rivers. Most of the people including children use public toilets. Some

areashas no water connections and as a result they buy water from vendors. There is need to provide proper sanitary facilities in the villages by upgrading the existing ones and connecting them to the sewer lines



Plate 7: Plot based toilets

5.9.7 Huruma

Huruma consists of six villages: Mahiira, Kambi Moto, Ghetto, Gitathuru, Redeemed and Madoya. The Huruma informal settlements are on public land under the trusteeship of Nairobi City County. The structures in Huruma are mainly semi-permanent. Most of the areas are served by served by NWSC in terms of water provision.



Plate 8: direct discharge of waste to storm drain at Mahiira

In Mahiira and Gheto villages, connections to the sewer lines have not been done and people pay for the toilets. The waste is discharged directly to the storm drains with the risks of contamination. In Mahiira there is a mixture of sanitation facilities. Latrines exist but not connected to the sewer and youth groups are involved in cleaning the lines. Toilet facilities in

the settlements are not user friendly hence needs proper sanitary facilities by upgrading existing ones and connecting the sewer lines.

5.9.8 Mowlem

Mowlem is located in the large Eastlands community, bordering Dandora, Komarock, Kariobangi south and Umoja. Mowlem is 13 Kilometers away from the city center, which makes it convenient for those working in town and those intending to move to and from the city. The cost of living in this location is low and so is the housing cost. There is mixture of sanitation facilities; pour flush which are connected to septic tanks and pit latrines. During the time of visit most of the facilities were full. Most of the private pit latrines are located within the residential areas. The septic tanks cannot support the high populations hence cases of overflows.



Plate 9: Overflow from a septic tank

The human waste disposal method commonly used is the manual exhauster. Water and sewer infrastructure exists to support the proposed project. The proponents has to put up laterals in order to connect the facilities to the sewer lines. Majority of the residents embraced the proposed project.

5.9.9 Kawangware

Kawangware is a slum that is situated approximately 12 km in the western outcasts of Nairobi Central Business District. It spans approximately 3 square kilometers. Kawangware can be accessed through a bus or taxi that plies route 46/56. The roads that lead to the site from the city are: Kenyatta Avenue that runs past Uhuru Park and Central Park and is linked with the valley road that has famous buildings like Pentecostal Church; "Christ is the Answer" Valley road links Argwings Kodhek road that runs past Yaya Centre. Kawangware holds many diverse ethnic backgrounds.

The Muslim village has been identified for rehabilitation of the existing sanitation facilities. The slum is characterized by scarcity of adequate clean drinking water and poor drainage system.



Plate 10: Pour flush toilet at Muslim village, Kawangware

There exists water and sewerage network although majority of the people are not connected. The residents buy water from a water kiosk at the mosque. Some people have their pour flush toilets connected to the sewer through Pamoja Trust.

5.9.2.1 Mukuru Kwa Njenga

Mukuru Kwa Njenga slum is one of the largest informal settlements in Nairobi that is located within Nairobi's larger industrial zone, about 8km to the southeast of the central business district. The economic activities of Mukuru Kwa Njenga are very diverse and vibrant. Most of the people are either employed in the industrial area or run their own businesses. Most of these businesses are small and form part of the Mukuru micro-economy. Water and sanitation infrastructures are the core issues that need urgent attention. Mukuru Kwa Njenga is composed of the following zones; Milimani, Sisal, Zone 48, Moto Moto, Wape Wape and Vietnam. Majority of them lack running water, sanitation or garbage collection services. Water and electricity are not always available, are informally provided and most of the households' solid waste goes directly into the river or the streets. The slum is surrounded by three major roads: Mombasa Road on the southern side, Outering Road on the North Eastern side and Airport North Road on the South Eastern side. The settlement spreads over two sub locations, namely Imara Daima Sublocation to the West and Mukuru Kwa Njenga Sublocation to the East. The area is generally flat with gentle slopes in Milimani, Riara, Wape

wape and Sisal, at an altitude between 1618 and 1623 m. There is a general smooth slope towards the stream water line that passes through Mukuru Kwa Njenga, a reason why most of the areas around it remain flooded during the rainy season. Ngong River flows bordering the north of the settlement in Sisal, and it is one of the critically polluted points in the area.



Plate 11: A Bio-centre at Sisal village Mukuru

The stream that ends in the Ngong River crossing through the slum is now used as an open sewer line that concentrates the untreated waste water from the drainages around and serves as disposal point for some of the public toilets, pit latrines along it, and manual sewage exhausters. Mukuru Kwa Njenga has numerous community organizations, most of which have been initiated by the people. These groups mainly focus on empowering their members and the surrounding community as well as putting efforts to alleviate poverty. Programs within community groups include mainly savings but also provision of services to the community e.g. community halls, collecting garbage, providing toilets, supplying water, micro loans and sporting activities. The Villages are administered by 3 elders, one chairman and one chairlady per village assisted by a youth leader elected by the community. They deal with the problems of the community; ensure the maintenance of plans and internal rules, the management of security and the mobilization and sensitization of the community.

The pit latrines are the dominant types of toilets with a few bio-latrines/bio-centers. Most of the private pit latrines are located within the residential. The human waste disposal method commonly used is the manual exhauster. The people that provide this service have organized themselves into a group. The manual exhausters are emptied directly into the stream water near Greenfields in Sisal, thereby posing more pollution problems. In the more accessible

parts of Moto Moto and south of Zone 48, the mechanical exhauster services are used due to the good accessibility. The issues of water and sanitation were similar in all the zones. Water and sewer infrastructure exists. There are few toilets serving a big population including schools. There is acute shortage of water and residents buy water from vendors. In some of these zones they have a common toilet and bathrooms. There is a sewer line which was done by AWSB from Sinai village.

6.0 ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 Introduction

Development programmes and projects usually result in environmental impacts of varied kinds and severity. They generally cause alterations to the bio-physical and social environment. On-site and offsite impacts can be induced during the construction of the facility, and later during its operation. Onsite impacts result from construction activities carried out within the construction site. The impacts of off-site work result from activities carried out outside the construction site yet are directly related to the project. The extent of impacts depends primarily on the environmental management practices that would be adopted during facility operation. Projects such as the proposed one may have some positive and negative impacts on the environment. The positive impacts ought to be enhanced while the negative impacts, which are sometimes severe, should be identified during project planning stages and appropriately mitigated against.

This Section identifies both positive and negative impacts associated with the proposed project. These impacts are hereby identified in three distinct phases of the project i.e. Construction Phase, Operation Phase and decommissioning phase. These impacts include the following and will need mitigation:

Positive Impacts:

Positive impacts will include the following:

- Improved state of sanitation and hygiene in the target informal settlements with the overall effects of acceptable habitation
- Reduction in pollution to surface water sources running within the project areas
- Improved aesthetic.
- Improved sanitation will lessen burdens on women and children and also ensure enhanced family health
- Construction labour will be provided by the local communities (mainly the youth and women) contributing a direct economic benefit to the residents.

Negative Impacts

1. Solid Waste Generation:

Solid waste will be generated during the construction phase. These will include metal cuttings, rejected materials, surplus materials, paper bags, empty cartons, and empty paint among others. Solid wastes if not well managed have a potential of causing disease outbreaks due to their presence. They are also a nuisance.

2. Noise and Vibrations

The machines are potentially noise emitters, though the ambient noise levels are expected to be generally higher than the anticipated levels. Noise and vibrations effects expected to be low as hand labour is desired (with low noise generation) and all works will be undertaken during the day.

3 .Drainage and Hydrology:

There may be potential but temporary disruptions of surface runoff during construction of sewer extensions. This could directly affect the immediate residential houses and access roads during heavy rains.

4. Workers accidents and hazards during construction

During construction of the site of the proposed project, it is possible that workers may encounter occupational health hazards as a result of coming into contact and handling hazardous waste and injuries from hand tools.

5. Health and Safety

Due to the high population and inadequate sanitation infrastructure in the informal settlement areas, the construction activities will have potential temporary negative impacts to health and safety of the residents including: disruption of accumulated waste materials could expose the residents to risks of environmental health problems during the period of construction, handling of the waste materials and contaminated surface runoff has direct health implications to the workers and the residents who gets into contacts, especially children, and any trenches and open excavated areas are potentially risky.

6. Water Quality

Emptying the existing pit latrines and construction activities will mobilize pollutants at site with possible contamination of water sources enroute to disposal areas through transit spillages. This will be in addition to surface transport to the nearest water bodies. Temporary unavailability of toilets during construction may cause water pollution.

Impacts from Operations to the Receiving Environment

1. Solid Waste generation

Solid waste from operations (tissues, sanitary towels etc.) may pose environmental hazards if not well managed.

2. Soil and water contamination

Among the anticipated impacts from the operations include the following: potential overflow of sewage from the immediate manholes into open drains risks contamination of surface

runoff and hence peoples' health. The pour flush toilets become a nuisance to the immediate neighborhoods from undesirable odors if the level of cleanliness is not well maintained.

3. Health and Safety Concerns

Dumping of solid waste into the manholes may cause blockages hence sewer overflows. Improper use of the facilities like dumping of sanitary wastes into the toilets could cause blockages which could impact negatively to the health of the communities.

Socio Economic Impacts

The overall economic impacts from the project will be positive. There will also be opportunities for raising incomes from repairs of the infrastructures. In addition, provision of these infrastructures there will be an overall impact of improved water and sanitation services and general aesthetics. There will be no social or economic disruptions anticipated from the project in the target areas. The proponent is advised to utilize the lateral lines which are constructed in areas where there are way leaves to avoid interfering with structures and businesses.

Table 6.1: Assessment criteria for significant impacts

Key	Key	Key
+2 = Major positive impacts	Sp = Specific/localized	W = Widespread
+1 = Minor positive impacts	R = Reversible	Ir = Irreversible
0 = No impact;	St = Short term	L = Long term
-1 = Minor negative impact	T = Temporary	P = Permanent
-2 = Major negative impact	NC = No Change	

7.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This Environmental and Social Management Plan (ESMP) provides a logical framework within which the negative environmental and social impacts identified during the ESIA study can be mitigated and any beneficial environment effects can be enhanced. It involves risk management strategies that should be undertaken by the project proponent and all stakeholders to mitigate environmental degeneration. There are approaches to monitor, control, reclaim and restore the environment back to its appropriate state. ESMPs for projects thus provides logical frameworks within which the identified issues of environmental concern can be mitigated or monitored i.e. provide a checklist for project monitoring and evaluation. Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve environmental quality.

The environmental management and monitoring plans has been developed to bring home the key findings of the environmental impact assessment; recommending necessary mitigation actions, defining roles, monitoring indicators and the estimated cost. The Contractor will also be required to prepare a separate and specific ESMP for their works in order to control construction impacts and ensure compliance with applicable environmental and health and safety legislation and standards. The Proponent (NCWSC) will ultimately be responsible for ensuring that the ESMP is implemented on site via reviewing the Contractor's ESMP and ensuring its implementation on site via audits.

The ESMPs outlined in the table below addresses the identified issues of concern (potential negative impacts) and mitigation measures as well as roles, costs, timeframe and monitoring indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The ESMPs have considered both the construction, occupational and decommissioning phases.

Table 7-1: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

IMPACT TYPE	DEGREE OF IMPACTS	POTENTIAL MITIGATION MEASURES	RESPONSIBILITY	MONITORING TOOL	OVERSIGHT	MONITORING FREQUENCY	COST (KSH.)
		A. CONSTRUCTION PHASE					
1. Noise and vibrations	-1T	Construction workers will be provided with appropriate PPEs	Contractor	Inspection	EHS Officer	Daily	7,000 Per month
		Machines not in use will always be switched off.	Contractor	Inspection	Foreman	Daily	No cost
		Construction works will be done during the day	Contractor	Inspection and service	Foreman	Daily (except Sunday & Public holidays)	TBD
		Regular maintenance and repair of machinery	Contractor	Inspection and service	Foreman	Once	30,000
		Low vibration equipment will be used where applicable	Contractor	Inspection	EHS Officer	Daily	No cost
		Vibration intensive operation will not be carried out in the same time	Contractor	Inspection	EHS Officer	Daily	No Cost

2.	Runoff & water logging	-2T	Provide alternative water drainage system will be when doing sewer extensions	Contractor	Inspection	Proponent	Once	150,000
3.	Employment opportunities	+2T	-Ensure gender equity in employment -Priority to be given to the local residents to enhance ownership of the project	Contractor	Observation	Proponent	throughout the construction period	No Cost
4	Soil and Water contamination	-2T	-Exhausted waste from existing toilets will be properly and responsibly handled, and disposed -Engaged a licensed waste handler and ensure the waste is disposed in designated areas	Contractor	Inspection	Public Health Officer	throughout the construction period	10,000 per month
5	Solid Waste Generation -2T		Waste would be segregated then collected by a designate waste handler	Contractor	Contract Agreements	Env Officer	Once	10,000 per month
			Reduce reuse and recycle where appropriate	Contractor	Observations	Env Officer	Daily	5,000

6	Safety & Health Concerns	-1T	Enclose the construction site.	Contractor	Observations	Env Officer/DOSH	Once	40,000
			Construction workers will be provided with Appropriate PPEs for related work.	Contractor	Inspection	Env Officer/DOSH	Daily	5,000
			Well-equipped first Aid kits will be provided.	Contractor	Inspection	Env Officer/DOSH	Monthly	10,000

			B. OPERATION PHASE					
1.	Solid Waste generation	-1R	Provision a solid waste holding bin and ensuring regular removal for safe disposal(Solid waste is mainly sanitary wastes)	Proponent/Management	Observation	Env. Officer	Daily	TBD

2.	Soil and water contamination	-2R	Maintenance of sewers and ensuring manholes are covered at all times to eradicate potential overflow of sewage from the immediate manholes into open drains	Proponent	Observation	Env. Officer	Daily	TBD
			Clearing of drainage systems discharging into the nearest main drains	Proponent	Observation	Env. Officer	Daily	50,000
3.	Health, Safety and hygiene Concerns	-1R	1.Provision of reliable water for flushing the toilets	Proponent	Inspection	EHS Officer	Continuous	TBD
			2. Creating appropriate sense of responsibility to all the users on keeping the facilities clean and functional at times.	Proponent	Number of awareness meetings	Env. Officer	Quarterly	30,000
			3.Ensure adequate sanitary facilities 4. Monitoring of project benefits	Proponent Proponent	Number disease outbreaks	Public Health Officer	Quarterly	35,000
			4.To avoid potential blockage of the toilets, the users shall be sensitized on the proper use of the toilets and how to keep the facilities clean	Proponent	Number of awareness meetings	EHS Officer	Quarterly	30,000
4.	Socio economic Impacts	-2R	-Consultation over issues of concern with all Stakeholders -Engaging community groups and leaders in resolving emerging issues. -focus group discussions -Hygiene Awareness campaigns	Proponent	Minutes of meeting	Sociologist	Quarterly	10,000 Per quarter (additional support from world bank)
			Hygiene awareness campaigns	Proponent	Number of awareness meetings	Env.Officer	Quarterly	10,000 Per annum(additional support from world bank)
			Design one unit for children, disabled and aged	Proponent	Observation	DOSH	Once	TBD

		C. DECOMMISSIONING PHASE						
1	Solid Waste generation	-1T	Collect, segregate and dispose waste responsibly	Contractor	Records	NEMA	Daily	TBD
			Contract a licensed waste handler to dispose the wastes	Contractor	Records/agreement	NEMA	Once	TBD
2	General	-1T	Inform stakeholders	Proponent	Communication/Memos/notices	Sociologist	Once	TBD
			Inform the relevant authorities.	Proponent	Approval letters.	Sociologist	Regularly	TBD
			Rehabilitate/restore the site to its original state	Proponent	Site observation	NEMA	Periodically	TBD

8.0 OCCUPATIONAL SAFETY AND HEALTH AND EMERGENCY RESPONSE

8.1 The Guiding Principles to be adopted by the contractor

The Construction Company will be guided by the following principle:-

1. It will be a conscious organization committed to the promotion and maintenance of high standards of safety and health for its employees, and the public at large;
2. Ensuring that OSH activities are implemented to protect the environment and prevent pollution;
3. Management shall demonstrate commitment and exercise constant vigilance in order to provide employees, neighbours of the project and the environment, with the greatest safeguards relating to OSH;
4. Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the general public as it relates to the OSH Management Plan.
5. The contractor shall develop a site specific ESMPs

8.2 Emergency procedure during construction and operation

1. An emergency situation means unforeseen happening resulting in serious or fatal injury to employed persons or the neighboring communities.

In the event of an emergency during construction, the workers shall:-

- a. Alert other persons exposed to danger;
- b. Inform the OSH coordinator;
- c. Do a quick assessment on the nature of emergency;
- d. Call for ambulance.

When emergency is over the OSH coordinator shall notify the workers by putting a message: "ALL CLEAR".

In the event of such an emergency during operation the workers shall: -

- a. Alert other persons exposed to danger;
- b. Ring the nearest police station, fire station and ambulance services.

The proponent has already put measures to respond to emergencies like emergency sewer blockages by having a USSD Code where customers could register complaints. There are also community health workers who could assist in cases of emergencies.

Table 8-1: Health, Safety and Accident Prevention Action Plan

Issue	Specific measures	Responsibility	Timing
Project Design	-Incorporation of health, safety and resource conservation measures in project design	-Project Architect -Structural and civil engineers	Design Stage
Site organization and cleanliness	-Keep construction material in correct place -Always maintain cleanliness at construction sites	-Proponent -contractor	Construction stage
Accident prevention	-Safe handling of tools and machinery -Use of appropriate PPEs -Engagement of qualified personnel	-Contractor -Proponent -Construction workers	Construction
Waste disposal	-Provision of adequate waste disposal facilities at the sites -Engagement of licensed waste handling and disposal company -Reuse of certain materials	-Contractor -Contracted waste disposal company	All stages of project cycle
Tool and machinery safety	-Use of tools and machinery for designated job -regular servicing of machinery -proper storage of tools	Construction company	Construction stage
Emergency preparedness	-Keeping passages clear -Training workers and residents on emergency preparedness -Maintaining a well-equipped first aid kits	-Contractor -proponent	All stages of project cycle
Site security	-Control of visitors entry into the sites -24 Hr security at the sites	-Contractor -security company	Construction
Insurance	-Insuring all workers involved in the project	Contractor	Construction and decommissioning

9.0 PROJECT ALTERNATIVES AND PUBLIC CONSULTATION

9.1 Project Alternatives

This section analyses the project alternatives in terms of site, technology and scale. The consideration of alternatives is one of the more proactive sides of environmental assessment - enhancing the project design through examining options instead of only focusing on the more defensive task of reducing adverse impacts of a single design. This calls for the comparison of feasible alternatives for the proposed project site, technology, and/or operational alternatives. Alternatives have to compare in terms of their potential environmental impacts, capital and recurrent costs, suitability under local conditions, and acceptability by neighboring land users. The project sites are all located in urban and semi-rural areas. There may be two alternatives to this project, namely:

9.1.1 Nil-Intervention or No Project Alternative.

The ‘**No Project Alternative**’: this leaves the status quo, continuation of suffering by the residents, and stagnation of the region’s social and economic development. This is not a preferred option by either the beneficiaries or the proponent. If the Proponent takes no action, and does not install the wash toilets, connection to sewers, impacts would be the “business as usual” poor sanitation, contamination of the water bodies and proliferation of water borne disease in the project area. Under the “**No Action Alternative**”, the Proponent’s proposal would not receive the necessary approval from NEMA and the connections to the sewers and installation of the wash toilets will not be done; the resultant environmental and socio-economic benefits of the project would be foregone. The anticipated environmental impacts resulting from implementation, and operation of the project, as proposed, would not occur. The No-Project Option is considered if the Project would not be implemented at all. Generally, it can be stated that the minor adverse impacts caused by the Project activities such as impacts on soil, air, would not occur.

The No-Project Option however, would consequently result in a number of more important negative impacts that affect the national economy of the country given that Nairobi is the capital city of Kenya. Some of the specific impacts that would arise as a result of the No project option include:

- Continued pollution of the environment from raw sewage which is overflowing from blocked or collapsed sewers as well as from filled up septic tanks or pit latrines.

- Increased cases of water borne diseases for the population in informal settlements within Nairobi.
- Continued menace of flying toilets, raw sewage flowing in open drains and excessive solid waste generation.
- Continued health and occupational hazards to the population living within areas contaminated with raw sewage.
- Continued accumulation of persistent contaminants in the environment that would otherwise have been conveyed and treated in a central plant. These persistent contaminants over time will surpass the toxic threshold levels and result in irreversible major environmental, social and health problems, and further reduce available freshwater and food reserves.

From the analysis above, it becomes apparent that ‘no project alternative’ is not the appropriate alternative to the persons living in informal settlement and the Government of Kenya.

9.1.2 Alternative Technologies

Other alternatives include continuation and expansion of existing technologies, like pit latrines and septic tanks as practiced by many in peri-urban areas of Kenya. However, these will not provide a better solution for sanitation and as such technologies have limitations for scaling up. Seemingly pit latrines and septic tanks have less environmental risks during construction (compared to sewer line connections), during operational phase and O&M activities, cumulatively, these present higher environmental risks and costs.

9.1.3 Alternative Layouts and Designs

This involves looking at various possible alternative project designs and layouts. However, the proponent has consulted widely with the project architect and the Contractor, project engineer, environmental consultants, quantity surveyor and the proposed design and layout is the one that optimizes the intended project objective. However the contractor will design one unit which is comfortable for use by disabled and the aged. This will ensure that these people also benefit from the project.

9.1.4 Alternative Material and Inputs

The choice of materials and inputs selected for the project shall be based on the stipulated laws, standards and specific.

The comparison of alternatives

Under the proposed Development Alternative, the project would create more efficient system for collection and disposal of waste water, alleviate sanitation problems in informal settlements in Nairobi and would provide employment directly to public. It would provide jobs for the workers during construction.

Under the NO Action Alternative, we shall continue with poor sanitation, contamination of the water bodies and proliferation of water borne disease in the project area. The residents will continue using the inefficient system of faecal disposal hence significant environmental impacts.

Provided the Environmental impact mitigation measures are implemented as well as adoption of sound construction management practices, negative impacts will be avoided/minimized. However, commitments related to development alternative would ensure that potential impacts are minimized to levels of insignificance as envisaged in the EMP

9.2 PUBLIC PARTICIPATION AND CONSULTATION

Introduction

The following section describes the public consultation events held to discuss the proposed project with those who live in the environs of the project areas. The aim of consultation is to ensure that stakeholder interests are identified during the ESIA study and that stakeholder views, and in particular those of PAPs, are taken into account at the project planning stage. Stakeholders' views are also important in shaping the development of the ESMP. The main findings and feedback from these events is summarised within this section while copies of the lists of attendees at the various consultations and minutes of the meetings are provided in Appendix of this report.

Public Consultation and Participation

Community members were mobilised through the provincial administration (local chiefs). The public consultations took the form of public meetings (barazas), which brought together representatives from the larger community including PAPs, local leaders such as

chiefs and assistant chiefs. Participants were then taken through details of the proposed projects. They were then informed of the reasons why the meeting was important and the need for them to raise any issues that in their opinion were important for the success of the projects. Participants were encouraged to be open and to feel free in expressing their opinion. It was emphasised that the proponent was keen to listen to the opinions of community members so as to incorporate them in the project plan. The participants were given an opportunity to ask questions and highlight other issues of concern to them. Many environmental and socio-economic issues were raised which form the basis of this section of the report.

Public Consultation is very important and an integral part of the ESIA process, which is a legal requirement as it is put in Environmental (Impact Assessment and Audit) Regulation, 2003 and a very important tool for collection of data and specifically the baseline/background information. It helps bring out the contentious issues and gives a chance to those who may be affected by proposed project to give views, inputs and opinions and any significant issue is addressed at the initiation stage. This enables evaluation of the public and neighbors' views and is thus very important. The overall goal of the consultation process is to disseminate project information and to incorporate the views of Project Affected People (PAPs) in the project so as to ensure the proper mitigation measures and management plan are incorporated in the ESIA. The specific aims of the consultation process is; to get views and concerns thereby minimize conflicts and delays in implementation; facilitate the development of appropriate and acceptable entitlement options; increase long term project sustainability and ownership and reduce problems of institutional coordination. However, the process is made difficult by people who are mostly unwilling; others see it as a bother while others are indifferent. There were wide consultation and none of those who responded had objection to the proposed project. Consultations and contacts with residents of the targeted informal settlements were made. Subsequently they were engaged in discussions focusing on awareness of the proposed project, their concerns and wishes. Where possible they were issued with questionnaires to fill. Concerns and observations accruing from this process are documented in the Appendix.

9.2.1 Reaction from Participants

The residents and a number of neighbors were interviewed including immediate neighbors bordering the proposed project site. Other stakeholders included major investments around the area. All those interviewed felt that the proposed project was good, as it would have far reaching benefits.

The Environmental Management Plan developed suggests ways and means of mitigating the possible negative environmental impacts anticipated by the public.

Positive comments about the project from the participants

- Employment opportunities
- Improved value and general aesthetic of the area
- Improved standards of neighborhood
- Increased business in the area
- Availability and accessibility to water and proper sanitation
- Improved aesthetic

Suggestions made by the participants

Reactions from stakeholders and participants were diverse but all were similar in the concern. One of the main concerns was payments of water and sewer connections. Some people were concerned considering that some residents have permanent toilets hence will require less rehabilitation as compared to those with temporary toilets. They suggested that the payments be staggered such that they could pay slowly on monthly basis. The issue of pipe size and its sustenance when the population grows in future was raised. The issue of criteria of hiring of casuals was also raised. Residents suggested that casuals be sourced from locals. In summary, the respondents welcomed the project because of the various advantages associated with such project but also indicated of the need the government to look into other infrastructures including roads. The issues raised and many others foreseeable have been adequately addressed in the report and in the EMP.

9.2.2 Community and Stakeholder Engagements

While EIA reports on the consultation and disclosure undertaken as part of the EIA process, it is acknowledged that consultation is an ongoing process and forms part of the life cycle of the project and corporate governance of the sponsor. The proponent will therefore ensure that the community and stakeholders continue to be informed during project implementation. Throughout the project, consultation and sensitization will continue to be undertaken by the proponent

Management Plan Principles

The project should observe environmental protection requirements in accordance to the established laws and regulations to ensure sustainability. To realize this goal, acceptability by a majority of the beneficiaries and minimal effects to the physical environment will require to be integrated in the project through constant consultations, evaluations and review of the project. It is recommended that guiding principles specific to this project. Among the factors that need to be considered in this particular project implementation will include:

- Enhance integration of environmental, social and economic functions in the project implementation,
- Consider preventive measures towards possible social and economic disruptions that may arise from the project implementation in accordance with the laid down guidelines, and
- Ensure prevention of pollutants discharge into the drainage systems and pollution of public water bodies,
- The contractors and other players in the project activities be prevailed upon to implement the ESMP through a sustained supervision and continuous consultations,

Management Responsibilities

In order to implement the management plan, it is recommended that an Environmentalist is identified to oversee environment and management aspects including pollution control, water loss control and equity access, management of sanitation and hygiene measures

throughout the project area. The Environmentalist would also be expected to co-ordinate and monitor environmental management during construction and provide monitoring schedules. Other recommended participants could include NEMA and NCC. The responsibility relationship is as follows;

- The Environmentalist will ensure that the contractor is observing all measures associated with environmental protection
- He will also liaise with the NEMA on matters of environmental and social nature.
- A sociologist is recommended to directly interact with the local communities on social, economic and cultural matters for long term sustainability of the intervention projects. In this regard, a community liaison committee shall be established for ease of communication of concerns to the project management
- The National Environmental Management Authority (NEMA) through the County Coordinators shall be responsible of surveillance of environmental and social aspects of the project implementation.

10.0 CONCLUSIONS AND RECOMMENDATION

10.1 Conclusion

Every person is entitled to a clean and healthy environment and has the responsibility to safeguard. From an environmental point of view, this project does not pose any significant environmental impacts both during the construction and operational phases. The informal settlements in Nairobi are faced with serious situation of water shortage and poor sanitation. The situation seem to arise from increasing population, lack of proper housing planning as well as poor infrastructural provisions. This situation is found in all the target areas of intervention. There is high appreciation of the intervention projects from the residents, majority who are youth and women with direct hands-on experiences with poor sanitation and hygiene on daily basis. Possible negative impacts are subtle impacts associated with such works. Possible sources of these subtle impacts include storm water drainage, noise, dust, health and safety, sanitation among others. With the exception of noise and vibration, it is possible to mitigate these potential negative impacts at minimal costs or cost free. Also these impacts are largely localized to the site.

Predicted socio-economic impacts are entirely positive, principally through creation of jobs and income. The potential negative impacts of the project are insignificant and should not prevent the project from proceeding, as long as the proponent and the contractor undertake measures to alleviate the potential impacts identified in this report. Implementation of the proposed water and sanitation project in various informal settlements will have major benefits to residents in these areas and overall savings both at household and general public levels inform of expenditures on health.

10.2 Recommendation

Based on the above observations, it is concluded that nothing in this ESIA findings will result into significant negative effects on the environment, as long as the mitigations proposed in the ESMP guidelines are implemented. In-fact the proposed modifications will help to solve some of the environmental problems which may arise from the inefficient treatment system currently being used by the factory. It is our consideration that the proposed development is timely venture thus we recommend that the project be allowed to go ahead with the implementation provided the outlined mitigation measures

are adhered to. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be addressed by following and implementation of the recommended Environmental Management and Monitoring plans (ESMPs).

We also recommend that;-

- Ensure sustainability of accruing impacts to be fully realized by considering use of locally available casual labor instead of “importing” workers, capacity building for various targeted facility management groups in management, operation and maintenance, beneficiary participation from outset of the project implementation,
- Ensure adequate awareness , sensitization on the importance of proper sanitation
- Sound construction practices aimed at environmental conservation should also be adopted and special attention should be paid to the extended sources of raw materials such as water, sand
- The project proponent should work closely with the environmental experts, engineers and other bodies to enhance the facilitation of the issues of concern such as standard construction, water supply and waste generation and management. This will help in solving any problem arising and which may not have been foreseeable during the ESIA project report study.

The proposed mitigation measures should be implemented. This will ensure that environmental and social concerns are integrated into the project at every stage of the implementation phase.

LIST OF REFERENCES

- Republic of Kenya (2005); Kenya Gazette Supplement Acts 2000, *Environmental Management and Coordination Act (EMCA) No. 8 of 1999*, Government Printer, Nairobi
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- Republic of Kenya (2005); Kenya Gazette Supplement Acts, *Way-leaves Act, 1989 (Cap. 292) Revised Edition 2010*, Government Printer, Nairobi
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- Republic of Kenya (2009); Kenya Population Census 2009, Government Printer, Nairobi
- Republic of Kenya (2011); Kenya Gazette Supplement Acts, *Urban Areas and Cities Act No. 13 of 2011*, Government Printer, Nairobi
- United Nations (1992); *Rio Declaration on Environment and Development*, Rio de Janeiro
- United Nations (1987); *World Commission on Environment and Development*
Environment Impact Assessment Guidelines and Administrative procedures.

APPENDICES

Appendix 1. Paul Karanja Mbugua Practicing License (Lead Expert Number 7957)

FORM 7 (r.15(2))


nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/3622
Application Reference No: NEMA/EIA/EL/5500

M/S **Paul Karanja Mbugua**
(individual or firm) of address
P.O. BOX 17285-00100, Nairobi

is licensed to practice in the
capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **7957**
in accordance with the provision of the Environmental Management and Coordination Act, 1999

Issued Date: **4/26/2016** Expiry Date: **12/31/2016**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P. T. O.


**APPENDIX 2: LIST OF SOCIOLOGISTS AND ENVIRONMENTALIST
ATTACHED TO THE PROJECT**

	NAME	ORGANIZATION	QUALIFICATIONS
1	Paul Karanja Mbugua	NWSC	-Doctor of Philosophy (Phd) in Environmental Science- On Going -Msc Degree in Environmental Science -Bachelor of Science Degree -EIA/EA Lead Expert(Registered and Licensed to practice by NEMA (Reg. No. 7957)
2	Christine Machio	NWSC	-M.A-Sociology(Community Development and Rural Sociology – On Going -B.A Degree in Sociology -UoN
3	Dasiy Moseti	NWSC	-M.A-Sociology(Community Development and Rural Sociology – On Going -B.A Degree in Sociology -UoN
4	Edith Njeri Nduati	NWSC	-Msc in Public Health -Ongoing -Bsc. in Public Health -Certificate in Monitoring and Evaluation
5	Hazel Atieno	INTERWAYS WORKS	-MA Counseling and Psychology-UoN (On Going) -Bachelor’s Degree in Social Sciences(Major in Sociology, Minor in Public Administration) – Makerere University -Post Graduate Diploma in Project Planning and Management – Moi University
6	Nipher Maloba	INTERWAYS WORKS	Bachelor’s Degree in Food Science and Technology- Egerton University
7	Eleanah Mwendwa	INTERWAYS WORKS	Diploma in Community Development- JKUAT.

APPENDIX 3. MINUTES OF PUBLIC PARTICIPATION

COMMUNITY MEETING FOR SHAURI YAKO

MEETING ATTENDANCE

Meeting date: May 18, 2016

Time: 2p.m. -4:30p.m.

Meeting location: Social Hall

Persons in attendance:

- Community members (Attached attendance list)
- Stakeholders' representatives
- Interways Construction Company
- Zonal leader
- Nairobi City Water and Sewerage Company
- World Bank representatives

SUMMARY OF ISSUES DISCUSSED AT THE MEETING

2.1 Welcome, introduction

2.1.1 Welcoming and Introduction

The zonal leader Mr. Joseph Gacheru, welcomed members to the meeting. This was followed by introduction of stakeholder staff present.

Julius Kiogora led the members present through an opening prayer

2.1.2. Deliberations

2.1.2.1 Project/Connection Requirements

Fridah Mwarania-Sociologist (OBA) took the members through the requirements for one to qualify for connection to the sewer line;

They must have a water account and those without to apply through the informal office

The water connection they need to pay is ksh.1, 648 as commitment fee and ksh.150 every month for 30 months

The sewer connection they need to pay Ksh.1, 648 as commitment fee and ksh.450 every month for 5years.

2.1.2.2 Sensitization on Use of the Toilets

Mr. Paul Mbagi (Hygiene Person (World Bank)) Highlighted to the members on the importance of the improved sanitation

He urged members to improve their plots to improve their dignity and status; this he noted can be done through rehabilitation of their existing toilets.

Once rehabilitation has been done landlords were urged to take care of their toilets by not dumping things in them as this will cause blockage.

He advised landlords to put in place a schedule on how to clean the toilets.

2.1.2.2Address on Issues arising from the meeting

Members sort clarification on the payment issue considering that some people have permanent toilets hence will require less rehabilitation as compared to those with temporary toilets; Jackson Munuve-RE (OBA) clarified that all this was put into consideration and that using social connection policy both cases were assessed and a middle figure arrived at, hence community members will pay the same amount despite the differences.

One of the members was concerned about the pipe size and its sustenance when the population grows in future. The Resident Engineer assured the members that the pipe is 6” PVC and is able to accommodate large flows as the Terrain is good and the Trunk sewers are near the lateral lines.

Mr. Humphrey Muhia-Chairman of SECT raised concern about lack of involvement of stakeholders when the sewer line was being installed-Mr. Munuve explained to him that it is Athi Water Services Board who expand Nairobi water infrastructure, and that they will be involved in future projects

One of the members was concerned about the criteria the contractor is using to hire casuals. The Resident Engineer explained that casuals will be hired per zone and that and shall be sourced from the locals

The meeting ended at 5:00 Pm

APPENDIX 4: PHOTOS OF STAKEHOLDER MEETINGS AND SITE PHOTOS



Figure 1: A stakeholders meeting



Figure 2: A stakeholders meeting



Figure 3: meeting with the administrators and stakeholders



Figure 4: Stakeholders' forum



Figure 5: stakeholders' awareness meeting



Figure 6: Stakeholders forum



Figure 7: Stakeholders forum



Figure 8: Audit team interviewing participants



Figure 9: Audit team interviewing participants



Figure 10: Audit team on a field visit

APPENDIX 5: QUESTIONNAIRE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT QUESTIONNAIRE

PROJECT TITLE: NAIROBI SANITATION (PROVISION OF SEWER CONNECTIONS IN INFORMAL SETTLEMENTS)

We are carrying out Environmental Impact Assessment on the above mentioned project in line with Environment Management and Coordination Act 1999 and World Bank OP on Environmental Assessment. The project is meant to alleviate sanitation problems in informal settlements by upgrading existing plot pit latrines to convectional standard mains sewer connections. We would like to have your views as an interested and /or affected party, please answer the following questions by marking in the appropriate spaces

LOCATION OF PROJECT: -----

COUNTY: - NAIROBI COUNTY

RESPONDENT NAME: -----

Address: -----

ID No. -----Telephone-----

Date: -----

S/N.	Question	Answer
1	What is your primary water source?	1) Piped Water in the House 2) Water Point /unimproved water source 3) Water Kiosk 4) Other Specify_____
2	Distance to the sanitation facility	_____Metres
3	Is the supply from the source regular?	1) Yes _____ 2) No _____
4	During times of short supply, how does the household cope?	1) Reduce Water for domestic uses 2) Store Water 3) Any other specify
5	Do you use other alternative water sources together with the supply?	1) Yes _____ 2) No _____
B	Sanitation	
1	What type of latrine/ toilet facility does this household most frequently use?	1) No facility 2) Pit latrine 3) VIP Latrine 5) connected to Public Sewer 8) Other Specify_____
2	How many households share the toilet/Latrine?	
3	How would you describe the quality of the toilet in terms of privacy?	1) Good 2) Fair 3) Poor
4	How would you describe the quality of the toilet in terms of cleanliness?	1) Good 2) Fair 3) Poor

5	How would you describe the quality of the toilet in terms of Convenience (distance, queue, security, operating time)	1) Good 2) Fair 3) Poor
6	Do you pay for the use of toilet facilities?	1) Yes 2) No
7	What do you normally do when the pit / septic tank is full?	1) Have it emptied 2) Dig a new one 3) Other Specify
8	If the Pit is emptied, what method is used?	1) By truck 2) Manually 3) By overflow 4) Any other Specify
9	Overall satisfaction with your present toilet/Latrine system?	1) Very satisfied 2) Satisfied 3) Very dissatisfied 4) Dissatisfied
10	If you were going to make a decision in the near future on alternative, would you choose a different method of human excreta disposal?	1) Yes 2) No
11	Which alternative method would you prefer?	1) Pit latrine 2) Latrine 3) Septic Tank 4) WC connected to Public Sewer

Thank you for your cooperation and your views shall be taken into consideration

APPENDIX 6: BILL OF QUANTITIES

GRAND SUMMARY SHEET

ITEM	BILL SUMMARY	AMOUNT (KSHS)
1	BILL NO. 1: PRELIMINARY AND PROVISIONAL ITEMS	112,763,184.00
2	BILL NO. 2: KAYOLE SOWETO & NEIGHBOURHOOD	239,056,951.00
3	BILL NO. 3: RIVERBANK	39,641,500.00
4	BILL NO. 4: MATOPENI	115,147,080.00
5	BILL NO. 5: MUKURU/MAKONGENI	135,418,000.00
6	BILL NO. 6: MWENGENYE	14,335,000.00
7	BILL NO. 7: MOWLEM	13,513,750.00
8	BILL NO. 8: MAILI SABA	89,820,400.00
9	BILL NO. 9: MATHARE	6,672,800.00
10	BILL NO. 10: HURUMA	15,260,050.00
11	BILL NO. 11: KAWANGWARE	22,162,600.00
12	BILL NO. 12: KIBERA	20,308,000.00
13	BILL NO. 13: CANAAN	11,051,000.00
TOTAL		945,451,315.00
Add a sum equal to 5% to cover for financial contingencies		42,272,565.75
SUB TOTAL		887,723,680.75
ADD 16% VAT		142,035,820.92
TENDER SUM TO THE FORM OF BID		1,029,769,701.67
AMOUNT IN WORDS		
Name of Bidder..... <u>INTERWAYS WORKS LIMITED</u>		
Physical Address..... <u>SPATS RD. OPP. BASIN CHURCH, KILILASH</u>		
Building..... <u>KIPRO CENTRE</u>		
Town..... <u>NAIROBI</u>		
Name of Authorised Representative of Bidder..... <u>JAMES NGARACHU MUGO</u>		
* Signature..... <u>[Signature]</u>		
Date..... <u>21/10/2015</u>		
Official Stamp/Company Seal		

APPENDIX 7: MAP OF PROJECT AREA

